

THE COMPLETE WORKS OF

# ARISTOTLE

THE REVISED OXFORD  
TRANSLATION

ONE VOLUME  
DIGITAL EDITION

*Edited by*

JONATHAN BARNES



PRINCETON / BOLLINGEN SERIES LXXI • 2

## **BOLLINGEN SERIES LXXI • 2**



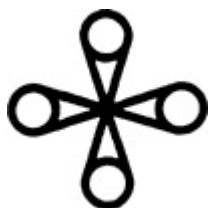
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VOLUME ONE AND TWO



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## PREFACE

BENJAMIN JOWETT published his translation of Aristotle's *Politics* in 1885, and he nursed the desire to see the whole of Aristotle done into English. In his will he left the perpetual copyright on his writings to Balliol College, desiring that any royalties should be invested and that the income from the investment should be applied "in the first place to the improvement or correction" of his own books, and "secondly to the making of New Translations or Editions of Greek Authors." In a codicil to the will, appended less than a month before his death, he expressed the hope that "the translation of Aristotle may be finished as soon as possible."

The Governing Body of Balliol duly acted on Jowett's wish: J. A. Smith, then a Fellow of Balliol and later Waynflete Professor of Moral and Metaphysical Philosophy, and W. D. Ross, a Fellow of Oriel College, were appointed as general editors to supervise the project of translating all of Aristotle's writings into English; and the College came to an agreement with the Delegates of the Clarendon Press for the publication of the work. The first volume of what came to be known as The Oxford Translation of Aristotle appeared in 1908. The work continued under the joint guidance of Smith and Ross, and later under Ross's sole editorship. By 1930, with the publication of the eleventh volume, the whole of the standard *corpus aristotelicum* had been put into English. In 1954 Ross added a twelfth volume, of selected fragments, and thus completed the task begun almost half a century earlier.

The translators whom Smith and Ross collected together included the most eminent English Aristotelians of the age; and the translations reached a remarkable standard of scholarship and fidelity to the text. But no translation is perfect, and all translations date: in 1976, the Jowett Trustees, in whom the copyright of the Translation lies, determined to commission a revision of the entire text. The Oxford Translation was to remain in substance its original self; but alterations were to be made, where advisable, in the light of recent scholarship and with the requirements of modern readers in mind.

The present volumes thus contain a revised Oxford Translation: in all but three treatises, the original versions have been conserved with only mild emendations. (The three exceptions are the *Categories* and *de*

*Interpretatione*, where the translations of J. L. Ackrill have been substituted for those of E. M. Edgehill, and the *Posterior Analytics*, where G. R. G. Mure's version has been replaced by that of J. Barnes. The new translations have all been previously published in the Clarendon Aristotle series.) In addition, the new Translation contains the tenth book of the *History of Animals*, and the third book of the *Economics*, which were not done for the original Translation; and the present selection from the fragments of Aristotle's lost works includes a large number of passages which Ross did not translate.

In the original Translation, the amount and scope of annotation differed greatly from one volume to the next: some treatises carried virtually no footnotes, others (notably the biological writings) contained almost as much scholarly commentary as text—the work of Ogle on the *Parts of Animals* or of d'Arcy Thompson on the *History of Animals*, Beare's notes to *On Memory* or Joachim's to *On Indivisible Lines*, were major contributions to Aristotelian scholarship. Economy has demanded that in the revised Translation annotation be kept to a minimum; and all the learned notes of the original version have been omitted. While that omission represents a considerable impoverishment, it has reduced the work to a more manageable bulk, and at the same time it has given the constituent translations a greater uniformity of character. It might be added that the revision is thus closer to Jowett's own intentions than was the original Translation.

The revisions have been slight, more abundant in some treatises than in others but amounting, on the average, to some fifty alterations for each Bekker page of Greek. Those alterations can be roughly classified under four heads.

(i) A quantity of work has been done on the Greek text of Aristotle during the past half century: in many cases new and better texts are now available, and the reviser has from time to time emended the original Translation in the light of this research. (But he cannot claim to have made himself intimate with all the textual studies that recent scholarship has thrown up.) A standard text has been taken for each treatise, and the few departures from it, where they affect the sense, have been indicated in footnotes. On the whole, the reviser has been conservative, sometimes against his inclination.

(ii) There are occasional errors or infelicities of translation in the original version: these have been corrected insofar as they have been observed.

(iii) The English of the original Translation now seems in some

respects archaic in its vocabulary and in its syntax: no attempt has been made to impose a consistently modern style upon the translations, but where archaic English might mislead the modern reader, it has been replaced by more current idiom.

(iv) The fourth class of alterations accounts for the majority of changes made by the reviser. The original Translation is often paraphrastic: some of the translators used paraphrase freely and deliberately, attempting not so much to English Aristotle's Greek as to explain in their own words what he was intending, to convey—thus translation turns by slow degrees into exegesis. Others construed their task more narrowly, but even in their more modest versions expansive paraphrase from time to time intrudes. The revision does not pretend to eliminate paraphrase altogether (sometimes paraphrase is venial; nor is there any precise boundary between translation and paraphrase); but it does endeavor, especially in the logical and philosophical parts of the *corpus*, to replace the more blatantly exegetical passages of the original by something a little closer to Aristotle's text.

The general editors of the original Translation did not require from their translators any uniformity in the rendering of technical and semitechnical terms. Indeed, the translators themselves did not always strive for uniformity within a single treatise or a single book. Such uniformity is surely desirable; but to introduce it would have been a massive task, beyond the scope of this revision. Some effort has, however, been made to remove certain of the more capricious variations of translation (especially in the more philosophical of Aristotle's treatises).

Nor did the original translators try to mirror in their English style the style of Aristotle's Greek. For the most part, Aristotle is terse, compact, abrupt, his arguments condensed, his thought dense. For the most part, the Translation is flowing and expansive, set out in well-rounded periods and expressed in a language which is usually literary and sometimes orotund. To that extent the Translation produces a false impression of what it is like to read Aristotle in the original; and indeed it is very likely to give a misleading idea of the nature of Aristotle's philosophizing, making it seem more polished and finished than it actually is. In the reviser's opinion, Aristotle's sinewy Greek is best translated into correspondingly tough English; but to achieve that would demand a new translation, not a revision. No serious attempt has been made to alter the style of the original—a style which, it should be said, is in itself elegant enough and pleasing to read.

The reviser has been aided by several friends; and he would like to

acknowledge in particular the help of Mr. Gavin Lawrence and Mr. Donald Russell. He remains acutely conscious of the numerous imperfections that are left. Yet—as Aristotle himself would have put it—the work was laborious, and the reader must forgive the reviser for his errors and give him thanks for any improvements which he may chance to have effected.

*March 1981*

J. B.

## ACKNOWLEDGMENTS

THE TRANSLATIONS of the *Categories* and the *de Interpretatione* are reprinted here by permission of Professor J. L. Ackrill and Oxford University Press (© Oxford University Press, 1963); the translation of the *Posterior Analytics* is reprinted by permission of Oxford University Press (© Oxford University Press, 1975); the translation of the third book of the *Economics* is reprinted by permission of The Loeb Classical Library (William Heinemann and Harvard University Press); the translation of the fragments of the *Protrepticus* is based, with the author's generous permission, on the version by Professor Ingemar During.

## NOTE TO THE READER

THE TRADITIONAL *corpus aristotelicum* contains several works which were certainly or probably not written by Aristotle. A single asterisk against the title of a work indicates that its authenticity has been seriously doubted; a pair of asterisks indicates that its spuriousness has never been seriously contested. These asterisks appear both in the Table of Contents and on the title pages of the individual works concerned.

The title page of each work contains a reference to the edition of the Greek text against which the translation has been checked. References are by editor's name, series or publisher (OCT stands for Oxford Classical Texts), and place and date of publication. In those places where the translation deviates from the chosen text and prefers a different reading in the Greek, a footnote marks the fact and indicates which reading is preferred; such places are rare.

The numerals in brackets throughout the text key the translation to Immanuel Bekker's standard edition of the Greek text of Aristotle of 1831. References consist of a page number, a column letter, and a line number. Thus "1343<sup>a</sup>" marks column one of page 1343 of Bekker's edition; and the following "5," "10," "15," etc. stand against lines 5, 10, 15, etc. of that column of text. Bekker references of this type are found in most editions of Aristotle's works, and they are used by all scholars who write about Aristotle.

NOTE (1994): This is an unrevised reprint of the first edition; but a small number of typographical errors have been corrected. Many of these errors were generously communicated to the editor by Mr. M. W. Dunn, who recorded the translation for the blind.



# THE COMPLETE WORKS OF ARISTOTLE

# CATEGORIES\*\*

J. L. Ackrill

1 · When things have only a name in common and the definition of being [1<sup>a</sup>1] which corresponds to the name is different, they are called *homonymous*. Thus, for example, both a man and a picture are animals. These have only a name in common and the definition of being which corresponds to the name is different; for if one is to say what being an animal is for each of them, one will give two distinct definitions. [5]

When things have the name in common and the definition of being which corresponds to the name is the same, they are called *synonymous*. Thus, for example, both a man and an ox are animals. Each of these is called, by a common name, an animal, and the definition of being is also the same; for if one is to give the [10] definition of each—what being an animal is for each of them—one will give the same definition.

When things get their name from something, with a difference of ending, they are called *paronymous*. Thus, for example, the grammarian gets his name from grammar, the brave get theirs from bravery. [15]

2 · Of things that are said, some involve combination while others are said without combination. Examples of those involving combination are: man runs, man wins; and of those without combination: man, ox, runs, wins.

Of things there are: (a) some are *said of* a subject but are not *in* any subject. [20] For example, man is said of a subject, the individual man, but is not in any subject. (b) Some are in a subject but are not said of any subject. (By ‘in a subject’ I mean what is in something, not as a part, and cannot exist separately from what it is in.) [25] For example, the individual knowledge-of-grammar is in a subject, the soul, but is not said of any subject; and the individual white is in a subject, the body (for all colour is in a body), but is not said of any subject. (c) Some are both said of a subject and in a subject. For example, knowledge is in a subject, the soul, and is also [1<sup>b</sup>1] said of a subject, knowledge-of-grammar. (d) Some

are neither in a subject nor said of a subject, for example, the individual man or the individual horse—for nothing of [5] this sort is either in a subject or said of a subject. Things that are individual and numerically one are, without exception, not said of any subject, but there is nothing to prevent some of them from being in a subject—the individual knowledge-of-grammar is one of the things in a subject.

[10] **3** · Whenever one thing is predicated of another as of a subject, all things said of what is predicated will be said of the subject also. For example, man is predicated of the individual man, and animal of man; so animal will be predicated [15] of the individual man also—for the individual man is both a man and an animal.

The differentiae of genera which are different<sup>1</sup> and not subordinate one to the other are themselves different in kind. For example, animal and knowledge: footed, winged, aquatic, two-footed, are differentiae of animal, but none of these is a [20] differentia of knowledge; one sort of knowledge does not differ from another by being two-footed. However, there is nothing to prevent genera subordinate one to the other from having the same differentiae. For the higher are predicated of the genera below them, so that all differentiae of the predicated genus will be differentiae of the subject also.

[25] **4** · Of things said without any combination, each signifies either substance or quantity or qualification or a relative or where or when or being-in-a-position or having or doing or being-affected. To give a rough idea, examples of substance are man, horse; of quantity: four-foot, five-foot; of qualification: white, grammatical; of [2<sup>a</sup>1] a relative: double, half, larger; of where: in the Lyceum, in the market-place; of when: yesterday, last-year; of being-in-a-position: is-lying, is-sitting; of having: has-shoes-on, has-armour-on; of doing: cutting, burning; of being-affected: being-cut, being-burned.

[5] None of the above is said just by itself in any affirmation, but by the combination of these with one another an affirmation is produced. For every affirmation, it seems, is either true or false; but of things said without any [10] combination none is either true or false (e.g. man, white, runs, wins).

**5** · A *substance*—that which is called a substance most strictly,

primarily, and most of all—is that which is neither said of a subject nor in a subject, e.g. the [15] individual man or the individual horse. The species in which the things primarily called substances are, are called *secondary substances*, as also are the genera of these species. For example, the individual man belongs in a species, man, and animal is a genus of the species; so these—both man and animal—are called secondary substances.

It is clear from what has been said that if something is said of a subject both its [20] name and its definition are necessarily predicated of the subject. For example, man is said of a subject, the individual man, and the name is of course predicated (since you will be predicating man of the individual man), and also the definition of man [25] will be predicated of the individual man (since the individual man is also a man). Thus both the name and the definition will be predicated of the subject. But as for things which are in a subject, in most cases neither the name nor the definition is [30] predicated of the subject. In some cases there is nothing to prevent the name from being predicated of the subject, but it is impossible for the definition to be predicated. For example, white, which is in a subject (the body), is predicated of the subject; for a body is called white. But the definition of white will never be predicated of the body.

All the other things are either said of the primary substances as subjects or in [35] them as subjects. This is clear from an examination of cases. For example, animal is predicated of man and therefore also of the individual man; for were it predicated of none of the individual men it would not be predicated of man at all. Again, colour is [2<sup>b</sup>1] in body and therefore also in an individual body; for were it not in some individual body it would not be in body at all. Thus all the other things are either said of the primary substances as subjects or in them as subjects. So if the primary substances [5] did not exist it would be impossible for any of the other things to exist.<sup>2</sup>

Of the secondary substances the species is more a substance than the genus, since it is nearer to the primary substance. For if one is to say of the primary substance what it is, it will be more informative and apt to give the species than the [10] genus. For example, it would be more informative to say of the individual man that he is a man than that he is an animal (since the one is more distinctive of the individual man while the other is more general); and more informative to say of the individual tree that it is a tree than that it is a plant. Further, it is because the [15] primary substances are subjects for all the other things and all the other

things are predicated of them or are in them, that they are called substances most of all. But as the primary substances stand to the other things, so the species stands to the genus: the species is a subject for the genus (for the genera are predicated of the species but [20] the species are not predicated reciprocally of the genera). Hence for this reason too the species is more a substance than the genus.

But of the species themselves—those which are not genera—one is no more a substance than another: it is no more apt to say of the individual man that he is a man than to say of the individual horse that it is a horse. And similarly of the [25] primary substances one is no more a substance than another: the individual man is no more a substance than the individual ox.

It is reasonable that, after the primary substances, their species and genera should be the only other things called secondary substances. For only they, of things [30] predicated, reveal the primary substance. For if one is to say of the individual man what he is, it will be in place to give the species or the genus (though more informative to give man than animal); but to give any of the other things would be out of place—for example, to say white or runs or anything like that. So it is [35] reasonable that these should be the only other things called substances. Further, it is because the primary substances are subjects for everything else that they are called substances most strictly. But as the primary substances stand to everything else, so [3<sup>a</sup>1] the species and genera of the primary substances stand to all the rest: all the rest are predicated of these. For if you will call the individual man grammatical, then you will call both a man and an animal grammatical; and similarly in other cases. [5]

It is a characteristic common to every substance not to be in a subject. For a primary substance is neither said of a subject nor in a subject. And as for secondary [10] substances, it is obvious at once that they are not in a subject. For man is said of the individual man as subject but is not in a subject: man is not *in* the individual man. Similarly, animal also is said of the individual man as subject, but animal is not *in* [15] the individual man. Further, while there is nothing to prevent the name of what is in a subject from being sometimes predicated of the subject, it is impossible for the definition to be predicated. But the definition of the secondary substances, as well as the name, is predicated of the subject: you will predicate the definition of man of the [20] individual man, and also that of animal. No substance, therefore, is in a subject.

This is not, however, peculiar to substance, since the differentia also

is not in a subject. For footed and two-footed are said of man as subject but are not in a [25] subject; neither two-footed nor footed is *in* man. Moreover, the definition of the differentia is predicated of that of which the differentia is said. For example, if footed is said of man the definition of footed will also be predicated of man; for man is footed.

[30] We need not be disturbed by any fear that we may be forced to say that the parts of a substance, being in a subject (the whole substance), are not substances. For when we spoke of things *in a subject* we did not mean things belonging in something as *parts*.

It is a characteristic of substances and differentiae that all things called from [35] them are so called synonymously. For all the predicates from them are predicated either of the individuals or of the species. (For from a primary substance there is no predicate, since it is said of no subject; and as for secondary substances, the species is predicated of the individual, the genus both of the species and of the individual. [3<sup>b</sup>1] Similarly, differentiae too are predicated both of the species and of the individuals.) And the primary substances admit the definition of the species and of the genera, and the species admits that of the genus; for everything said of what is predicated [5] will be said of the subject also. Similarly, both the species and the individuals admit the definition of the differentiae. But synonymous things were precisely those with both the name in common and the same definition. Hence all the things called from substances and differentiae are so called synonymously.

[10] Every substance seems to signify a certain 'this'. As regards the primary substances, it is indisputably true that each of them signifies a certain 'this'; for the thing revealed is individual and numerically one. But as regards the secondary substances, though it appears from the form of the name—when one speaks of man [15] or animal—that a secondary substance likewise signifies a certain 'this', this is not really true; rather, it signifies a certain qualification—for the subject is not, as the primary substance is, one, but man and animal are said of many things. However, it does not signify simply a certain qualification, as white does. White signifies [20] nothing but a qualification, whereas the species and the genus mark off the qualification of substance—they signify substance of a certain qualification. (One draws a wider boundary with the genus than with the species, for in speaking of animal one takes in more than in speaking of man.)

Another characteristic of substances is that there is nothing contrary to them. For what would be contrary to a primary substance? For example, there is nothing [25] contrary to an individual man, nor yet is

there anything contrary to man or to animal. This, however, is not peculiar to substance but holds of many other things also, for example, of quantity. For there is nothing contrary to four-foot or to ten or to anything of this kind—unless someone were to say that many is contrary to few or [30] large to small; but still there is nothing contrary to any *definite* quantity.

Substance, it seems, does not admit of a more and a less. I do not mean that one substance is not more a substance than another (we have said that it is), but that [35] any given substance is not called more, or less, that which it is. For example, if this substance is a man, it will not be more a man or less a man either than itself or than another man. For one man is not more a man than another, as one pale thing is more [4<sup>a</sup>1] pale than another and one beautiful thing more beautiful than another. Again, a thing is called more, or less, such-and-such than itself; for example, the body that is pale is called more pale now than before, and the one that is hot is called more, or less, hot. Substance, however, is not spoken of thus. For a man is not called more a [5] man now than before, nor is anything else that is a substance. Thus substance does not admit of a more and a less.

It seems most distinctive of substance that what is numerically one and the [10] same is able to receive contraries. In no other case could one bring forward anything, numerically one, which is able to receive contraries. For example, a colour which is numerically one and the same will not be black and white, nor will numerically one and the same action be bad and good; and similarly with everything [15] else that is not substance. A substance, however, numerically one and the same, is able to receive contraries. For example, an individual man—one and the same—becomes pale at one time and dark at another, and hot and cold, and bad and [20] good.

Nothing like this is to be seen in any other case, unless perhaps someone might object and say that statements and beliefs are like this. For the same statement seems to be both true and false. Suppose, for example, that the statement that somebody is sitting is true; after he has got up this same statement will be false. [25] Similarly with beliefs. Suppose you believe truly that somebody is sitting; after he has got up you will believe falsely if you hold the same belief about him. However, even if we were to grant this, there is still a difference in the way contraries are received. For in the case of substances it is by themselves changing that they are [30] able to receive contraries. For what has become cold instead of hot, or dark instead of pale, or good instead of

bad, has changed (has altered); similarly in other cases too it is by itself undergoing change that each thing is able to receive contraries. Statements and beliefs, on the other hand, themselves remain completely [35] unchangeable in every way; it is because the *actual thing* changes that the contrary comes to belong to them. For the statement that somebody is sitting remains the same; it is because of a change in the actual thing that it comes to be true at one [4<sup>b</sup>1] time and false at another. Similarly with beliefs. Hence at least the *way* in which it is able to receive contraries—through a change in itself—would be distinctive of [5] substance, even if we were to grant that beliefs and statements are able to receive contraries. However, this is not true. For it is not because they themselves receive anything that statements and beliefs are said to be able to receive contraries, but because of what has happened to something else. For it is because the actual thing [10] exists or does not exist that the statement is said to be true or false, not because it is able itself to receive contraries. No statement, in fact, or belief is changed at all by anything. So, since nothing happens in them, they are not able to receive contraries. A substance, on the other hand, is said to be able to receive contraries because it [15] itself receives contraries. For it receives sickness and health, and paleness and darkness; and because it itself receives the various things of this kind it is said to be able to receive contraries. It is, therefore, distinctive of substance that what is numerically one and the same is able to receive contraries. This brings to an end our discussion of substance.

[20] **6** · Of quantities some are discrete, others continuous; and some are composed of parts which have position in relation to one another, others are not composed of parts which have position.

Discrete are number and language; continuous are lines, surfaces, bodies, and [25] also, besides these, time and place. For the parts of a number have no common boundary at which they join together. For example, if five is a part of ten the two fives do not join together at any common boundary but are separate; nor do the three and the seven join together at any common boundary. Nor could you ever in [30] the case of a number find a common boundary of its parts, but they are always separate. Hence number is one of the discrete quantities. Similarly, language also is one of the discrete quantities (that language is a quantity is evident, since it is measured by long and short syllables; I mean here language that is *spoken*). For its [35] parts do not join together at any



common boundary. For there is no common boundary at which the syllables join together, but each is separate in itself. A line, [5<sup>a</sup>1] on the other hand, is a continuous quantity. For it is possible to find a common boundary at which its parts join together, a point. And for a surface, a line; for the parts of a plane join together at some common boundary. Similarly in the case of a [5] body one could find a common boundary—a line or a surface—at which the parts of the body join together. Time also and place are of this kind. For present time joins on to both past time and future time. Place, again, is one of the continuous [10] quantities. For the parts of a body occupy some place, and they join together at a common boundary. So the parts of the place occupied by the various parts of the body, themselves join together at the same boundary at which the parts of the body do. Thus place also is a continuous quantity, since its parts join together at one common boundary.

[15] Further, some quantities are composed of parts which have position in relation to one another, others are not composed of parts which have position. For example, the parts of a line have position in relation to one another: each of them is situated somewhere, and you could distinguish them and say where each is situated in the [20] plane and which one of the other parts it joins on to. Similarly, the parts of a plane have some position here again: one could say where each is situated and which join on to one another. So, too, with the parts of a solid and the parts of a place. With a number, on the other hand, one could not observe that the parts have some position in relation to one another or are situated somewhere, nor see which of the parts join [25] on to one another. Nor with the parts of a time either; for none of the parts of a time endures, and how could what is not enduring have any position? Rather might you say that they have a certain *order* in that one part of a time is before and another after. Similarly with a number also, in that one is counted before two and two before [30] three; in this way they may have a certain order, but you would certainly not find position. And language similarly. For none of its parts endures, once it has been uttered it can no longer be recaptured; and so its parts cannot have position, seeing [35] that none of them endures. Some quantities then are composed of parts which have position, others are not composed of parts which have position.

Only these we have mentioned are called quantities strictly, all the others derivatively; for it is to these we look when we call the others quantities. For [5<sup>b</sup>1] example, we speak of a large amount of white because the *surface* is large, and an action or a change is called long

because the *time* is long. For it is not in its own right that each of these others is called a quantity. For example, if one is to say how long [5] an action is, one will determine this by the time, saying that it is a-year-long or something of that sort; and in saying how much white one will determine it by the surface—whatever the size of the surface one will say that the white too is that size. Thus only those we mentioned are called quantities strictly and in their own right, while nothing else is so in its own right but, if at all, derivatively. [10]

Next, a quantity has no contrary. In the case of definite quantities it is obvious that there is no contrary; there is, for example, no contrary to four-foot or five-foot or to a surface or anything like that. But might someone say that many is contrary [15] to few or large to small? None of these, however, is a quantity; they are relatives. For nothing is called large or small just in itself, but by reference to something else. For example, a mountain is called small yet a grain of millet large—because one is larger than other things of its kind while the other is smaller than other things of its kind. Thus the reference is to something else, since if a thing were called small or [20] large in itself the mountain would never be called small yet the grain of millet large. Again, we say that there are many people in the village but few in Athens—though there are many times more here than there; and that there are many in the house [25] but few in the theatre—though there are many more here than there. Further, ‘four-foot’, ‘five-foot’, and the like all signify a quantity, but ‘large’ or ‘small’ does not signify a quantity but rather a relative, since the large and the small are looked at in relation to something else. So it is clear that these are relatives.

Moreover, whether one counts them as quantities or does not, they have no [30] contrary. For how could there be any contrary to what cannot be grasped just in itself but only by reference to something else? Further, if large and small are to be contraries it will turn out that the same thing admits contraries at the same time, and that things are their own contraries. For the same thing turns out to be at the [35] same time both large and small—since in relation to this thing it is small but in relation to another this same thing is large; so the same thing turns out to be both large and small at the same time and thus to admit contraries at the same time. But [6<sup>a</sup>1] nothing seems to admit contraries at the same time. In the case of a substance, for example, while it seems to be able to receive contraries, yet it is certainly not at the same time ill and well nor is it at the same time pale and dark; nor does anything else admit contraries at the same time. It turns out also that things are their own [5]

contraries. For if large is contrary to small, and the same thing is at the same time large and small, a thing would be its own contrary. But it is impossible for a thing to be its own contrary. Large, therefore, is not contrary to small, nor many to few. So [10] that even if someone says that these belong not to relatives but to quantity, it will still have no contrary.

But it is most of all with regard to place that there seems to be contrariety of a quantity. For people regard up as contrary to down—meaning by ‘down’ the region [15] towards the centre—because the centre is at the greatest distance from the limits of the world. And they probably derive from these their definition of the other contraries also; for they define as contraries those things in the same genus which are most distant from one another.

A quantity does not seem to admit of a more and a less. Four-foot for example: [20] one thing is not more four-foot than another. Or take number: we do not speak of a three as more three than a five, nor of one three as more three than another three. Nor yet is one time called more a time than another. Nor is there a single one, among those we listed, as to which a more and a less is spoken of. Hence a quantity [25] does not admit of a more and a less.

Most distinctive of a quantity is its being called both equal and unequal. For each of the quantities we spoke of is called both equal and unequal. For example, a body is called both equal and unequal, and a number is called both equal and [30] unequal, and so is a time; so also with the others we spoke of, each is called both equal and unequal. But anything else—whatever is not a quantity—is certainly not, it would seem, called equal and unequal. For example, a condition is certainly not called equal and unequal, but, rather, similar; and white is certainly not equal and [35] unequal, but similar. Thus most distinctive of a quantity would be its being called both equal and unequal.

7 · We call *relatives* all such things as are said to be just what they are, *of* or *than* other things, or in some other way *in relation to* something else. For example, what is larger is called what it is *than* something else (it is called larger than something); and what is double is called what it is *of* something else (it is called [6b1] double of something); similarly with all other such cases. The following, too, and their like, are among relatives: state, condition, perception, knowledge, position. For each of these is called what it is (and not something different) *of* something else.

A [5] state is called a state of something, knowledge knowledge of something, position position of something, and the rest similarly. All things then are relative which are called just what they are, *of* or *than* something else—or in some other way *in relation to* something else. Thus a mountain is called large in relation to something else (the mountain is called large in relation to something); and what is similar is called similar *to* something; and the others of this kind are in the same way spoken [10] of in relation to something.

Lying, standing, and sitting are particular positions; position is a relative. To-be-lying, to-be-standing, or to-be-sitting are themselves not positions, but they get their names paronymously from the aforesaid positions.

There is contrariety in relatives, e.g. virtue is contrary to vice (and each of [15] them is relative), and knowledge to ignorance. But there is not a contrary to every relative; there is no contrary to what is double or treble or anything like that.

Relatives seem also to admit of a more and a less. For a thing is called more [20] similar and less similar, and more unequal and less unequal; and each of these is relative, since what is similar is called similar *to* something and what is unequal unequal *to* something. But not all admit of a more and less; for what is double, or [25] anything like that, is not called more double or less double.

All relatives are spoken of in relation to correlatives that reciprocate. For example, the slave is called slave of a master and the master is called master of a slave; the double double of a half, and the half half of a double; the larger larger [30] than a smaller, and the smaller smaller than a larger; and so for the rest too. Sometimes, however, there will be a verbal difference, of ending. Thus knowledge is called knowledge *of* what is knowable, and what is knowable knowable *by* knowledge; perception perception *of* the perceptible, and the perceptible perceptible [35] *by* perception.<sup>3</sup>

Sometimes, indeed, they will not seem to reciprocate—if a mistake is made and that in relation to which something is spoken of is not given properly. For example, if a wing is given as *of a bird*, *bird of a wing* does not reciprocate; for it has not been given properly in the first place as wing of a bird. For it is not as being a [7<sup>a</sup>1] bird that a wing is said to be of it, but as being a winged, since many things that are not birds have wings. Thus if it is given properly there is reciprocation; for example, a wing is wing of a winged and a winged is winged with a wing. [5]

It may sometimes be necessary even to invent names, if no name exists in relation to which a thing would be given properly. For example, if a rudder is given as *of a boat*, that is not to give it properly (for it is not as being a boat that a rudder is said to be of it, since there are boats which have not got rudders); and so there is [10] not reciprocation—a boat is not called boat of a rudder. But perhaps it would be given more properly if given thus, that a rudder is rudder of (or somehow else related to) a ‘ruddered’ (since there is no established name); and now there is reciprocation, if it is given properly—a ruddered is ruddered by a rudder. Similarly [15] in other cases. For example, a head would be more properly given as of a headed than as of an animal, because it is not as being an animal that a thing has a head, since many animals have not got a head. This is perhaps the easiest way to lay hold of things for which there are no established names—if names derived from the original relatives are assigned to their reciprocating correlatives, as in the above [20] case ‘winged’ was derived from ‘wing’ and ‘ruddered’ from ‘rudder’.

All relatives, then, are spoken of in relation to correlatives that reciprocate, *provided* they are properly given. For, of course, if a relative is given as related to some chance thing and not to just that thing in relation to which it is spoken of, [25] there is not reciprocation. I mean that even with relatives that are admittedly spoken of in relation to correlatives that reciprocate and for which names exist, none reciprocates if a relative is given as related to something accidental and not to just that thing in relation to which it is spoken of. For example, if a slave is given as of—not a master, but—a man or a biped or anything else like that, there is not [30] reciprocation; for it has not been given properly.

Again, if that in relation to which a thing is spoken of is properly given, then, when all the other things that are accidental are stripped off and that alone is left to which it was properly given as related, it will always be spoken of in relation to that. [35] For example, if a slave is spoken of in relation to a master, then, when everything accidental to a master is stripped off—like being a biped, capable of knowledge, a man—and there is left only being a master, a slave will always be spoken of in relation to that. For a slave is called slave of a master. On the other hand, if that in [7<sup>b</sup>1] relation to which a thing is spoken of is not properly given, then, when the other things are stripped off and that alone is left to which it was given as related, it will not be spoken of in relation to that. Suppose a slave is given as *of a man* and a wing [5] as *of a bird*, and strip off from man his being a master; a slave will no longer be spoken of in relation to a man, for if there is no master there is no slave either.

Similarly, strip off from bird its being winged; a wing will no longer be a relative, for if there is nothing winged neither will there be a wing of anything.

[10] One must therefore give as correlative whatever it is properly spoken of in relation to; and if a name already exists it is easy to give this, but if it does not it may be necessary to invent a name. When correlatives are given thus it is clear that all relatives will be spoken of in relation to correlatives that reciprocate.

[15] Relatives seem to be simultaneous by nature; and in most cases this is true. For there is at the same time a double and a half, and when there is a half there is a double, and when there is a slave there is a master; and similarly with the others. [20] Also, each carries the other to destruction; for if there is not a double there is not a half, and if there is not a half there is not a double. So too with other such cases.

Yet it does not seem to be true of all relatives that they are simultaneous by nature. For the knowable would seem to be prior to knowledge. For as a rule it is of [25] actual things already existing that we acquire knowledge; in few cases, if any, could one find knowledge coming into existence at the same time as what is knowable. Moreover, destruction of the knowable carries knowledge to destruction, but knowledge does not carry the knowable to destruction. For if there is not a knowable [30] there is not knowledge—there will no longer be anything for knowledge to be of—but if there is not knowledge there is nothing to prevent there being a knowable. Take, for example, the squaring of the circle, supposing it to be knowable; knowledge of it does not yet exist but the knowable itself exists. Again, if animal is destroyed there is no knowledge, but there may be many knowables.

[35] The case of perception is similar to this; for the perceptible seems to be prior to perception. For the destruction of the perceptible carries perception to destruction, but perception does not carry the perceptible to destruction. For perceptions are to do with body and in body, and if the perceptible is destroyed, body too is destroyed (since body is itself a perceptible), and if there is not body, perception too is [8<sup>a</sup>1] destroyed; hence the perceptible carries perception to destruction. But perception does not carry the perceptible. For if animal is destroyed perception is destroyed, but there will be something perceptible, such as body, hot, sweet, bitter, and all the [5] other perceptibles. Moreover, perception comes into existence at the same time as what is capable of perceiving—an animal and perception come into existence at the same time—but the perceptible exists even before perception exists; fire and

water and so on, of which an animal is itself made up, exist even before there exists an [10] animal at all, or perception. Hence the perceptible would seem to be prior to perception.

It is a problem whether (as one would think) *no* substance is spoken of as a relative, or whether this is possible with regard to some secondary substances. In the [15] case of primary substances it is true; neither wholes nor parts are spoken of in relation to anything. An individual man is not called someone's individual man, nor an individual ox someone's individual ox. Similarly with parts; an individual hand is not called someone's individual hand (but someone's hand), and an individual head [20] is not called someone's individual head (but someone's head). Similarly with secondary substances, at any rate most of them. For example, a man is not called someone's man nor an ox someone's ox nor a log someone's log (but it is called someone's property). With such cases, then, it is obvious that they are not relatives, [25] but with some secondary substances there is room for dispute. For example, a head is called someone's head and a hand is called someone's hand, and so on; so that these would seem to be relatives.

Now if the definition of relatives given above was adequate, it is either exceedingly difficult or impossible to reach the solution that no substance is spoken [30] of as a relative. But if it was not adequate, and if those things are relatives for which *being is the same as being somehow related to something*, then perhaps some answer may be found. The previous definition does, indeed, apply to all relatives, yet this—their being called what they are, of other things—is not what their being [35] relatives is.

It is clear from this that if someone knows any relative definitely he will also know definitely that in relation to which it is spoken of. This is obvious on the face of it. For if someone knows of a certain 'this' that it is a relative, and being for relatives is the same as being somehow related to something, he knows that also to which this [8<sup>b</sup>1] is somehow related. For if he does not in the least know that to which this is somehow related, neither will he know whether it is somehow related to something. The same point is clear also in particular cases. For example, if someone knows definitely of a certain 'this' that it is double he also, by the same token, knows [5] definitely what it is double of; for if he does not know it to be double anything definite neither does he know whether it is double at all. Similarly, if he knows of a certain 'this' that it is more beautiful, he must also, because of this, know definitely what it is more beautiful than. (He is not to know *indefinitely* that this is more [10] beautiful than an

inferior thing. For that sort of thing is supposition, not knowledge. For he will no longer strictly *know* that it is more beautiful than an inferior thing, since it may so happen that there is nothing inferior to it.) It is plain, therefore, that anyone who knows any relative definitely must know definitely that also in relation [15] to which it is spoken of.

But as for a head or a hand or any such substance, it is possible to know it—what it itself is—definitely, without necessarily knowing definitely that in relation to which it is spoken of. For whose this head is, or whose the hand, it is not [20] necessary<sup>4</sup> to know definitely. So these would not be relatives. And if they are not relatives it would be true to say that no substance is a relative.

It is perhaps hard to make firm statements on such questions without having examined them many times. Still, to have gone through the various difficulties is not unprofitable.

[25] **8** · By a *quality* I mean that in virtue of which things are said to be qualified somehow. But quality is one of the things spoken of in a number of ways.

One kind of quality let us call *states* and *conditions*. A state differs from a condition in being more stable and lasting longer. Such are the branches of [30] knowledge and the virtues. For knowledge seems to be something permanent and hard to change if one has even a moderate grasp of a branch of knowledge, unless a great change is brought about by illness or some other such thing. So also virtue; [35] justice, temperance, and the rest seem to be not easily changed. It is what are easily changed and quickly changing that we call conditions, e.g. hotness and chill and sickness and health and the like. For a man is in a certain condition in virtue of these but he changes quickly from hot to cold and from being healthy to being sick. [9a1] Similarly with the rest, unless indeed even one of these were eventually to become through length of time part of a man's nature and irremediable or exceedingly hard to change—and *then* one would perhaps call this a state. It is obvious that by a state [5] people do mean what is more lasting and harder to change. For those who lack full mastery of a branch of knowledge and are easily changed are not said to be in a state of knowledge, though they are of course in some condition, a better or a worse, in regard to that knowledge. Thus a state differs from a condition in that the one is easily changed while the other lasts longer and is harder to change.

[10] States are also conditions but conditions are not necessarily



states. For people in a state are, in virtue of this, also in some condition, but people in a condition are not in every case also in a state.

Another kind of quality is that in virtue of which we call people boxers or [15] runners or healthy or sickly—anything, in short, which they are called in virtue of a natural capacity or incapacity. For it is not because one is in some condition that one is called anything of this sort, but because one has a natural capacity for doing something easily or for being unaffected. For example, people are called boxers or [20] runners not because they are in some condition but because they have a natural capacity to do something easily; they are called healthy because they have a natural capacity not to be affected easily by what befalls them, and sickly because they have an incapacity to be unaffected. Similarly with the hard and the soft: the hard is so [25] called because it has a capacity not to be divided easily, the soft because it has an incapacity for this same thing.

A third kind of quality consists of *affective qualities* and *affections*. Examples of such are sweetness, bitterness, sourness, and all their kin, and also hotness and [30] coldness and paleness and darkness. That these are qualities is obvious, for things that possess them are said to be qualified in virtue of them. Thus honey because it possesses sweetness is called sweet, and a body pale because it possesses paleness, and similarly with the others. They are called *affective* qualities not because the things that possess them have themselves been affected somehow—for honey is not [9<sup>b</sup>1] called sweet because it has been affected somehow nor is any other such thing. Similarly, hotness and coldness are not called affective qualities because the things that possess them have themselves been affected somehow, but it is because each of [5] the qualities mentioned is productive of an affection of the senses that they are called affective qualities. For sweetness produces a certain affection of taste, hotness one of touch, and the rest likewise.

Paleness and darkness, however, and other colourings are not called affective [10] qualities in the same way as those just mentioned, but because they themselves have been brought about by an affection. That many changes of colour do come about through an affection is clear; when ashamed one goes red, when frightened one turns pale, and so on. And so if somebody suffers by nature from some such [15] affection it is reasonable that he should have the corresponding colouring. For the very same bodily condition which occurs now when one is ashamed might occur also in virtue of a man's natural make-up, so that the corresponding colouring too would come about by nature.

When such circumstances have their origin in affections that are hard to [20] change and permanent they are called qualities. For if pallor or darkness have come about in the natural make-up they are called qualities (for in virtue of them we are said to be qualified); and if pallor or darkness have resulted from long illness or from sunburn, and do not easily give way—or even last for a lifetime—these too are [25] called qualities (since, as before, in virtue of them we are said to be qualified). But those that result from something that easily disperses and quickly gives way are called affections; for people are not, in virtue of them, said to be qualified somehow. Thus a man who reddens through shame is not called ruddy, nor one who pales in [30] fright pallid; rather he is said to have been affected somehow. Hence such things are called affections but not qualities.

Similarly with regard to the soul also we speak of affective qualities and affections. Those which are present right from birth as a result of certain affections are called qualities, for example, madness and irascibility and the like; for in virtue [10<sup>a</sup>1] of these people are said to be qualified, being called irascible and mad. Similarly with any aberrations that are not natural but result from some other circumstances, and are hard to get rid of or even completely unchangeable; such things, too, are [5] qualities, for in virtue of them people are said to be qualified. But those which result from things that quickly subside are called affections, e.g. if a man in distress is rather bad-tempered; for the man who in such an affection is rather bad-tempered is not said to be bad-tempered, but rather he is said to have been affected somehow. [10] Hence such things are called affections but not qualities.

A fourth kind of quality is shape and the external form of each thing, and in addition straightness and curvedness and anything like these. For in virtue of each of these a thing is said to be qualified somehow; because it is a triangle or square it is [15] said to be qualified somehow, and because it is straight or curved. And in virtue of its form each thing is said to be qualified somehow.

‘Rare’ and ‘dense’ and ‘rough’ and ‘smooth’ might be thought to signify a qualification; they seem, however, to be foreign to the classification of qualifications. [20] It seems rather to be a certain position of the parts that each of them reveals. For a thing is dense because its parts are close together, rare because they are separated from one another; smooth because its parts lie somehow on a straight line, rough because some stick up above others.

[25] Perhaps some other manner of quality might come to light, but

we have made a pretty complete list of those most spoken of.

These, then, that we have mentioned are *qualities*, while things called paronymously because of these or called in some other way from them are *qualified*. Now in most cases, indeed in practically all, things are called paronymously, [30] as the pale man from paleness, the grammatical from grammar, the just from justice, and so on. But in some cases, because there are no names for the qualities, it is impossible for things to be called paronymously from them. For example, the runner or the boxer, so called in virtue of a natural capacity, is not [10<sup>b</sup>1] called paronymously from any quality; for there are no names for the capacities in virtue of which these men are said to be qualified—as there *are* for the branches of knowledge in virtue of which men are called boxers or wrestlers with reference to their condition (for we speak of boxing and of wrestling as branches of knowledge, [5] and it is paronymously from them that those in the condition are said to be qualified). Sometimes, however, even when there is a name for a quality, that which is said to be qualified in virtue of it is not so called paronymously. For example, the good man is so called from virtue, since it is because he has virtue that he is called good; but he is not called paronymously from virtue. This sort of case is, however, [10] rare. Things then that are called paronymously from the qualities we mentioned, or called from them in some other way, are said to be qualified.

There is contrariety in regard to qualification. For example, justice is contrary to injustice and whiteness to blackness, and so on; also things said to be qualified in [15] virtue of them—the unjust to the just and the white to the black. But this is not so in all cases; for there is no contrary to red or yellow or such colours though they are qualifications.

Further, if one of a pair of contraries is a qualification, the other too will be a qualification. This is clear if one examines the other predicates. For example, if justice is contrary to injustice and justice is a qualification, then injustice too is a [20] qualification. For none of the other predicates fits injustice, neither quantity nor relative nor where nor in fact any other such predicate except qualification. Similarly with the other contraries that involve qualification. [25]

Qualifications admit of a more and a less; for one thing is called more pale or less pale than another, and more just than another. Moreover, it itself sustains increase (for what is pale can still become paler)—not in all cases though, but in most. It might be questioned whether one justice is called more a justice than [30] another, and similarly for the other conditions. For some people dispute about such cases. They utterly deny

that one justice is called more or less a justice than another, or one health more or less a health, though they say that one person has health less than another, justice less than another, and similarly with grammar and the other [11<sup>a</sup>1] conditions. At any rate things spoken of in virtue of these unquestionably admit of a more and a less: one man is called more grammatical than another, juster, healthier, and so on.

Triangle and square do not seem to admit of a more, nor does any other shape. [5] For things which admit the definition of triangle or circle are all equally triangles or circles, while of things which do not admit it none will be called *more that* than another—a square is not more a circle than an oblong is, for neither admits the [10] definition of circle. In short, unless both admit the definition of what is under discussion neither will be called more than the other. Thus not all qualifications admit of a more and a less.

Nothing so far mentioned is distinctive of quality, but it is in virtue of qualities [15] only that things are called *similar* and *dissimilar*; a thing is not similar to another in virtue of anything but that in virtue of which it is qualified. So it would be distinctive of quality that a thing is called similar or dissimilar in virtue of it.

We should not be disturbed lest someone may say that though we proposed to [20] discuss quality we are counting in many relatives (since states and conditions are relatives). For in pretty well all such cases the genera are spoken of in relation to something, but none of the particular cases is. For knowledge, a genus, is called just [25] what it is, of something else (it is called knowledge of something); but none of the particular cases is called just what it is, of something else. For example, grammar is not called grammar of something nor music music of something. If at all it is in virtue of the genus that these too are spoken of in relation to something: grammar is called knowledge of something (not grammar of something) and music knowledge [30] of something (not music of something). Thus the particular cases are not relatives. But it is with the particular cases that we are said to be qualified, for it is these which we possess (it is because we have some particular knowledge that we are called knowledgeable). Hence these—the particular cases, in virtue of which we are [35] on occasion said to be qualified—would indeed be qualities; and these are not relatives.

Moreover, if the same thing really is a qualification and a relative there is nothing absurd in its being counted in both the genera.

[11<sup>b</sup>1] 9 · Doing and being-affected admit of contrariety and of a more and a less. For heating is contrary to cooling, and being heated to being cooled, and being pleased to being pained; so they admit of contrariety. And of a more and a less also. [5] For it is possible to heat more and less, and to be heated more and less, and to be pained more and less; hence doing and being-affected admit of a more and a less.<sup>5</sup>

. . . . .

[10] [So much, then, is said about these; and about being-in-a-position too it has been remarked, in the discussion of relatives, that it is spoken of paronymously from the positions. About the rest, when and where and having, owing to their obviousness nothing further is said about them than what was said at the beginning, that having is signified by ‘having-shoes-on’, ‘having-armour-on’, where by, for example, ‘in the Lyceum’—and all the other things that were said about them.]

[15] 10 · [About the proposed genera, then, enough has been said; but something must be said about opposites and the various ways in which things are customarily opposed.]

Things are said to be opposed to one another in four ways: as relatives or as contraries or as privation and possession or as affirmation and negation. Examples [20] of things thus opposed (to give a rough idea) are: as relatives, the double and the half; as contraries, the good and the bad; as privation and possession, blindness and sight; as affirmation and negation, he is sitting—he is not sitting.

Things opposed as *relatives* are called just what they are, *of* their opposites or [25] in some other way *in relation to* them. For example, the double is called just what it is (double) *of* the half. Again, knowledge and the knowable are opposed as relatives, and knowledge is called just what it is, *of* the knowable, and the knowable too is [30] called just what it is, in relation to its opposite, knowledge; for the knowable is called knowable *by* something—by knowledge. Thus things opposed as relatives are called just what they are, *of* their opposites or in some other way *in relation to* one another.

Things opposed as *contraries*, however, are never called just what they are, in [35] relation to one another, though they are called *contraries of* one another. For the good is not called *good of* the bad, but the contrary of it; and the white not *white of* the black, but its contrary. Thus these

oppositions differ from one another.

[12<sup>a</sup>1] If contraries are such that it is necessary for one or the other of them to belong to the things they naturally occur in or are predicated of, there is nothing intermediate between them. For example, sickness and health naturally occur in [5] animals' bodies and it is indeed necessary for one or the other to belong to an animal's body, either sickness or health; again, odd and even are predicated of numbers, and it is indeed necessary for one or the other to belong to a number, either odd or even. And between these there is certainly nothing intermediate—between sickness and health or odd and even. But if it is not necessary for one or the [10] other to belong, there is something intermediate between them. For example, black and white naturally occur in bodies, but it is not *necessary* for one or the other of them to belong to a body (for not every body is either white or black); again, bad and good are predicated both of men and of many other things, but it is not [15] necessary for one or the other of them to belong to those things they are predicated of (for not all are either bad or good). And between these there is certainly something intermediate—between white and black are grey, yellow and all other colours, and between the bad and the good the neither bad nor good. In some cases [20] there exist names for the intermediates, as with grey and yellow between white and black; in some, however, it is not easy to find a name for the intermediate, but it is by the negation of each of the extremes that the intermediate is marked off, as with the neither good nor bad and neither just nor unjust. [25]

*Privation* and *possession* are spoken of in connexion with the same thing, for example sight and blindness in connexion with the eye. To generalize, each of them is spoken of in connexion with whatever the possession naturally occurs in. We say that anything capable of receiving a possession is deprived of it when it is entirely absent from that which naturally has it, at the time when it is natural for it to have [30] it. For it is not what has not teeth that we call toothless, or what has not sight blind, but what has not got them at the time when it is natural for it to have them. For some things from birth have neither sight nor teeth yet are not called toothless or blind.

Being deprived and possessing are not privation and possession. For sight is a [35] possession and blindness a privation, but having sight is not sight nor is being blind blindness. For blindness is a particular privation but being blind is being deprived, not a privation. Moreover, if blindness were the same as being blind both would be [40] predicated of the same thing. But though a man is called blind a man is certainly not

called blindness. These do, however, seem to be opposed—being deprived and [12<sup>b</sup>1] having a possession—as privation and possession are. For the manner of opposition is the same. For as blindness is opposed to sight so also is being blind opposed to having sight. (Nor is what underlies an affirmation or negation itself an affirmation [5] or negation. For an affirmation is an affirmative statement and a negation a negative statement, whereas none of the things underlying an affirmation or negation is a statement. These are, however, said to be opposed to one another as [10] affirmation and negation are; for in these cases, too, the manner of opposition is the same. For in the way an affirmation is opposed to a negation, for example ‘he is sitting’—‘he is not sitting’, so are opposed also the actual things underlying each, his [15] sitting—his not sitting.)

That privation and possession are not opposed as relatives is plain. For neither is called just what it is, of its opposite. Sight is not sight of blindness nor is it spoken of in any other way in relation to it; nor would one call blindness blindness of [20] sight—blindness is called privation of sight but is not called blindness of sight. Moreover, all relatives are spoken of in relation to correlatives that reciprocate, so that with blindness, too, if it were a relative, that in relation to which it is spoken of would reciprocate; but it does not reciprocate, since sight is not called sight of [25] blindness.

Nor are cases of privation and possession opposed as contraries, as is clear from the following. With contraries between which there is nothing intermediate it is necessary for one or the other of them always to belong to the things they [30] naturally occur in or are predicated of. For there was nothing intermediate in just those cases where it was necessary for one or the other to belong to a thing capable of receiving them, as with sickness and health and odd and even. But where there is something intermediate it is never necessary for one or the other to belong to everything: it is not necessary for everything to be white or black that is capable of [35] receiving them, or hot or cold, since something intermediate between these may perfectly well be present. Moreover, there was something intermediate in just those cases where it was not necessary for one or the other to belong to a thing capable of receiving them—except for things to which the one belongs by nature, as being hot belongs to fire and being white to snow; and in these cases it is necessary for [40] definitely one or the other to belong, and not as chance has it. For it is not possible for fire to be cold or snow black. Thus it is not necessary for one or the other of them [13<sup>a</sup>1] to belong to everything

capable of receiving them, but only to things to which the one belongs by nature, and in these cases it must be definitely the one and not as chance has it.

But neither of these accounts is true of privation and possession. For it is not necessary for one or the other of them always to belong to a thing capable of [5] receiving them, since if it is not yet natural for something to have sight it is not said either to be blind or to have sight; so that these would not be contraries of the sort that have nothing intermediate between them. Nor, however, of the sort that do have something intermediate between them. For it is necessary at some time for one or the other of them to belong to everything capable of receiving them. For when [10] once it is natural for something to have sight then it will be said either to be blind or to have sight—not definitely one or the other of these but as chance has it, since it is not necessary either for it to be blind or for it to have sight, but as chance has it. But with contraries which have something intermediate between them we said it was never necessary for one or the other to belong to everything, but to certain things, [15] and to them definitely the one. Hence it is clear that things opposed as privation and possession are not opposed in either of the ways contraries are.

Further, with contraries it is possible (while the thing capable of receiving [20] them is there) for change into one another to occur, unless the one belongs to something by nature as being hot does to fire. For it is possible for the healthy to fall sick and for the white to become black and the hot cold; and it is possible to become bad instead of good or good instead of bad. (For the bad man, if led into better ways [25] of living and talking, would progress, if only a little, towards being better. And if he once made even a little progress it is clear that he might either change completely or make really great progress. For however slight the progress he made to begin with, he becomes ever more easily changed towards virtue, so that he is likely to make still [30] more progress; and when this keeps happening it brings him over completely into the contrary state, provided time permits.) With privation and possession, on the other hand, it is impossible for change into one another to occur. For change occurs from possession to privation but from privation to possession it is impossible; one who has gone blind does not recover sight nor does a bald man regain his hair nor [35] does a toothless man grow teeth.

It is plain that things opposed as affirmation and negation are not opposed in any of the above ways; for only with them is it necessary always for one to be true [13<sup>b</sup>1] and the other one false. For with



contraries it is not necessary always for one to be true and the other false, nor with relatives nor with possession and privation. For [5] example, health and sickness are contraries, and neither is either true or false; similarly, the double and the half are opposed as relatives, and neither of them is either true or false; nor are cases of possession and privation, such as sight and blindness. Nothing, in fact, that is said without combination is either true or false; [10] and all the above *are* said without combination.

It might, indeed, very well seem that the same sort of thing does occur in the case of contraries said *with* combination, ‘Socrates is well’ being contrary to ‘Socrates is sick’. Yet not even with these is it necessary always for one to be true [15] and the other false. For if Socrates exists one will be true and one false, but if he does not both will be false; neither ‘Socrates is sick’ nor ‘Socrates is well’ will be true if Socrates himself does not exist at all. As for possession and privation, if he does [20] not exist at all neither is true, while not always one or the other is true if he does. For ‘Socrates has sight’ is opposed to ‘Socrates is blind’ as possession to privation; and if he exists it is not necessary for one or the other to be true or false (since until the time when it is natural for him to have it both are false), while if Socrates does not [25] exist at all then again both are false, both ‘he has sight’ and ‘he is blind’. But with an affirmation and negation one will always be false and the other true whether he exists or not. For take ‘Socrates is sick’ and ‘Socrates is not sick’: if he exists it is [30] clear that one or the other of them will be true or false, and equally if he does not; for if he does not exist ‘he is sick’ is false but ‘he is not sick’ true. Thus it would be distinctive of these alone—opposed affirmations and negations—that always one or [35] the other of them is true or false.

**11** · What is contrary to a good thing is necessarily bad; this is clear by induction from cases—health and sickness, justice and injustice, courage and [14<sup>a</sup>1] cowardice, and so on with the rest. But what is contrary to a bad thing is sometimes good but sometimes bad. For excess is contrary to deficiency, which is bad, and is itself bad; yet moderation as well is contrary to both, and it is good. However, though this sort of thing may be seen in a few cases, in most cases what is contrary [5] to a bad thing is always a good.

With contraries it is not necessary if one exists for the other to exist too. For if everyone were well health would exist but not sickness, and if

everything were white whiteness would exist but not blackness. Further, if Socrates's being well is contrary [10] to Socrates's being sick, and it is not possible for both to hold at the same time of the same person, it would not be possible if one of the contraries existed for the other to exist too; if Socrates's being well existed Socrates's being sick would not.

It is clearly the nature of contraries to belong to the same thing (the same [15] either in species or in genus)—sickness and health in an animal's body, but whiteness and blackness in a body simply, and justice and injustice in a soul.

All contraries must either be in the same genus or in contrary genera, or be [20] themselves genera. For white and black are in the same genus (since colour is their genus), but justice and injustice are in contrary genera (since the genus of one is virtue, of the other vice), while good and bad are not in a genus but are themselves [25] actually genera of certain things.

**12** · One thing is called prior to another in four ways. First and most strictly, in respect of time, as when one thing is called older or more ancient than another; for it is because the time is longer that it is called either older or more ancient. [30] Secondly, what does not reciprocate as to implication of existence. For example, one is prior to two because if there are two it follows at once that there is one whereas if there is one there are not necessarily two, so that the implication of the other's existence does not hold reciprocally from one; and that from which the implication [35] of existence does not hold reciprocally is thought to be prior. Thirdly, a thing is called prior in respect of some order, as with sciences and speeches. For in the demonstrative sciences there is a prior and posterior in order, for the elements are [14b1] prior in order to the constructions (and in grammar the elements are prior to the syllables); likewise with speeches, for the introduction is prior in order to the exposition. Further, besides the ways mentioned, what is better and more valued is [5] thought to be prior by nature: ordinary people commonly say of those they specially value and love that they 'have priority'. This fourth way is perhaps the least proper.

There are, then, this many ways of speaking of the prior. There would seem, [10] however, to be another manner of priority besides those mentioned. For of things which reciprocate as to implication of existence, that which is in some way the cause of the other's existence might reasonably be called prior by nature. And that there are some such cases

is clear. For there being a man reciprocates as to implication of [15] existence with the true statement about it: if there is a man, the statement whereby we say that there is a man is true, and reciprocally—since if the statement whereby we say that there is a man is true, there is a man. And whereas the true statement is [20] in no way the cause of the actual thing's existence, the actual thing does seem in some way the cause of the statement's being true: it is because the actual thing exists or does not that the statement is called true or false. Thus there are five ways in which one thing might be called prior to another.

13 · Those things are called *simultaneous* without qualification and most [25] strictly which come into being at the same time; for neither is prior or posterior. These are called simultaneous in respect of time. But those things are called *simultaneous by nature* which reciprocate as to implication of existence, provided that neither is in any way the cause of the other's existence, e.g. the double and the [30] half. These reciprocate, since if there is a double there is a half and if there is a half there is a double, but neither is the cause of the other's existence. Also, co-ordinate species of the same genus are called simultaneous by nature. It is those resulting from the same division that are called co-ordinate, e.g. bird and beast and fish. For [35] these are of the same genus and co-ordinate, since animal is divided into these—into bird and beast and fish. And none of them is prior or posterior, but things of this kind are thought to be simultaneous by nature. (Each of these might itself be [15<sup>a</sup>1] further divided into species—I mean beast and bird and fish). So those things resulting from the same division of the same genus will also be simultaneous by nature. Genera, however, are always prior to species since they do not reciprocate as [5] to implication of existence; e.g. if there is a fish there is an animal, but if there is an animal there is not necessarily a fish. Thus we call simultaneous by nature those things which reciprocate as to implication of existence provided that neither is in any way the cause of the other's existence; and also co-ordinate species of the same [10] genus. And we call simultaneous without qualification things which come into being at the same time.

14 · There are six kinds of change: generation, destruction, increase, diminution, alteration, change of place. That the rest are distinct from one another [15] is obvious (for generation is not destruction, nor yet is increase or diminution,<sup>6</sup> nor is change of place; and similarly with the

others too), but there is a question about alteration—whether it is not perhaps necessary for what is altering to be altering in virtue of one of the other changes. However, this is not true. For in pretty well all the [20] affections, or most of them, we undergo alteration without partaking of any of the other changes. For what changes as to an affection does not necessarily increase or diminish—and likewise with the others. Thus alteration would be distinct from the [25] other changes. For if it were the same, a thing altering would, as such, have to be increasing too or diminishing, or one of the other changes would have to follow; but this is not necessary. Equally, a thing increasing—or undergoing some other change—would have to be altering. But there are things that increase without altering, as a square is increased by the addition of a gnomon but is not thereby [30] altered; similarly, too, with other such cases. Hence the changes are distinct from one another.

Change in general is contrary to staying the same. As for the particular kinds, [15<sup>b</sup>1] destruction is contrary to generation and diminution to increase, while change of place seems most opposed to staying in the same place—and perhaps to change towards the contrary place (upward change of place, for example, being opposed to [5] downward and downward to upward). As for the other change in our list, it is not easy to state what is contrary to it. There seems to be nothing contrary, unless here too one were to oppose staying the same in qualification or change towards the contrary qualification (just as with change of place we had staying in the same [10] place or change towards the contrary place). For alteration is change in qualification. Thus to change in qualification is opposed staying the same in qualification or change towards the contrary qualification (becoming white, for example, being [15] opposed to becoming black). For a thing alters through the occurrence of change towards contrary qualifications.

**15** · *Having* is spoken of in a number of ways: having as a state and condition or some other quality (we are said to have knowledge and virtue); or as a [20] quantity, like the height someone may have (he is said to have a height of five feet or six feet); or as things on the body, like a cloak or tunic; or as on a part, like a ring on a hand; or as a part, like a hand or foot; or as in a container, as with the measure of [25] wheat or the jar of wine (for the jar is said to have wine, and the measure wheat, so these are said to have as in a container); or as a possession (for we are said to have a house and a field). One is also said to have a wife, and a

wife a husband, but this seems to be a very strange way of 'having', since by 'having a wife' we signify [30] nothing other than that he is married to her. Some further ways of having might perhaps come to light, but we have made a pretty complete enumeration of those commonly spoken of.

**\*\*TEXT:** L. Minio-Paluello, OCT, Oxford, 1956, 2nd ed.

<sup>1</sup>Read τῶν ἐτέρων γενῶν.

<sup>2</sup>The Oxford text continues: ‘For all the other things are either said of these as subjects or in them as subjects; so that if the primary substances did not exist, it would be impossible for any of the other things to exist.’ Most scholars excise those sentences.

<sup>3</sup>The function performed in English by “of” and “by” is performed in Greek by the genitive and dative cases, which have different endings.

<sup>4</sup>Read οὐκ ἄναγκαῖόνά ἐστιν εἰδέναι. The received text says: ‘. . . it is not possible to know definitely.’

<sup>5</sup>Aristotle’s discussion of the categories ends here, in an unfinished state: the following passage in square brackets was added by an ancient editor in order to link [Chapters 1–9](#) to [Chapters 10–14](#).

<sup>6</sup>Read ἡ αὕξησις ἢ ἡ μείωσις.

# DE INTERPRETATIONE\*\*

*J. L. Ackrill*

1 · First we must settle what a name is and what a verb is, and then what a [16<sup>a</sup>1] negation, an affirmation, a statement and a sentence<sup>1</sup> are.

Now spoken sounds are symbols of affections in the soul, and written marks symbols of spoken sounds. And just as written marks are not the same for all men, [5] neither are spoken sounds. But what these are in the first place signs of—affections of the soul—are the same for all; and what these affections are likenesses of—actual things—are also the same. These matters have been discussed in the work on the soul<sup>2</sup> and do not belong to the present subject.

Just as some thoughts in the soul are neither true nor false while some are [10] necessarily one or the other, so also with spoken sounds. For falsity and truth have to do with combination and separation. Thus names and verbs by themselves—for instance ‘man’ or ‘white’ when nothing further is added—are like the thoughts that [15] are without combination and separation; for so far they are neither true nor false. A sign of this is that even ‘goat-stag’ signifies something but not, as yet, anything true or false—unless ‘is’ or ‘is not’ is added (either simply or with reference to time).

2 · A *name* is a spoken sound significant by convention, without time, none of whose parts is significant in separation. For in ‘Whitfield’ the ‘field’ does not [20] signify anything in its own right, as it does in the phrase ‘white field’. Not that it is the same with complex names as with simple ones: in the latter the part is in no way significant, in the former it has some force but is not significant of anything in [25] separation, for example the ‘boat’ in ‘pirate-boat’.

I say ‘by convention’ because no name is a name naturally but only when it has become a symbol. Even inarticulate noises (of beasts, for instance) do indeed reveal something, yet none of them is a name.

‘Not man’ is not a name, nor is there any correct name for it. It is neither a [30] phrase nor a negation. Let us call it an indefinite name.

‘Philo’s’, ‘to-Philo’, and the like are not names but inflexions of names. The [16<sup>b</sup>1] same account holds for them as for names except that an inflexion when combined with ‘is’, ‘was’, or ‘will be’ is not true or false whereas a name always is. Take, for example, ‘Philo’s is’ or ‘Philo’s is not’; so far there is nothing either true or false. [5]

3 · A *verb* is what additionally signifies time, no part of it being significant separately; and it is a sign of things said of something else.

It additionally signifies time: ‘recovery’ is a name, but ‘recovers’ is a verb, because it additionally signifies something’s holding *now*. And it is always a sign of [10] what holds, that is, holds of a subject.

‘Does not recover’ and ‘does not ail’ I do not call verbs. For though they additionally signify time and always hold of something, yet there is a difference—for which there is no name. Let us call them indefinite verbs, because they hold [15] indifferently of anything whether existent or non-existent. Similarly, ‘recovered’ and ‘will-recover’ are not verbs but inflexions of verbs. They differ from the verb in that it additionally signifies the present time, they the time outside the present.

When uttered just by itself a verb is a name and signifies something—the [20] speaker arrests his thought and the hearer pauses—but it does not yet signify whether it is or not. For not even<sup>3</sup> ‘to be’ or ‘not to be’ is a sign of the actual thing (nor if you say simply ‘that which is’); for by itself it is nothing, but it additionally [25] signifies some combination, which cannot be thought of without the components.

4 · A *sentence* is a significant spoken sound some part of which is significant in separation—as an expression, not as an affirmation.

I mean that animal, for instance, signifies something, but not that it is or is not [30] (though it will be an affirmation or negation if something is added); the single syllables of ‘animal’, on the other hand, signify nothing. Nor is the ‘ice’ in ‘mice’ significant; here it is simply a spoken sound. In double words, as we said, a part does signify, but not in its own right.

[17<sup>a</sup>1] Every sentence is significant (not as a tool but, as we said, by convention), but not every sentence is a statement-making sentence, but only those in which there is truth or falsity. There is not truth or falsity in



all sentences: a prayer is a sentence but is neither true or false. The present investigation deals with the statement [5] making sentence; the others we can dismiss, since consideration of them belongs rather to the study of rhetoric or poetry.

5 · The first single statement-making sentence is the affirmation, next is the negation. The others are single in virtue of a connective.

[10] Every statement-making sentence must contain a verb or an inflexion of a verb. For even the definition of man is not yet a statement-making sentence—unless ‘is’ or ‘will be’ or ‘was’ or something of this sort is added. (To explain why ‘two-footed land animal’ is one thing and not many belongs to a different inquiry; [15] certainly it will not be one simply through being said all together.)

A single statement-making sentence is either one that reveals a single thing or one that is single in virtue of a connective. There are more than one if more things than one are revealed or if connectives are lacking.

(Let us call a name or a verb simply an expression, since by saying it one cannot reveal anything by one’s utterance in such a way as to be making a statement, whether one is answering a question or speaking spontaneously.)

Of these the one is a simple statement, affirming or denying something of [20] something, the other is compounded of simple statements and is a kind of composite sentence. The simple statement is a significant spoken sound about whether something does or does not hold (in one of the divisions of time).

6 · An *affirmation* is a statement affirming something of something, a [25] *negation* is a statement denying something of something.

Now it is possible to state of what does hold that it does not hold, of what does not hold that it does hold, of what does hold that it does hold, and of what does not hold that it does not hold. Similarly for times outside the present. So it must be [30] possible to deny whatever anyone has affirmed, and to affirm whatever anyone has denied. Thus it is clear that for every affirmation there is an opposite negation, and for every negation an opposite affirmation. Let us call an affirmation and a negation which are opposite a *contradiction*. I speak of statements as opposite when they affirm and deny the same thing of the same thing—

not homonymously, [35] together with all other such conditions that we add to counter the troublesome objections of sophists.

7 · Now of actual things some are universal, others particular (I call universal that which is by its nature predicated of a number of things, and particular that which is not; man, for instance, is a universal, Callias a particular). [17<sup>b</sup>1] So it must sometimes be of a universal that one states that something holds or does not, sometimes of a particular. Now if one states universally of a universal that something holds or does not, there will be contrary statements (examples of what I mean by ‘stating universally of a universal’ are: every man is white—no man is [5] white). But when one states something of a universal but not universally, the statements are not contrary (though what is being revealed may be contrary). Examples of what I mean by ‘stating of a universal not universally’ are: a man is white—a man is not white; man is a universal but it is not used universally in the [10] statement (for ‘every’ does not signify the universal but that it is taken universally). It is not true to predicate a universal universally of a subject, for there cannot be an affirmation in which a universal is predicated universally of a subject, for instance: [15] every man is every animal.

I call an affirmation and a negation *contradictory* opposites when what one signifies universally the other signifies not universally, e.g. every man is white—not every man is white, no man is white—some man is white. But I call the universal affirmation and the universal negation contrary opposites, e.g. every man is [20] just—no man is just. So these cannot be true together, but their opposites may both be true with respect to the same thing, e.g. not every man is white—some man is [25] white.

Of contradictory statements about a universal taken universally it is necessary for one or the other to be true or false; similarly if they are about particulars, e.g. Socrates is white—Socrates is not white. But if they are about a universal not taken [30] universally it is not always the case that one is true and the other false. For it is true to say at the same time that a man is white and that a man is not white, or that a man is noble and a man is not noble (for if base, then not noble; and if something is becoming something, then it is not that thing). This might seem absurd at first [35] sight, because ‘a man is not white’ looks as if it signifies also at the same time that no man is white; this, however, does not signify the same, nor does it necessarily hold at the same time.

It is evident that a single affirmation has a single negation. For the

negation must deny the same thing as the affirmation affirmed, and of the same thing, [18<sup>a</sup>1] whether a particular or a universal (taken either universally or not universally). I mean, for example, Socrates is white—Socrates is not white. But if something else is denied, or the same thing is denied of something else, that will not be the opposite statement, but a different one. The opposite of ‘every man is white’ is ‘not every man [5] is white’; of ‘some man is white’, ‘no man is white’; of ‘a man is white’, ‘a man is not white’.

We have explained, then: that a single affirmation has a single negation as its contradictory opposite, and which these are; that contrary statements are different, [10] and which these are; and that not all contradictory pairs are true or false, why this is, and when they are true or false.

8 · A single affirmation or negation is one which signifies one thing about one thing (whether about a universal taken universally or not), e.g. every man is [15] white—not every man is white, a man is white—a man is not white, no man is white—some man is white—assuming that ‘white’ signifies one thing.

But if one name is given to two things which do not make up one thing, there is not a single affirmation. Suppose, for example, that one gave the name cloak to [20] horse and man; ‘a cloak is white’ would not be a single affirmation. For to say this is no different from saying a horse and a man is white, and this is no different from saying a horse is white and a man is white. So if this last signifies more than one [25] thing and is more than one affirmation, clearly the first also signifies either more than one thing or nothing (because no man is a horse). Consequently it is not necessary, with these statements either, for one contradictory to be true and the other false.

9 · With regard to what is and what has been it is necessary for the affirmation or the negation to be true or false. And with universals taken universally [30] it is always necessary for one to be true and the other false, and with particulars too, as we have said; but with universals not spoken of universally it is not necessary. But with particulars that are going to be it is different.

For if every affirmation or negation is true or false it is necessary for [35] everything either to be the case or not to be the case. For if one

person says that something will be and another denies this same thing, it is clearly necessary for one of them to be saying what is true—if every affirmation is true or false; for both will not be the case together under such circumstances. For if it is true to say that it is white or is not white, it is necessary for it to be white or not white; and if it is white or [18<sup>b</sup>1] is not white, then it was true to say or deny this. If it is not the case it is false, if it is false it is not the case. So it is necessary for the affirmation or the negation to be true. It follows that nothing either is or is happening, or will be or will not be, by [5] chance or as chance has it, but everything of necessity and not as chance has it (since either he who says or he who denies is saying what is true). For otherwise it might equally well happen or not happen, since what is as chance has it is no more thus than not thus, nor will it be.

Again, if it is white now it was true to say earlier that it would be white; so that [10] it was always true to say of anything that has happened that it would be so. But if it was always true to say that it was so, or would be so, it could not not be so, or not be going to be so. But if something cannot not happen it is impossible for it not to happen; and if it is impossible for something not to happen it is necessary for it to happen. Everything that will be, therefore, happens necessarily. So nothing will [15] come about as chance has it or by chance; for if by chance, not of necessity.

Nor, however, can we say that *neither* is true—that it neither will be nor will not be so. For, firstly, though the affirmation is false the negation is not true, and though the negation is false the affirmation, on this view, is not true. Moreover, if it [20] is true to say that something is white and large,<sup>4</sup> both have to hold of it, and if true that they will hold tomorrow, they will have to hold tomorrow;<sup>5</sup> and if it neither will be nor will not be the case tomorrow, then there is no ‘as chance has it’. Take a sea-battle: it would *have* neither to happen nor not to happen. [25]

These and others like them are the absurdities that follow if it is necessary for every affirmation and negation either about universals spoken of universally or about particulars, that one of the opposites be true and the other false, and that nothing of what happens is as chance has it, but everything is and happens of [30] necessity. So there would be no need to deliberate or to take trouble (thinking that if we do this, this will happen, but if we do not, it will not). For there is nothing to prevent someone’s having said ten thousand years beforehand that this would be the case, and another’s having denied it; so that whichever of the two was true to say [35] then, will be the case of necessity. Nor, of course, does it

make any difference whether any people made the contradictory statements or not. For clearly this is how the actual things are even if someone did not affirm it and another deny it. For it is not because of the affirming or denying that it will be or will not be the case, nor is it a question of ten thousand years beforehand rather than any other time. Hence, [19<sup>a</sup>1] if in the whole of time the state of things was such that one or the other was true, it was necessary for this to happen, and for the state of things always to be such that everything that happens happens of necessity. For what anyone has truly said would [5] be the case cannot not happen; and of what happens it was always true to say that it would be the case.

But what if this is impossible? For we see that what will be has an origin both in deliberation and in action, and that, in general, in things that are not always [10] actual there is the possibility of being and of not being; here both possibilities are open, both being and not being, and consequently, both coming to be and not coming to be. Many things are obviously like this. For example, it is possible for this cloak to be cut up, and yet it will not be cut up but will wear out first. But equally, its [15] not being cut up is also possible, for it would not be the case that it wore out first unless its not being cut up were possible. So it is the same with all other events that are spoken of in terms of this kind of possibility. Clearly, therefore, not everything is or happens of necessity: some things happen as chance has it, and of the affirmation [20] and the negation neither is true rather than the other; with other things it is one rather than the other and as a rule, but still it is possible for the other to happen instead.

What is, necessarily is, when it is; and what is not, necessarily is not, when it is not. But not everything that is, necessarily is; and not everything that is not, [25] necessarily is not. For to say that everything that is, is of necessity, when it is, is not the same as saying unconditionally that it is of necessity. Similarly with what is not. And the same account holds for contradictories: everything necessarily is or is not, and will be or will not be; but one cannot divide and say that one or the other is [30] necessary. I mean, for example: it is necessary for there to be or not to be a sea-battle tomorrow; but it is not necessary for a sea-battle to take place tomorrow, nor for one not to take place—though it is necessary for one to take place or not to take place. So, since statements are true according to how the actual things are, it is clear that wherever these are such as to allow of contraries as chance has it, the [35] same necessarily holds for the contradictories also. This happens with things

that are not always so or are not always not so. With these it is necessary for one or the other of the contradictories to be true or false—not, however, this one or that one, but as chance has it; or for one to be true *rather* than the other, yet not *already* true or false.

[19<sup>b</sup>1] Clearly, then, it is not necessary that of every affirmation and opposite negation one should be true and the other false. For what holds for things that are does not hold for things that are not but may possibly be or not be; with these it is as we have said.

[5] **10** · Now an affirmation signifies something about something, this last being either a name or a ‘non-name’; and what is affirmed must be one thing about one thing. (Names and ‘non-names’ have already been discussed. For I do not call ‘not-man’ a name but an indefinite name—for what it signifies is in a way one thing, [10] but indefinite—just as I do not call ‘does not recover’ a verb). So every affirmation will contain either a name and a verb or an indefinite name and a verb. Without a verb there will be no affirmation or negation. ‘Is’, ‘will be’, ‘was’, ‘becomes’, and the like are verbs according to what we laid down, since they additionally signify time. So a first affirmation and negation are: ‘a man is’, ‘a man is not’; then, ‘a not-man [15] is’, ‘a not-man is not’; and again, ‘every man is’, ‘every man is not’, ‘every not-man is’, ‘every not-man is not’. For times other than the present the same account holds.

But when ‘is’ is predicated additionally as a third thing, there are two ways of expressing opposition. (I mean, for example, a man is just; here I say that the ‘is’ is a [20] third component—whether name or verb—in the affirmation.) Because of this there will here be *four* cases (two of which will be related, as to order of sequence, to the affirmation and negation in the way the privations are, while two will not). I mean that ‘is’ will be added either to ‘just’ or to ‘not-just’, and so, too, will the [25] negation. Thus there will be four cases. What is meant should be clear from the following diagram:

(b) ‘a man is ~~just~~ just’

This is the negation of (a).

(d) ‘a man is ~~not-just~~ just’

This is the negation of (c).

‘Is’ and ‘is not’ are here added to ‘just’ and to ‘not-just’. [30]

This then is how these are arranged (as is said in the *Analytics*).<sup>6</sup> Similarly, too, if the affirmation is about the name taken universally, e.g.:

(b) ~~'every man is just'~~ just'

(d) ~~'every man is just'~~ just'

Here, however, it is not in the same way possible for diagonal statements to be true [35] together, though it is possible sometimes.

These, then, are two pairs of opposites. There are others if something is added to 'not-man' as a sort of subject, thus:

(b) ~~'a not-man is just'~~ just'

(d) ~~'a not-man is not-just'~~ just'

There will not be any more oppositions than these. These last are a group on their [20<sup>a</sup>1] own separate from the others, in that they use 'not-man' as a name.

In cases where 'is' does not fit (e.g. with 'recovers' or 'walks') the verbs have the same effect when so placed as if 'is' were joined on, e.g.: [5]

(b) ~~'every man does not'~~ recover'

(d) ~~'every not-man does not'~~ recover'

Here one must not say 'not every man' but must add the 'not', the negation, to 'man'. For 'every' does not signify a universal, but that it is taken universally. This is clear from the following. [10]

(b) ~~'a man does not'~~ recover'

(d) ~~'a not-man does not'~~ recover'

For these differ from the previous ones in not being universal. So 'every' or 'no' additionally signify nothing other than that the affirmation or negation is about the [15] name taken universally. Everything else, therefore, must be added unchanged.

Since the contrary negation of 'every animal is just' is that which signifies that no animal is just, obviously these will never be true together or of the same thing, but their opposites sometimes will (e.g. not every animal is just, and some animal is [20] just). 'No man is just' follows from 'every man is not-just', while the opposite of this, 'not every man is not-just', follows from 'some man is just' (for there must be one). It is clear too that, with regard to particulars, if it is true, when asked something, to [25] deny it, it is true also to affirm something. For instance: Is Socrates wise? No. Then Socrates is not-wise. With universals, on the other hand, the corresponding affirmation is not true, but the negation is true. For instance: Is every man wise? No. Then every man is not-wise. This is false, but 'then not every man is wise' is [30] true; this is the opposite statement, the other is the contrary.

Names and verbs that are indefinite (and thereby opposite), such as ‘not-man’ and ‘not-just’, might be thought to be negations without a name and a verb. But they are not. For a negation must always be true or false; but one who says [35] not-man—without adding anything else—has no more said something true or false (indeed rather less so) than one who says man.

‘Every not-man is just’ does not signify the same as any of the above, nor does its opposite, ‘not every not-man is just’. But ‘every not-man is not-just’ signifies the same as ‘no not-man is just’.

[20<sup>b</sup>1] If names and verbs are transposed they still signify the same thing, e.g. a man is white—white is a man. For otherwise the same statement will have more than one negation, whereas we have shown that one has only one. For ‘a man is white’ has for [5] negation ‘a man is not white’, while ‘white is a man’—if it is not the same as ‘a man is white’—will have for negation either ‘white is not a not-man’ or ‘white is not a man’. But one of these is a negation of ‘white is a not-man’, the other of ‘a man is [10] white’. Thus there will be two negations of one statement. Clearly, then, if the name and the verb are transposed the same affirmation and negation are produced.

**11** · To affirm or deny one thing of many, or many of one, is not *one* [15] affirmation or negation unless the many things together make up some one thing. I do not call them one if there exists one name but there is not some one thing they make up. For example, man is perhaps an animal and two-footed and tame, yet these do make up some one thing; whereas white and man and walking do not make up one thing. So if someone affirms some one thing of these it is not one affirmation; [20] it is one spoken sound, but more than one affirmation. Similarly, if these are affirmed of one thing, that is more than one affirmation. So if a dialectical question demands as answer either the statement proposed or one side of a contradiction (the statement in fact being a side of one contradiction), there could not be *one* answer in these cases. For the question itself would not be one question, even if true. These [25] matters have been discussed in the *Topics*.<sup>7</sup> (It is also clear that ‘What is it?’ is not a dialectical question either; for the question must give one the choice of stating whichever side of the contradiction one wishes. The questioner must specify further and ask whether man is this or not this.) [30]

Of things predicated separately some can be predicated in combination, the whole predicate as one, others cannot. What then is the



difference? For of a man it is true to say two-footed separately and animal separately, and also to say them as one; similarly, white and man separately, and also as one. But if someone is good [35] and a cobbler it does not follow that he is a good cobbler. For if because each of two holds both together also hold, there will be many absurdities. For since of a man both 'white' and 'a man' are true, so also is the whole compound; again, if 'white' then the whole compound—so that he will be a white white man, and so on indefinitely. Or, again, we shall have 'walking white musician', and then these [21+1] compounded many times over. Further, if Socrates is a man and is Socrates he will be a man Socrates; and if two-footed and a man then a two-footed man. Clearly, then, one is led into many absurdities if one lays down without restriction that the [5] compounds come about. How the matter should be put we will now explain.

Of things predicated, and things they get predicated of, those which are said accidentally, either of the same thing or of one another, will not be one. For example, a man is white and musical, but 'white' and 'musical' are not one, because [10] they are both accidental to the same thing. And even if it is true to say that the white is musical, 'musical white' will still not be one thing; for it is accidentally that the musical is white, and so 'white musical' will not be one.<sup>8</sup> Nor, consequently, will the cobbler who is (without qualification) good, though an animal which is two-footed [15] will (since this is not accidental). Further, where one of the things is contained in the other, they will not be one. This is why 'white' is not repeated and why a man is not an animal man or a two-footed man; for two-footed and animal are contained in man.

It is true to speak of the particular case even without qualification; e.g. to say that some particular man is a man or some particular white man white. Not always, [20] though. When in what is added some opposite is contained from which a contradiction follows, it is not true but false (e.g. to call a dead man a man); but when no such opposite is contained, it is true. Or rather, when it is contained it is always not true, but when it is not, it is not always true. For example, Homer is [25] something (say, a poet). Does it follow that he is? No, for the 'is' is predicated accidentally of Homer; for it is because he is a poet, not in its own right, that the 'is' is predicated of Homer. Thus, where predicates *both* contain no contrariety if definitions are put instead of names *and* are predicated in their own right and not [30] accidentally, in these cases it will be true to speak of the particular thing even without qualification. It is not true to say that what is not, since it is thought about, is something

that is; for what is thought about it is not that it is, but that it is not.

12 · Having cleared up these points, we must consider how negations and [35] affirmations of the possible to be and the not possible are related to one another, and of the admissible and not admissible, and about the impossible and the necessary. For there are some puzzles here.

Suppose we say that of combined expressions those are the contradictory opposites of one another which are ordered by reference to 'to be' and 'not to be'. [21<sup>b</sup>1] For example, the negation of 'to be a man' is 'not to be a man', not 'to be a not-man', and the negation of 'to be a white man' is 'not to be a white man', not 'to be a not-white man' (otherwise, since of everything the affirmation or the negation [5] holds, the log will be truly said *to be a not-white man*). And if this is so, in cases where 'to be' is not added what is said instead of 'to be' will have the same effect. For example, the negation of 'a man walks' is not 'a not-man walks' but 'a man does not walk'; for there is no difference between saying that a man walks and saying that a man is walking.

[10] So then, if this holds good everywhere, the negation of 'possible to be' is 'possible not to be', and not 'not possible to be'. Yet it seems that for the same thing it is possible both to be and not to be. For everything capable of being cut or of walking is capable also of not walking or of not being cut. The reason is that [15] whatever is capable in this way is not always actual, so that the negation too will hold of it: what can walk is capable also of not walking, and what can be seen of not being seen. But it is impossible for opposite expressions to be true of the same thing. [20] This then is not the negation. For it follows from the above that either the same thing is said and denied of the same thing at the same time, or it is not by 'to be' and 'not to be' being added that affirmations and negations are produced. So if the former is impossible we must choose the latter. The negation of 'possible to be', therefore, is 'not possible to be'.

[25] The same account holds for 'admissible to be': its negation is 'not admissible to be'. Similarly with the others, 'necessary' and 'impossible'. For as in the previous examples 'to be' and 'not to be' are additions, while the actual things that are subjects are white and man, so here 'to be' serves as subject, while 'to be possible' [30] and 'to be admissible' are additions—these determining the possible and not possible in the case of 'to be', just as in the previous cases 'to be' and 'not to be' determine the true.

The negation of 'possible not to be' is 'not possible not to be'. This is

why [35] ‘possible to be’ and ‘possible not to be’ may be thought actually to follow from one another. For it is possible for the same thing to be and not to be: such statements are not contradictories of one another. But ‘possible to be’ and ‘not possible to be’ never [22<sup>a</sup>1] hold together, because they are opposites. Nor do ‘possible not to be’ and ‘not possible not to be’ ever hold together.

Similarly, the negation of ‘necessary to be’ is not ‘necessary not to be’ but ‘not [5] necessary to be’; and of ‘necessary not to be’, ‘not necessary not to be’. And of ‘impossible to be’ it is not ‘impossible not to be’ but ‘not impossible to be’; and of ‘impossible not to be’, ‘not impossible not to be’. Universally, indeed, as has been said, one must treat ‘to be’ and ‘not to be’ as the subjects, and these others must be joined on to ‘to be’ and ‘not to be’ to make affirmations and negations. We must take [10] the opposite expressions to be these: possible—not possible; admissible—not admissible; impossible—not impossible; necessary—not necessary; true—not true.

13 · With this treatment the implications work out in a reasonable way. From ‘possible to be’ follow ‘admissible to be’ (and, reciprocally, the former from [15] the latter) and ‘not impossible to be’ and ‘not necessary to be’. From ‘possible not to be’ and ‘admissible not to be’ follow both ‘not necessary not to be’ and ‘not impossible not to be’. From ‘not possible to be’ and ‘not admissible to be’ follow ‘necessary not to be’ and ‘impossible to be’. From ‘not possible not to be’ and ‘not [20] admissible not to be’ follow ‘necessary to be’ and ‘impossible not to be’. What we are saying can be seen from the following table.

II  
~~possible to be~~  
~~admissible to be~~ [25]  
~~impossible to be~~  
~~necessary to be~~

III  
~~possible not to be~~  
~~admissible not to be~~  
~~impossible not to be~~ [30]  
~~necessary not to be~~

‘Impossible’ and ‘not impossible’ follow from ‘admissible’ and ‘possible’ and ‘not possible’ and ‘not admissible’ contradictorily but

conversely; for the negation of 'impossible' follows from 'possible to be', and the affirmation from the negation, [35] 'impossible to be' from 'not possible to be' (for 'impossible to be' is an affirmation, 'not impossible' a negation).

But what about the necessary? Evidently things are different here: it is contraries which follow, and the contradictories are separated. For the negation of 'necessary not to be' is not 'not necessary to be'. For both may be true of the same [22<sup>b</sup>1] thing, since the necessary not to be is not necessary to be. The reason why these do not follow in the same way as the others is that it is when applied in a contrary way that 'impossible' and 'necessary' have the same force. For if it is impossible *to be* it is [5] necessary for this (not, *to be*, but) *not to be*; and if it is impossible not to be it is necessary for this to be. Thus if those follow from 'possible' and 'not possible' in the same way, these follow in a contrary way, since 'necessary' and 'impossible' do signify the same but (as we said) when applied conversely.

But perhaps it is impossible for the contradictories in the case of the necessary [10] to be placed thus? For the necessary to be is possible to be. (Otherwise the negation will follow, since it is necessary either to affirm or to deny it; and then, if it is not possible to be, it is impossible to be; so the necessary to be is impossible to [15] be—which is absurd.) However, from 'possible to be' follows 'not impossible to be', and from this follows 'not necessary to be'; with the result that the necessary to be is not necessary to be—which is absurd.

However, it is not 'necessary to be' nor yet 'necessary not to be' that follows from 'possible to be'. For with this both may happen, but whichever of the others is [20] true these will no longer be true; for it is at the same time possible to be and not to be, but if it is necessary to be or not to be it will not be possible for both. It remains, therefore, for 'not necessary not to be' to follow from 'possible to be'; for this is true of 'necessary to be' also. Moreover, this proves to be contradictory to what follows [25] from 'not possible to be', since from that follow 'impossible to be' and 'necessary not to be', whose negation is 'not necessary not to be'. So these contradictories, too, follow in the way stated, and nothing impossible results when they are so placed.

One might raise the question whether 'possible to be' follows from 'necessary [30] to be'. For if it does not follow the contradictory will follow, 'not possible to be'—or if one were to deny that this is the contradictory one must say that 'possible not to be' is; both of which are false of 'necessary to be'. On the other hand, the same thing seems to be

capable of being cut and of not being cut, of being and of not being, so [35] that the necessary to be will be admissible not to be; but this is false.

Well now, it is evident that not everything capable either of being or of walking is capable of the opposites also. There are cases of which this is not true. Firstly, with things capable non-rationally; fire, for example, can heat and has an irrational [23<sup>a</sup>1] capability. While the same rational capabilities are capabilities for more than one thing, for contraries, not all irrational capabilities are like this. Fire, as has been said, is not capable of heating and of not heating, and similarly with everything else that is actualized all the time. Some, indeed, even of the things with irrational [5] capabilities are at the same time capable of opposites. But the point of our remarks is that not every capability is for opposites—not even all those which are capabilities of the same kind.

Again, some capabilities are homonymous. For the capable is spoken of in more than one way: either because it is true as being actualized (e.g. it is capable of walking because it walks, and in general capable of being because what is called [10] capable already is in actuality), or because it might be actualized (e.g. it is capable of walking because it might walk). This latter capability applies to changeable things only, the former to unchangeable things also. (Of both it is true to say that it is not impossible for them to walk, or to be—both what is already walking and [15] actualized and what can walk.) Thus it is not true to assert the second kind of capability of that which is without qualification necessary, but it is true to assert the other. So, since the universal follows from the particular, from being of necessity there follows capability of being—though not every sort.

Perhaps, indeed, the necessary and not necessary are first principles of [20] everything's either being or not being, and one should look at the others as following from these. It is evident from what has been said that what is of necessity is in actuality; so that, if the things which are eternal are prior, then also actuality is prior to capability. Some things are actualities without capability (like the primary substances), others with capability (and these are prior by nature but posterior in [25] time to the capability); and others are never actualities but only capabilities.

14 · Is the affirmation contrary to the negation, or the affirmation to the affirmation—the statement that every man is just contrary to the statement 'no man is just', or 'every man is just' contrary to 'every man is unjust'? Take, for [30] example, Callias is just, Callias is not just, Callias

is unjust; which of these are contraries?

Now if spoken sounds follow things in the mind, and there it is the belief of the contrary which is contrary (e.g. the belief that every man is just is contrary to the belief 'every man is unjust'), the same must hold also of spoken affirmations. But if [35] it is not the case there that the belief of the contrary is contrary, neither will the affirmation be contrary to the affirmation, but rather the above-mentioned negation. So we must inquire what sort of true belief is contrary to a false belief, the belief of the negation or the belief that the contrary holds. What I mean is this: there is a true belief about the good, that it is good, another (false) one, that it is not [23<sup>b</sup>1] good, and yet another, that it is bad; now which of these is contrary to the true one? And if they are one belief, by reason of which is it contrary? (It is false to suppose that contrary beliefs are distinguished by being of contraries. For the belief about the good, that it is good, and the one about the bad, that it is bad, are perhaps the [5] same—and true, whether one belief or more than one. Yet these are contrary things. It is not, then, through being of contraries that beliefs are contrary, but rather through being to the contrary effect.)

Now about the good there is the belief that it is good, the belief that it is not good, and the belief that it is something else, something which does not and cannot hold of it. (We must not take any of the other beliefs, either to the effect that what does not hold holds or to the effect that what holds does not hold—for there is an [10] indefinite number of both kinds, both of those to the effect that what does not hold holds and of those to the effect that what holds does not hold—but only those in which there is deception. And these are from things from which comings-into-being arise. But comings-into-being are from opposites. So also, then, are cases of deceit.) Now the good is both good and not bad, the one in itself, the other accidentally (for [15] it is accidental to it to be not bad); but the more true belief about anything is the one about what it is in itself; and if this holds for the true it holds also for the false. Therefore the belief that the good is not good is a false belief about what holds in itself, while the belief that it is bad is a false belief about what holds accidentally, so [20] that the more false belief about the good would be that of the negation rather than that of the contrary. But it is he who holds the contrary belief who is most deceived with regard to anything, since contraries are among things which differ most with regard to the same thing. If, therefore, one of these is contrary, and the belief of the contradiction is more contrary, clearly this must be the contrary. The belief that the [25] good is bad is complex; for the same person must

perhaps suppose also that it is not good.

Further, if in other cases also the same must hold, it would seem that we have given the correct account of this one as well. For either everywhere that of the contradiction is the contrary, or nowhere. But in cases where there are no contraries [30] there is still a false belief, the one opposite to the true one; e.g. he who thinks that the man is not a man is deceived. If, therefore, these are contraries, so too elsewhere are the beliefs of the contradiction.

Further, the belief about the good that it is good and that about the not good that it is not good are alike; and so, too, are the belief about the good that it is not [35] good and that about the not good that it is good. What belief then is contrary to the true belief about the not good that it is not good? Certainly not the one which says that it is bad, for this might sometimes be true at the same time, while a true belief is never contrary to a true one. (There is something not good which is bad, so that it is possible for both to be true at the same time.) Nor again is it the belief that it is not bad, for these also might hold at the same time. There remains, then, as [24<sup>a</sup>1] contrary to the belief about the not good that it is not good, the belief about the not good that it is good. Hence, too, the belief about the good that it is not good is contrary to that about the good that it is good.

Evidently it will make no difference even if we make the affirmation [5] universally. For the universal negation will be contrary; e.g. the belief that none of the goods is good will be contrary to the belief to the effect that every good is good. For if in the belief about the good that it is good 'the good' is taken universally, it is the same as the belief that whatever is good is good. And this is no different from the belief that everything which is good is good. And similarly also in the case of the not [24<sup>b</sup>1] good.

If then this is how it is with beliefs, and spoken affirmations and negations are symbols of things in the soul, clearly it is the universal negation about the same thing that is contrary to an affirmation; e.g. the contrary of 'every good is good' or 'every man is good' is 'no good is good' or 'no man is good', while 'not every good is [5] good' or 'not every man is good' are opposed contradictorily. Evidently also it is not possible for either a true belief or a true contradictory statement to be contrary to a true one. For contraries are those which enclose their opposites; and while these latter may possibly be said truly by the same person, it is not possible for contraries to hold of the same thing at the same time.

**\*\***TEXT: L. Minio-Paluello, OCT, Oxford, 1956, 2nd ed.

<sup>1</sup>‘Sentence’ here and hereafter translates λόγος.

<sup>2</sup>See *de Anima* III 3–8.

<sup>3</sup>Read οὐδὲ γάρ.

<sup>4</sup>Read λευκὸν καὶ μέγα.

<sup>5</sup>Read εἰ δὲ ὑπάρξει ..., ὑπάρξειν ...

<sup>6</sup>See *Prior Analytics* I 46.

<sup>7</sup>See esp. *Topics* VIII.

<sup>8</sup>Read μουσικὸν ἐν.



# PRIOR ANALYTICS\*\*

*A. J. Jenkinson*

## BOOK I

1 · First we must state the subject of the enquiry and what it is about: the [24<sup>a</sup>10] subject is demonstration, and it is about demonstrative understanding.<sup>1</sup> Next we must determine what a proposition<sup>2</sup> is, what a term is, and what a deduction<sup>3</sup> is (and what sort of deduction is perfect and what imperfect); and after that, what it is for one thing to be or not be in another as a whole, and what we mean by being predicated of every or of no. [15]

A proposition, then, is a statement affirming or denying something of something; and this is either universal or particular or indefinite. By universal I mean a statement that something belongs to all or none of something; by particular that it belongs to some or not to some or not to all; by indefinite that it does or does not belong, without any mark of being universal or particular, e.g. ‘contraries are [20] subjects of the same science’, or ‘pleasure is not good’. A demonstrative proposition differs from a dialectical one, because a demonstrative proposition is the assumption of one of two contradictory statements (the demonstrator does not ask for his premiss, but lays it down), whereas a dialectical proposition choice between two contradictories. But this will make no difference to the production of a deduction in [25] either case; for both the demonstrator and the dialectician argue deductively after assuming that something does or does not belong to something. Therefore a deductive proposition without qualification will be an affirmation or denial of something concerning something in the way we have described; it will be demonstrative, if it is true and assumed on the basis of the first principles of its science; it will be dialectical if it asks for a choice between two contradictories (if one is [24<sup>b</sup>10] enquiring) or if it assumes what is apparent and reputable, as we said in the *Topics*<sup>4</sup> (if one is

deducing). Thus as to what a proposition is and how deductive, demonstrative and dialectical propositions differ, we have now said enough for our present purposes—we shall discuss the matter with precision later on.<sup>5</sup> [15]

I call a term that into which the proposition is resolved, i.e. both the predicate and that of which it is predicated, 'is' or 'is not' being added.

A deduction is a discourse in which, certain things being stated, something [20] other than what is stated follows of necessity from their being so. I mean by the last phrase that it follows because of them, and by this, that no further term is required from without in order to make the consequence necessary.

I call perfect a deduction which needs nothing other than what has been stated to make the necessity evident; a deduction is imperfect if it needs either one or more [25] things, which are indeed the necessary consequences of the terms set down, but have not been assumed in the propositions.

That one term should be in another as in a whole is the same as for the other to be predicated of all of the first. And we say that one term is predicated of all of another, whenever nothing can be found of which the other term cannot be asserted; 'to be predicated of none' must be understood in the same way.

[25<sup>a</sup>1] **2** · Every proposition states that something either belongs or must belong or may belong; of these some are affirmative, others negative, in respect of each of the three modes; again some affirmative and negative propositions are universal, others [5] particular, others indefinite. It is necessary then that in universal attribution the terms of the negative proposition should be convertible, e.g. if no pleasure is good, then no good will be pleasure; the terms of the affirmative must be convertible, not however universally, but in part, e.g. if every pleasure is good, some good must be [10] pleasure; the particular affirmative must convert in part (for if some pleasure is good, then some good will be pleasure); but the particular negative need not convert, for if some animal is not man, it does not follow that some man is not animal.

First then take a universal negative with the terms *A* and *B*. Now if *A* belongs [15] to no *B*, *B* will not belong to any *A*; for if it does belong to some *B* (say to *C*), it will not be true that *A* belongs to no *B*—for *C* is one of the *B*s. And if *A* belongs to every *B*, then *B* will belong to some *A*; for if it belongs to none, then *A* will belong to no [20] *B*—but it was laid down

that it belongs to every *B*. Similarly if the proposition is particular: if *A* belongs to some *B*, it is necessary for *B* to belong to some *A*; for if it belongs to none, *A* will belong to no *B*. But if *A* does not belong to some *B*, it is not necessary that *B* should not belong to some *A*: e.g., if *B* is animal and *A* man; for [25] man does not belong to every animal, but animal belongs to every man.

3 · The same manner of conversion will hold good also in respect of necessary propositions. The universal negative converts universally; each of the affirmatives [30] converts into a particular. If it is necessary that *A* belongs to no *B*, it is necessary also that *B* belongs to no *A*. For if it is possible that it belongs to some *A*, it would be possible also that *A* belongs to some *B*. If *A* belongs to all or some *B* of necessity, it is necessary also that *B* belongs to some *A*; for if there were no necessity, neither would *A* belong to some *B* of necessity. But the particular negative does not convert, [35] for the same reason which we have already stated.

In respect of possible propositions, since possibility is used in several ways (for we say that what is necessary and what is not necessary and what is potential is possible), affirmative statements will all convert in a similar manner. For if it is possible that *A* belongs to all or some *B*, it will be possible that *B* belongs to some *A*. [25<sup>b</sup>1] For if it could belong to none, then *A* could belong to no *B*. This has been already proved. But in negative statements the case is different. Whatever is said to be possible, either because it necessarily belongs or because it does not necessarily not belong, admits of conversion like other negative statements, e.g. if one should say, it [5] is possible that the man is not a horse, or that no garment is white. For in the former case the one necessarily does not belong to the other; in the latter there is no necessity that it should: and the proposition converts like other negative statements. For if it is possible for no man to be a horse, it is also admissible for no horse to be a man; and if it is admissible for no garment to be white, it is also admissible for [10] nothing white to be a garment. For if some white thing must be a garment, then some garment will necessarily be white. This has been already proved. The particular negative is similar. But if anything is said to be possible because it is the general rule and natural (and it is in this way we define the possible), the negative [15] propositions can no longer be converted in the same way: the universal negative does not convert, and the particular does. This will be plain

when we speak about the possible.<sup>6</sup> At present we may take this much as clear in addition to what has been said: the statements that it is possible that  $A$  belongs to no  $B$  or does not belong to [20] some  $B$  are affirmative in form; for the expression 'is possible' ranks along with 'is', and 'is' makes an affirmative always and in every case, whatever the terms to which it is added in predication, e.g. 'it is not-good' or 'it is not-white' or in a word 'it is not-this'. But this also will be proved in the sequel.<sup>7</sup> In conversion these will behave like the other affirmative propositions. [25]

4 · After these distinctions we now state by what means, when, and how every deduction is produced; subsequently we must speak of demonstration. Deduction should be discussed before demonstration, because deduction is the more general: a demonstration is a sort of deduction, but not every deduction is a [30] demonstration.

Whenever three terms are so related to one another that the last is in the middle as in a whole, and the middle is either in, or not in, the first as in a whole, the extremes must be related by a perfect deduction. I call that term middle which both [35] is itself in another and contains another in itself: in position also this comes in the middle. By extremes I mean both that term which is itself in another and that in which another is contained. If  $A$  is predicated of every  $B$ , and  $B$  of every  $C$ ,  $A$  must [26<sup>a</sup>1] be predicated of every  $C$ : we have already explained what we mean by 'predicated of every'. Similarly also, if  $A$  is predicated of no  $B$ , and  $B$  of every  $C$ , it is necessary that  $A$  will belong to no  $C$ .

But if the first term belongs to all the middle, but the middle to none of the last term, there will be no deduction in respect of the extremes; for nothing necessary [5] follows from the terms being so related; for it is possible that the first should belong either to all or to none of the last, so that neither a particular nor a universal conclusion is necessary. But if there is no necessary consequence, there cannot be a deduction by means of these propositions. As an example of a universal affirmative relation between the extremes we may take the terms animal, man, horse; of a universal negative relation, the terms animal, man, stone. Nor again can a [10] deduction be formed when neither the first term belongs to any of the middle, nor the middle to any of the last. As an example of a positive relation between the extremes take the terms science, line, medicine: of a negative relation science, line, unit.

If then the terms are universally related, it is clear in this figure when a deduction will be possible and when not, and that if a deduction is

possible the terms [15] must be related as described, and if they are so related there will be a deduction.

But if one term is related universally, the other in part only, to its subject, there must be a perfect deduction whenever universality is posited with reference to the major term either affirmatively or negatively, and particularity with reference to [20] the minor term affirmatively; but whenever the universality is posited in relation to the minor term, or the terms are related in any other way, a deduction is impossible. I call that term the major in which the middle is contained and that term the minor which comes under the middle. Let  $A$  belong to every  $B$  and  $B$  to some  $C$ . Then if 'predicated of every' means what was said above, it is necessary that  $A$  belongs to [25] some  $C$ . And if  $A$  belongs to no  $B$  and  $B$  to some  $C$ , it is necessary that  $A$  does not belong to some  $C$ . (The meaning of 'predicated of none' has also been defined.) So there will be a perfect deduction. This holds good also if deduction  $BC$  should be indefinite, provided that it is affirmative; for we shall have the same deduction [30] whether it is indefinite or particular.

But if the universality is posited with respect to the minor term either affirmatively or negatively, a deduction will not be possible, whether the other is affirmative or negative, indefinite or particular: e.g. if  $A$  belongs or does not belong to some  $B$ , and  $B$  belongs to every  $C$ . As an example of a positive relation between [35] the extremes take the terms good, state, wisdom; of a negative relation, good, state, ignorance. Again if  $B$  belongs to no  $C$ , and  $A$  belongs or does not belong to some  $B$  (or does not belong to every  $B$ ), there cannot be a deduction. Take the terms white, horse, swan; white, horse, raven. The same terms may be taken also if  $BA$  is indefinite.

[26<sup>b</sup>1] Nor when the proposition relating to the major extreme is universal, whether affirmative or negative, and that to the minor is negative and particular, can there be a deduction: e.g. if  $A$  belongs to every  $B$ , and  $B$  does not belong to some  $C$  or not [5] to every  $C$ . For the first term may be predicable both of all and of none of the term to some of which the middle does not belong. Suppose the terms are animal, man, white: next take some of the white things of which man is not predicated—swan and snow: animal is predicated of all of the one, but of none of the other. Consequently there cannot be a deduction. Again let  $A$  belong to no  $B$ , but let  $B$  not belong to some [10]  $C$ . Take the terms inanimate, man, white: then take some white things of which man is not predicated—swan and snow: inanimate is predicated of all of the one, of none of the other.

Further since it is indefinite to say that  $B$  does not belong to some  $C$ , and it is [15] true that it does not belong to some  $C$  both if it belongs to none and if it does not belong to every, and since if terms are assumed such that it belongs to none, no deduction follows (this has already been stated), it is clear that this arrangement of terms will not afford a deduction: otherwise one would have been possible in the other case too. A similar proof may also be given if the universal proposition is negative. [20]

Nor can there in any way be a deduction if both the relations are particular, either positively or negatively, or the one positively and the other negatively, or one indefinite and the other definite, or both indefinite. Terms common to all the above are animal, white, horse; animal, white, stone. [25]

It is clear then from what has been said that if there is a deduction in this figure with a particular conclusion, the terms must be related as we have stated: if they are related otherwise, no deduction is possible at all. It is evident also that all the deductions in this figure are perfect (for they are all completed by means of [30] what was originally assumed) and that all conclusions are proved by this figure, viz. universal and particular, affirmative and negative. Such a figure I call the first.

**5** · Whenever the same thing belongs to all of one subject, and to none of another, or to all of each subject or to none of either, I call such a figure the second; [35] by middle term in it I mean that which is predicated by both subjects, by extremes the terms of which this is said, by major extreme that which lies near the middle, by minor that which is further away from the middle. The middle term stands outside the extremes, and is first in position. A deduction cannot ever be perfect in this [27<sup>a</sup>1] figure, but it may be potential whether the terms are related universally or not.

If then the terms are related universally a deduction will be possible, whenever the middle belongs to all of one subject and to none of another (it does not matter which has the negative relation), but in no other way. Let  $M$  be predicated of no  $N$ , [5] but of every  $O$ . Since, then, the negative is convertible,  $N$  will belong to no  $M$ ; but  $M$  was assumed to belong to every  $O$ : consequently  $N$  will belong to no  $O$ . This has already been proved. Again if  $M$  belongs to every  $N$ , but to no  $O$  then  $O$  will belong to no  $N$ . For if  $M$  belongs to no  $O$ ,  $O$  belongs to no  $M$ ; but  $M$  (as was said) belongs to [10] every  $N$ :  $O$  then will belong to no  $N$ ; for the first figure

has again been formed. But since the negative is convertible, *N* will belong to no *O*. Thus it will be the same deduction.

It is possible to prove these results also by *reductio ad impossibile*. [15]

It is clear then that a deduction is formed when the terms are so related, but not a perfect one; for the necessity is not perfectly established merely from the original assumptions; others also are needed.

But if *M* is predicated of every *N* and *O*, there will not be a deduction. Terms to illustrate a positive relation between the extremes are substance, animal, man; a [20] negative relation, substance, animal, number—substance being the middle term.

Nor is a deduction possible when *M* is predicated neither of any *N* nor of any *O*. Terms to illustrate a positive relation are line, animal, man; a negative relation, line, animal, stone.

It is clear then that if a deduction is formed when the terms are universally related, the terms must be related as we stated at the outset; for if they are [25] otherwise related no necessary consequence follows.

If the middle term is related universally to one of the extremes, a particular negative deduction must result whenever the middle term is related universally to the major whether positively or negatively, and particularly to the minor and in a manner opposite to that of the universal statement (by 'an opposite manner' I mean, [30] if the universal statement is negative, the particular is affirmative: if the universal is affirmative, the particular is negative). For if *M* belongs to no *N*, but to some *O*, it is necessary that *N* does not belong to some *O*. For since the negative is convertible, *N* [35] will belong to no *M*; but *M* was admitted to belong to some *O*: therefore *N* will not belong to some *O*; for a deduction is found by means of the first figure. Again if *M* belongs to every *N*, but not to some *O*, it is necessary that *N* does not belong to some *O*; for if *N* belongs to every *O*, and *M* is predicated also of every *N*, *M* must belong [27<sup>b</sup>1] to every *O*; but we assumed that *M* does not belong to some *O*. And if *M* belongs to every *N* but not to every *O*, we shall conclude that *N* does not belong to every *O*: the proof is the same as the above. But if *M* is predicated of every *O*, but not of every *N*, [5] there will be no deduction. Take the terms animal, substance, raven; animal, white raven. Nor will there be a deduction when *M* is predicated of no *O*, but of some *N*. Terms to illustrate a positive relation between the extremes are animal, substance, unit; a negative relation, animal, substance, science.

If then the universal statement is opposed to the particular, we have stated [10] when a deduction will be possible and when not; but if the

premises are similar in form, I mean both negative or both affirmative, a deduction will not be possible at all. First let them be negative, and let the universality apply to the major term, i.e. [15] let  $M$  belong to no  $N$ , and not to some  $O$ . It is possible then for  $N$  to belong either to every  $O$  or to no  $O$ . Terms to illustrate the negative relation are black, snow, animal. But it is not possible to find terms of which the extremes are related positively and universally, if  $M$  belongs to some  $O$ , and does not belong to some  $O$ . For if  $N$  belonged to every  $O$ , but  $M$  to no  $N$ , then  $M$  would belong to no  $O$ ; but we assumed [20] that it belongs to some  $O$ . In this way then it is not admissible to take terms: our point must be proved from the indefinite nature of the particular statement. For since it is true that  $M$  does not belong to some  $O$ , even if it belongs to no  $O$ , and since if it belongs to no  $O$  a deduction is (as we have seen) not possible, clearly it will not be possible now either.

Again let the propositions be affirmative, and let the universality apply as [25] before, i.e. let  $M$  belong to every  $N$  and to some  $O$ . It is possible then for  $N$  to belong to every  $O$  or to no  $O$ . Terms to illustrate the negative relation are white, swan, stone. But it is not possible to take terms to illustrate the universal affirmative relation, for the reason already stated: the point must be proved from the indefinite nature of the particular statement. And if the universality applies to the minor extreme, and  $M$  belongs to no  $O$ , and not to some  $N$ , it is possible for  $N$  to belong [30] either to every  $O$  or to no  $O$ . Terms for the positive relation are white, animal, raven; for the negative relation, white, stone, raven. If the propositions are positive, terms for the negative relation are white, animal, snow; for the positive relation, white, animal, swan. Evidently then, whenever the propositions are similar in form, and one is universal, the other particular, a deduction cannot be formed at all. Nor is one [35] possible if the middle term belongs to some of each of the extremes, or does not belong to some of either, or belongs to some of the one, not to some of the other, or belongs to neither universally, or is related to them indefinitely. Common terms for all the above are white, animal, man; white, animal, inanimate.

It is clear then from what has been said that if the terms are related to one [28<sup>a</sup>1] another in the way stated, a deduction results of necessity; and if there is a deduction, the terms must be so related. But it is evident also that all the deductions in this figure are imperfect; for all are made perfect by certain supplementary [5] assumptions, which either are contained in the terms of necessity or are assumed as hypotheses, i.e. when we prove *per impossibile*. And it is evident that an affirmative



deduction is not attained by means of this figure, but all are negative, whether universal or particular.

6 · But if one term belongs to all, and another to none, of a third, or if both [10] belong to all, or to none, of it, I call such a figure the third; by middle term in it I mean that of which both are predicated, by extremes I mean the predicates, by the major extreme that which is further from the middle, by the minor that which is nearer to it. The middle term stands outside the extremes, and is last in position. A [15] deduction cannot be perfect in this figure either, but it may be potential whether the terms are related universally or not to the middle term.

If they are universal, whenever both *P* and *R* belong to every *S*, it follows that *P* will necessarily belong to some *R*. For, since the affirmative is convertible, *S* will belong to some *R*: consequently since *P* belongs to every *S*, and *S* to some *R*, *P* must [20] belong to some *R*; for a deduction in the first figure is produced. It is possible to demonstrate this both *per impossibile* and by exposition. For if both *P* and *R* belong to every *S*, should one of the *S*s, e.g. *N*, be taken, both *P* and *R* will belong to this, [25] and thus *P* will belong to some *R*.

If *R* belongs to every *S*, and *P* to no *S*, there will be a deduction that *P* will necessarily not belong to some *R*. This may be demonstrated in the same way as before by converting the proposition *RS*. It might be proved also *per impossibile*, as [30] in the former cases. But if *R* belongs to no *S*, *P* to every *S*, there will be no deduction. Terms for the positive relation are animal, horse, man; for the negative relation animal, inanimate, man.

Nor can there be a deduction when both terms are asserted of no *S*. Terms for the positive relation are animal, horse, inanimate; for the negative relation man, [35] horse, inanimate—inanimate being the middle term.

It is clear then in this figure also when a deduction will be possible and when not, if the terms are related universally. For whenever both the terms are affirmative, there will be a deduction that one extreme belongs to some of the other; [28<sup>b</sup>1] but when they are negative, no deduction will be possible. But when one is negative, the other affirmative, if the major is negative, the minor affirmative, there will be a deduction that the one extreme does not belong to some of the other; but if the relation is reversed, no deduction will be possible.

[5] If one term is related universally to the middle, the other in part only, when both are affirmative there must be a deduction, no matter

which is universal. For if  $R$  belongs to every  $S$ ,  $P$  to some  $S$ ,  $P$  must belong to some  $R$ . For since the [10] affirmative is convertible,  $S$  will belong to some  $P$ ; consequently since  $R$  belongs to every  $S$ , and  $S$  to some  $P$ ,  $R$  must also belong to some  $P$ ; therefore  $P$  must belong to some  $R$ . Again if  $R$  belongs to some  $S$ , and  $P$  to every  $S$ ,  $P$  must belong to some  $R$ . This may be demonstrated in the same way as the preceding. And it is possible to [15] demonstrate it also *per impossibile* and by exposition, as in the former cases.

But if one term is affirmative, the other negative, and if the affirmative is universal, a deduction will be possible whenever the minor term is affirmative. For if  $R$  belongs to every  $S$ , but  $P$  does not belong to some  $S$ , it is necessary that  $P$  does not belong to some  $R$ . For if  $P$  belongs to every  $R$ , and  $R$  belongs to every  $S$ , then  $P$  [20] will belong to every  $S$ ; but we assumed that it did not. Proof is possible also without reduction, if one of the  $S$ s be taken to which  $P$  does not belong.

But whenever the major is affirmative, no deduction will be possible, e.g. if  $P$  belongs to every  $S$ , and  $R$  does not belong to some  $S$ . Terms for the universal affirmative relation are animate, man, animal. For the universal negative relation it [25] is not possible to get terms, if  $R$  belongs to some  $S$ , and does not belong to some  $S$ . For if  $P$  belongs to every  $S$ , and  $R$  to some  $S$ , then  $P$  will belong to some  $R$ ; but we assumed that it belongs to no  $R$ . We must put the matter as before. Since its not belonging to some is indefinite, it is true to say of that which belongs to none that it [30] does not belong to some. But if  $R$  belongs to no  $S$ , no deduction is possible, as has been shown. Clearly then no deduction will be possible here.

But if the negative term is universal, whenever the major is negative and the minor affirmative there will be a deduction. For if  $P$  belongs to no  $S$ , and  $R$  belongs to some  $S$ ,  $P$  will not belong to some  $R$ ; for we shall have the first figure again, if the [35] proposition  $RS$  is converted.

But when the minor is negative, there will be no deduction. Terms for the positive relation are animal, man, wild; for the negative relation, animal, science, wild—the middle in both being the term wild.

Nor is a deduction possible when both are stated in the negative, but one is universal, the other particular. When the minor is related universally to the middle, [29<sup>a</sup>1] take the terms animal, science, wild; animal, man, wild. When the major is related universally to the middle, take as terms for a negative relation raven, snow, white. For a positive relation terms cannot be found, if  $R$  belongs to some  $S$ , and does not [5] belong to some  $S$ . For if  $P$  belongs to every  $R$ , and  $R$  to some  $S$ , then  $P$

belongs to some *S*; but we assumed that it belongs to no *S*. Our point, then, must be proved from the indefinite nature of the particular statement.

Nor is a deduction possible at all, if each of the extremes belongs to some of the middle, or does not belong, or one belongs and the other does not, or one belongs to some, the other not to all, or if they are indefinite. Common terms for all are animal, man, white; animal, inanimate, white. [10]

It is clear then in this figure also when a deduction will be possible, and when not; and that if the terms are as stated, a deduction results of necessity, and if there is a deduction, the terms must be so related. It is clear also that all the deductions in this figure are imperfect (for all are made perfect by certain supplementary [15] assumptions), and that it will not be possible to deduce a universal conclusion by means of this figure, whether negative or affirmative.

7 · It is evident also that in all the figures, whenever a deduction does not result, if both the terms are affirmative or negative nothing necessary follows at all, [20] but if one is affirmative, the other negative, and if the negative is assumed universally, a deduction always results relating the minor to the major term, e.g. if *A* belongs to every or some *B*, and *B* belongs to no *C*; for if the propositions are converted it is necessary that *C* does not belong to some *A*. Similarly also in the [25] other figures; a deduction always results by means of conversion. It is evident also that the substitution of an indefinite for a particular affirmative will effect the same deduction in all the figures.

It is clear too that all the imperfect deductions are made perfect by means of [30] the first figure. For all are brought to a conclusion either probatively or *per impossibile*, in both ways the first figure is formed: if they are made perfect probatively, because (as we saw) all are brought to a conclusion by means of conversion, and conversion produces the first figure; if they are proved *per* [35] *impossibile*, because on the assumption of the false statement the deduction comes about by means of the first figure, e.g. in the last figure, if *A* and *B* belong to every *C*, it follows that *A* belongs to some *B*; for if *A* belonged to no *B*, and *B* belongs to every *C*, *A* would belong to no *C*; but (as we stated) it belongs to every *C*. Similarly also with the rest.

It is possible also to reduce all deductions to the universal deductions in the [29<sup>b</sup>1] first figure. Those in the second figure are clearly made

perfect by these, though not all in the same way; the universal ones are made perfect by converting the negative premiss, each of the particular by *reductio ad impossibile*. In the first figure [5] particular deductions are indeed made perfect by themselves, but it is possible also to prove them by means of the second figure, reducing them *ad impossibile*, e.g. if *A* belongs to every *B*, and *B* to some *C*, it follows that *A* belongs to some *C*. For if it belonged to no *C*, and belongs to every *B*, then *B* will belong to *C*: this we know by [10] means of the second figure. Similarly also demonstration will be possible in the case of the negative. For if *A* belongs to no *B*, and *B* belongs to some *C*, *A* will not belong to some *C*; for if it belonged to every *C*, and belongs to *B*, then *B* will belong to no *C*; and this (as we saw) is the middle figure. Consequently, since all deductions in the [15] middle figure can be reduced to universal deductions in the first figure, and since particular deductions in the first figure can be reduced to deductions in the middle figure, it is clear that particular deductions can be reduced to universal deductions in the first figure. Deductions in the third figure, if the terms are universal, are [20] directly made perfect by means of those deductions; but, when one of the propositions is particular, by means of the particular deductions in the first figure and these (we have seen) may be reduced to the universal deductions in the first figure; consequently also the particular deductions in the third figure may be so [25] reduced. It is clear then that all may be reduced to the universal deductions in the first figure.

We have stated then how deductions which prove that something belongs or does not belong to something else are constituted, both how those of the same figure are constituted in themselves, and how those of different figures are related to one another.

8 · Since there is a difference according as something belongs, necessarily [30] belongs, or may belong (for many things belong, but not necessarily, others neither necessarily nor indeed at all, but it is possible for them to belong), it is clear that there will be different deductions for each of these, and deductions with differently related terms, one concluding from what is necessary, another from what is, a third [35] from what is possible.

In the case of what is necessary, things are pretty much the same as in the case of what belongs; for when the terms are put in the same way, then, whether something belongs or necessarily belongs (or does not belong), a deduction will or will not result alike in both cases, the only

difference being the addition of the [30<sup>a</sup>1] expression ‘necessarily’ to the terms. For the negative is convertible alike in both cases, and we should give the same account of the expressions ‘to be in something as in a whole’ and ‘to be predicated of every’. Thus in the other cases, the conclusion [5] will be proved to be necessary by means of conversion, in the same manner as in the case of simple predication. But in the middle figure when the universal is affirmative, and the particular negative, and again in the third figure when the universal is affirmative and the particular negative, the demonstration will not take the same form, but it is necessary by the exposition of a part of the subject, to which [10] in each case the predicate does not belong, to make the deduction in reference to this: with terms so chosen the conclusion will be necessary. But if the relation is necessary in respect of the part exposed, it must hold of some of that term in which this part is included; for the part exposed is just some of that. And each of the resulting deductions is in the appropriate figure.

[15] 9 · It happens sometimes also that when *one* proposition is necessary the deduction is necessary, not however when either is necessary, but only when the one related to the major is, e.g. if *A* is taken as necessarily belonging or not belonging to *B*, but *B* is taken as simply belonging to *C*; for if the propositions are taken in this [20] way, *A* will necessarily belong or not belong to *C*. For since *A* necessarily belongs, or does not belong, to every *B*, and since *C* is one of the *B*s, it is clear that for *C* also the positive or the negative relation to *A* will hold necessarily. But if *AB* is not necessary, but *BC* is necessary, the conclusion will not be necessary. For if it were, it [25] would result both through the first figure and through the third that *A* belongs necessarily to some *B*. But this is false; for *B* may be such that it is possible that *A* should belong to none of it. Further, an example also makes it clear that the conclusion will not be necessary, e.g. if *A* were movement, *B* animal, *C* man; man is [30] an animal necessarily, but an animal does not move necessarily, nor does man. Similarly also if *AB* is negative; for the proof is the same.

In particular deductions, if the universal is necessary, then the conclusion will be necessary; but if the particular, the conclusion will not be necessary, whether the [35] universal proposition is negative or affirmative. First let the universal be necessary, and let *A* belong to every *B* necessarily, but let *B* simply belong to some *C*: it is necessary then that *A* belongs to some *C* necessarily; for *C* falls under *B*, and *A* was assumed

to belong necessarily to every *B*. Similarly also if the deduction should be [30<sup>b</sup>1] negative; for the proof will be the same. But if the particular is necessary, the conclusion will not be necessary; for from the denial of such a conclusion nothing impossible results, just as it does not in the universal deductions. The same is true of [5] negatives too. Try the terms movement, animal, white.

**10** · In the second figure, if the negative proposition is necessary, then the conclusion will be necessary, but if the affirmative, not necessary. First let the negative be necessary; let *A* be possible of no *B*, and simply belong to *C*. Since then [10] the negative is convertible, *B* is possible of no *A*. But *A* belongs to every *C*; consequently *B* is possible of no *C*. For *C* falls under *A*. The same result would be obtained if the negative refers to *C*; for if *A* is possible of no *C*, *C* is possible of no *A*; [15] but *A* belongs to every *B*, consequently *C* is possible of no *B*; for again we have obtained the first figure. Neither then is *B* possible of *C*; for conversion is possible as before.

But if the affirmative proposition is necessary, the conclusion will not be necessary. Let *A* belong to every *B* necessarily, but to no *C* simply. If then the [20] negative is converted, the first figure results. But it has been proved in the case of the first figure that if the negative related to the major is not necessary the conclusion will not be necessary either. Therefore the same result will obtain here. Further, if the conclusion is necessary, it follows that *C* necessarily does not belong [25] to some *A*. For if *B* necessarily belongs to no *C*, *C* will necessarily belong to no *B*. But *B* at any rate must belong to some *A*, if it is true (as was assumed) that *A* necessarily belongs to every *B*. Consequently it is necessary that *C* does not belong to some *A*. But nothing prevents such an *A* being taken that it is possible for *C* to [30] belong to all of it. Further one might show by an exposition of terms that the conclusion is not necessary without qualification, though it is necessary given the premisses. For example let *A* be animal, *B* man, *C* white, and let the propositions be assumed in the same way as before: it is possible that animal should belong to [35] nothing white. Man then will not belong to anything white, but not necessarily; for it is possible for a man to become white, not however so long as animal belongs to nothing white. Consequently given these premisses the conclusion will be necessary, but it is not necessary without qualification.

Similar results will obtain also in particular deductions. For whenever

the [31<sup>a</sup>1] negative proposition is both universal and necessary, then the conclusion will be necessary; but whenever the affirmative is universal and the negative particular, the [5] conclusion will not be necessary. First then let the negative be both universal and necessary: let it be possible for no *B* that *A* should belong to it, and let *A* belong to some *C*. Since the negative is convertible, it will be possible for no *A* that *B* should belong to it; but *A* belongs to some *C*; consequently *B* necessarily does not belong to [10] some *C*. Again let the affirmative be both universal and necessary, and let the affirmative refer to *B*. If then *A* necessarily belongs to every *B*, but does not belong to some *C*, it is clear that *B* will not belong to some *C*, but not necessarily. For the same terms can be used to demonstrate the point, which were used in the universal [15] deductions. Nor again, if the negative is necessary but particular, will the conclusion be necessary. The point can be demonstrated by means of the same terms.

**11** · In the last figure when the terms are related universally to the middle, [20] and both propositions are affirmative, if one of the two is necessary, then the conclusion will be necessary. But if one is negative, the other affirmative, whenever the negative is necessary the conclusion also will be necessary, but whenever the affirmative is necessary the conclusion will not be necessary. First let both the [25] propositions be affirmative, and let *A* and *B* belong to every *C*, and let *AC* be necessary. Since then *B* belongs to every *C*, *C* also will belong to some *B*, because the universal is convertible into the particular; consequently if *A* belongs necessarily to every *C*, and *C* belongs to some *B*, it is necessary that *A* should belong to some *B* [30] also. For *B* is under *C*. The first figure then is formed. A similar proof will be given also if *BC* is necessary. For *C* is convertible with some *A*; consequently if *B* belongs necessarily to every *C*, it will belong necessarily also to some *A*.

Again let *AC* be negative, *BC* affirmative, and let the negative be necessary. [35] Since then *C* is convertible with some *B*, but *A* necessarily belongs to no *C*, *A* will necessarily not belong to some *B* either; for *B* is under *C*. But if the affirmative is necessary, the conclusion will not be necessary. For suppose *BC* is affirmative and [40] necessary, while *AC* is negative and not necessary. Since then the affirmative is convertible, *C* also will belong to some *B* necessarily; consequently if *A* belongs to no [31<sup>b</sup>1] *C* while *C* belongs to some *B*, *A* will not belong to some *B*—but not of necessity; for it has been proved, in the case of the first figure, that if the negative proposition is not necessary, neither will the conclusion be

necessary. Further, the point may be [5] made clear by considering the terms. Let *A* be good, *B* animal, *C* horse. It is possible then that good should belong to no horse, and it is necessary that animal should belong to every horse; but it is not necessary that some animal should not be good, since it is possible for every animal to be good. Or if that is not possible, take as the [10] term awake or asleep; for every animal can accept these.

If, then, the terms are universal in relation to the middle, we have stated when the conclusion will be necessary. But if one is universal, the other particular, and if both are affirmative, whenever the universal is necessary the conclusion also must [15] be necessary. The demonstration is the same as before; for the particular affirmative also is convertible. If then it is necessary that *B* should belong to every *C*, and *A* falls under *C*, it is necessary that *B* should belong to some *A*. But if *B* must belong to some *A*, then *A* must belong to some *B*; for conversion is possible. Similarly also if *AC* should be necessary and universal; for *B* falls under *C*. But if the particular is [20] necessary, the conclusion will not be necessary. Let *BC* be both particular and necessary, and let *A* belong to every *C*, not however necessarily. If *BC* is converted the first figure is formed, and the universal proposition is not necessary, but the particular is necessary. But when the propositions were thus, the conclusion (as we [25] proved) was not necessary; consequently it is not here either. Further, the point is clear if we look at the terms. Let *A* be waking, *B* biped, and *C* animal. It is necessary that *B* should belong to some *C*, but it is possible for *A* to belong to *C*, and that *A* should belong to *B* is not necessary. For there is no necessity that some biped should [30] be asleep or awake. Similarly and by means of the same terms proof can be made, should *AC* be both particular and necessary.

But if one of the terms is affirmative, the other negative, whenever the universal is both negative and necessary the conclusion also will be necessary. For if it is not possible that *A* should belong to any *C*, but *B* belongs to some *C*, it is [35] necessary that *A* should not belong to some *B*. But whenever the affirmative is necessary, whether universal or particular, or the negative is particular, the conclusion will not be necessary. The rest of the proof of this will be the same as before; but if terms are wanted, when the affirmative is universal and necessary, take the terms waking, animal, man, man being middle, and when the affirmative is [32<sup>a</sup>1] particular and necessary, take the terms waking, animal, white; for it is necessary that animal should belong to some white thing, but it is possible that waking should belong to none, and it is not



necessary that waking should not belong to some animal. But when the negative is particular and necessary, take the terms biped, moving, animal, animal being middle. [5]

12 · It is clear then that a deduction that something belongs is not reached unless both propositions state that something belongs, but a necessary conclusion is possible even if one only of the propositions is necessary. But in both cases, whether the deductions are affirmative or negative, it is necessary that one proposition [10] should be similar to the conclusion. I mean by 'similar', if the conclusion states that something belongs, the proposition must too; if the conclusion is necessary, the proposition must be necessary. Consequently this also is clear, that the conclusion will be neither necessary nor simple unless a necessary or simple proposition is assumed.

13 · Perhaps enough has been said about necessity, how it comes about and [15] how it differs from belonging. We proceed to discuss that which is possible, when and how and by what means it can be proved. I use the terms 'to be possible' and 'the possible' of that which is not necessary but, being assumed, results in nothing impossible. We say indeed, homonymously, of the necessary that it is possible. [But [20] that my definition of the possible is correct is clear from the contradictory negations and affirmations. For the expressions 'it is not possible to belong', 'it is impossible to belong', and 'it is necessary not to belong' are either identical or follow from one [25] another; consequently their opposites also, 'it is possible to belong', 'it is not impossible to belong', and 'it is not necessary not to belong', will either be identical or follow from one another. For of everything the affirmation or the denial holds good. That which is possible then will be not necessary and that which is not [30] necessary will be possible.]<sup>8</sup> It results that all propositions in the mode of possibility are convertible into one another. I mean not that the affirmative are convertible into the negative, but that those which are affirmative in form admit of conversion by opposition, e.g. 'it is possible to belong' may be converted into 'it is possible not to belong', and 'it is possible to belong to every' into 'it is possible to belong to no' or 'not to every', and 'it is possible to belong to some' into 'it is possible not to belong to [35] some'. And similarly for the others. For since that which is possible is not necessary, and that which is not necessary may possibly not belong, it is clear that if it is possible that *A* should belong to *B*, it is

possible also that it should not belong to *B*; and if it is possible that it should belong to every, it is also possible that it should not belong to every. The same holds good in the case of particular affirmations; for the [32<sup>b</sup>1] proof is identical. And such propositions are affirmative and not negative; for 'to be possible' is in the same rank as 'to be', as was said above.

Having made these distinctions we next point out that 'to be possible' is used in [5] two ways. In one it means to happen for the most part and fall short of necessity, e.g. a man's turning grey or growing or decaying, or generally what naturally belongs to a thing (for this has not its necessity unbroken, since a man does not exist forever, [10] although if a man does exist, it comes about either necessarily or for the most part). In another way it means the indefinite, which can be both thus and not thus, e.g. an animal's walking or an earthquake's taking place while it is walking, or generally what happens by chance; for none of these inclines by nature in the one way more than in the opposite.

That which is possible in each of its two ways is convertible into its opposite, [15] not however in the same way: what is natural is convertible because it does not necessarily belong (for in this sense it is possible that a man should not grow grey) and what is indefinite is convertible because it inclines this way no more than that. Science and demonstrative deductions are not concerned with things which are indefinite, because the middle term is uncertain; but they are concerned with things [20] that are natural, and as a rule arguments and inquiries are made about things which are possible in this sense. Deductions indeed can be made about the former, but it is unusual at any rate to inquire about them.

These matters will be treated more definitely in the sequel;<sup>9</sup> our business at present is to state when and how and what deductions can be made from possible [25] propositions. The expression 'it is possible for this to belong to that' may be taken in two ways: either 'to which that belongs' or 'to which it may belong'; for 'A may be said of that of which *B*' means one or other of these—either 'of which *B* is said' or 'of [30] which it may be said'; and there is no difference between 'A may be said of that of which *B*' and 'A may belong to every *B*'. It is clear then that the expression 'A may possibly belong to every *B*' might be used in two ways. First then we must state the nature and characteristics of the deduction which arises if *B* is possible of the subject of *C*, and *A* is possible of the subject of *B*. For thus both propositions are assumed in the mode of possibility; but whenever *A* is possible of the subject of *B*, [35] one

proposition is simple, the other possible. Consequently we must start from propositions which are similar in form, as in the other cases.

14 · Whenever *A* may belong to every *B*, and *B* to every *C*, there will be a perfect deduction that *A* may belong to every *C*. This is clear from the definition; for it was in this way that we explained ‘to be possible to belong to every’. Similarly if it [33<sup>a</sup>1] is possible for *A* to belong to no *B*, and for *B* to belong to every *C*, then it is possible for *A* to belong to no *C*. For the statement that it is possible for *A* not to belong to that of which *B* may be true means (as we saw) that none of those things which can fall under *B* is left out of account. But whenever *A* may belong to every *B*, and *B* [5] may belong to no *C*, then indeed no deduction results from the propositions assumed; but if *BC* is converted after the manner of possibility, the same deduction results as before. For since it is possible that *B* should belong to no *C*, it is possible also that it should belong to every *C*. This has been stated above. Consequently if *B* [10] is possible for every *C*, and *A* is possible for every *B*, the same deduction again results. Similarly if in both propositions the negative is joined with ‘it is possible’: e.g. if *A* may belong to no *B*, and *B* to no *C*. No deduction results from the assumed [15] propositions, but if they are converted we shall have the same deduction as before. It is clear then that if the negation relates either to the minor extreme or to both the propositions, either no deduction results, or if one does it is not perfect. For the necessity results from the conversion. [20]

But if one of the propositions is universal, the other particular, when one relating to the major extreme is universal there will be a deduction. For if *A* is possible for every *B*, and *B* for some *C*, then *A* is possible for some *C*. This is clear from the definition of being possible. Again if *A* may belong to no *B*, and *B* may [25] belong to some *C*, it is necessary that *A* may not belong to some of the *C*s. The proof is the same as above. But if the particular proposition is negative, and the universal is affirmative, and they are in the same position as before, e.g. *A* is possible for every *B*, *B* may not belong to some *C*, then an evident deduction does not result from the [30] assumed propositions; but if the particular is converted and it is laid down that *B* may belong to some *C*, we shall have the same conclusion as before, as in the cases given at the beginning.

But if the proposition relating to the major extreme is particular, the minor [35] universal, whether both are affirmative, or negative, or different in quality, or if both are indefinite or particular, in no way will a

deduction be possible. For nothing prevents *B* from reaching beyond *A*, so that as predicates they cover unequal areas. Let *C* be that by which *B* extends beyond *A*. To *C* it is not possible that *A* should belong—either to all or to none or to some or not to some, since propositions in the [33<sup>b</sup>1] mode of possibility are convertible and it is possible for *B* to belong to more things than *A*. Further, this is obvious if we take terms; for if the propositions are as [5] assumed, the first term is both possible for none of the last and must belong to all of it. Take as terms common to all the cases under consideration animal, white, man, where the first belongs necessarily to the last; animal, white, garment, where it is not possible that the first should belong to the last. It is clear then that if the terms are related in this manner, no deduction results. For every deduction proves that [10] something belongs either simply or necessarily or possibly. It is clear that there is no proof of the first or of the second. For the affirmative is destroyed by the negative, and the negative by the affirmative. There remains the proof of possibility. But this is impossible. For it has been proved that if the terms are related in this manner it is [15] both necessary that the first should belong to all the last and not possible that it should belong to any. Consequently there cannot be a deduction to prove the possibility; for the necessary (as we stated) is not possible.

It is clear that if the terms are universal in possible propositions a deduction [20] always results in the first figure, whether they are affirmative or negative, but that a perfect deduction results in the first case, an imperfect in the second. But possibility must be understood according to the definition laid down, not as covering necessity. This is sometimes forgotten.

[25] **15** · If one proposition is simple, the other possible, whenever the one related to the major extreme indicates possibility all the deductions will be perfect and establish possibility in the sense defined; but whenever the one related to the minor indicates possibility all the deductions will be imperfect, and those which are [30] negative will establish not possibility according to the definition, but that something does not necessarily belong to any, or to every. For if something does not necessarily belong to any or to every, we say it is possible that it should belong to none or not to every. Let *A* be possible for every *B*, and let *B* belong to every *C*. Since *C* falls under [35] *B*, and *A* is possible for every *B*, clearly it is possible for every *C* also. So a perfect deduction results.

Likewise if the proposition  $AB$  is negative, and  $BC$  is affirmative, the former stating possible, the latter simple attribution, a perfect deduction results proving that  $A$  possibly belongs to no  $C$ .

[34<sup>a</sup>1] It is clear that perfect deductions result if the proposition related to the minor term states simple belonging; but that deductions will result in the opposite case, must be proved *per impossibile*. At the same time it will be evident that they are imperfect; for the proof proceeds not from the propositions assumed. First we must [5] state that if  $B$ 's being follows necessarily from  $A$ 's being,  $B$ 's possibility will follow necessarily from  $A$ 's possibility. For suppose, the terms being so related, that  $A$  is possible, and  $B$  is impossible. If then that which is possible, when it is possible for it to be, might happen, and if that which is impossible, when it is impossible, could not [10] happen, and if at the same time  $A$  is possible and  $B$  impossible, it would be possible for  $A$  to happen without  $B$ , and if to happen, then to be. For that which has happened, when it has happened, is. But we must take the impossible and the possible not only in the sphere of becoming, but also in the spheres of truth and [15] belonging, and the various other spheres in which we speak of the possible; for it will be alike in all. Further we must understand the statement that  $B$ 's being follows from  $A$ 's being, not as meaning that if some single thing  $A$  is,  $B$  will be; for nothing follows of necessity from the being of some one thing, but from two at least, i.e. when the propositions are related in the manner stated to be that of a deduction. For if  $C$  is predicated of  $D$ , and  $D$  of  $F$ , then  $C$  is necessarily predicated of  $F$ . And if each [20] is possible, the conclusion also is possible. If then, for example, one should indicate the propositions by  $A$ , and the conclusion by  $B$ , it would not only result that if  $A$  is necessary,  $B$  is necessary, but also that if  $A$  is possible,  $B$  is possible.

Since this is proved it is evident that if a false and not impossible assumption is [25] made, the consequence of the assumption will also be false and not impossible: e.g. if  $A$  is false, but not impossible, and if  $B$  follows from  $A$ ,  $B$  also will be false but not impossible. For since it has been proved that if  $B$ 's being follows from  $A$ 's being, [30] then  $B$ 's possibility will follow from  $A$ 's possibility, and  $A$  is assumed to be possible, consequently  $B$  will be possible; for if it were impossible, the same thing would at the same time be possible and impossible.

Since we have clarified these points, let  $A$  belong to every  $B$ , and  $B$  be possible for every  $C$ : it is necessary then that  $A$  should possibly belong to every  $C$ . Suppose [35] that it is not possible, but assume that  $B$  belongs to every  $C$ : this is false but not impossible. If then  $A$  is not possible for every

$C$  but  $B$  belongs to every  $C$ , then  $A$  is not possible for every  $B$ ; for a deduction is formed in the third figure. But it was [40] assumed that  $A$  possibly belonged to every  $B$ . It is necessary then that  $A$  is possible for every  $C$ . For though the assumption we made is false and not impossible, the [34<sup>b</sup>1] conclusion is impossible. [It is possible also in the first figure to bring about the impossibility, by assuming that  $B$  belongs to  $C$ . For if  $B$  belongs to every  $C$ , and  $A$  is possible for every  $B$ , then  $A$  would be possible for every  $C$ . But the assumption was [5] made that  $A$  is not possible for every  $C$ .]<sup>10</sup>

We must understand 'that which belongs to every' with no limitation in respect of time, e.g. to the present or to a particular period, but without qualification. For it is by the help of such propositions that we make deductions, since if the proposition is understood with reference to the present moment, there cannot be a deduction. [10] For nothing perhaps prevents man belonging at a particular time to everything that is moving, i.e. if nothing else were moving; but moving is possible for every horse; yet man is possible for no horse. Further let the first term be animal, the middle moving, the last man. The propositions then will be as before, but the conclusion [15] necessary, not possible. For man is necessarily animal. It is clear then that the universal must be understood without qualification, and not limited in respect of time.

Again let the proposition  $AB$  be universal and negative, and assume that  $A$  belongs to no  $B$ , but  $B$  possibly belongs to every  $C$ . These being laid down, it is [20] necessary that  $A$  possibly belongs to no  $C$ . Suppose that it cannot belong, and that  $B$  belongs to  $C$ , as above. It is necessary then that  $A$  belongs to some  $B$ ; for we have a deduction in the third figure; but this is impossible. Thus it will be possible for  $A$  to [25] belong to no  $C$ ; for if that is supposed false, the consequence is impossible. This deduction then does not establish possibility according to the definition, but that it belongs necessarily to none (for this is the contradictory of the assumption which [30] was made; for it was supposed that  $A$  necessarily belongs to some  $C$ , but a deduction *per impossibile* establishes the contradictory assertion). Further, it is clear also from an example that the conclusion will not establish possibility. Let  $A$  be raven,  $B$  intelligent, and  $C$  man.  $A$  then belongs to no  $B$ ; for no intelligent thing is a raven. [35] But  $B$  is possible for every  $C$ ; for every man may be intelligent. But  $A$  necessarily belongs to no  $C$ ; so the conclusion does not establish possibility. But neither is it always necessary. Let  $A$  be moving,  $B$  science,  $C$  man.  $A$  then will belong to no  $B$  [40] but  $B$  is possible for every  $C$ . And the conclusion will not be necessary. For it is not necessary that no man

should move; indeed it is not necessary that some man should [35<sup>a</sup>1] move. Clearly then the conclusion establishes that it belongs necessarily to none. But we must take our terms better.

If the negative relates to the minor extreme and indicates possibility, from the [5] actual propositions taken there can be no deduction, but if the possible proposition is converted, a deduction will be possible, as before. Let  $A$  belong to every  $B$ , and let  $B$  possibly belong to no  $C$ . If the terms are arranged thus, nothing necessarily follows; [10] but if  $BC$  is converted and it is assumed that  $B$  is possible for every  $C$ , a deduction results as before; for the terms are in the same relative positions. Likewise if both the relations are negative, if  $AB$  indicates that it does not belong, and  $BC$  that it possibly belongs to none. Through the propositions actually taken nothing necessary [15] results in any way; but if the possible proposition is converted, we shall have a deduction. Suppose that  $A$  belongs to no  $B$ , and  $B$  may belong to no  $C$ . Through these comes nothing necessary. But if  $B$  is assumed to be possible for every  $C$  (and this is true) and if the proposition  $AB$  remains as before, we shall again have the [20] same deduction. But if it be assumed that  $B$  does not belong to every  $C$ , instead of possibly not belonging, there cannot be a deduction at all, whether the proposition  $AB$  is negative or affirmative. As common instances of a necessary and positive relation we may take the terms white, animal, snow; of an impossible relation, white, animal, pitch.

[25] Clearly then if the terms are universal, and one of the propositions is simple, the other possible, whenever the proposition relating to the minor extreme is possible, a deduction always results, only sometimes it results from the propositions that are taken, sometimes it requires the conversion of one proposition. We have [30] stated when each of these happens and the reason why. But if one of the relations is universal, the other particular, then whenever the one relating to the major extreme is universal and possible, whether affirmative or negative, and the particular is affirmative and simple, there will be a perfect deduction, just as when the terms are [35] universal. The demonstration is the same as before. But whenever the one relating to the major extreme is universal, but simple rather than possible, and the other is particular and possible, whether both are negative or affirmative, or one is negative, the other affirmative, in all cases there will be an imperfect deduction. Only some of them will be proved *per impossibile*, others by the conversion of the possible [35<sup>b</sup>1] proposition, as has been shown above. And a deduction will be possible by means of conversion when the proposition relating to the major extreme is universal and simple, and the other

particular, negative, and possible, e.g. if  $A$  belongs to every  $B$  [5] or to no  $B$ , and  $B$  may not belong to some  $C$ . For if  $BC$  is converted in respect of possibility, a deduction results. But whenever the particular is simple and negative, there cannot be a deduction. As instances of the positive relation we may take the terms white, animal, snow; of the negative, white, animal, pitch. For the [10] demonstration must be made through the indefinite nature of the particular proposition. But if the universal relates to the minor extreme, and the particular to the major, whether either is negative or affirmative, possible or simple, in no way is a deduction possible. Nor is a deduction possible when the propositions are [15] particular or indefinite, whether possible or simple, or the one possible, the other simple. The demonstration is the same as above. As instances of the necessary and positive relation we may take the terms animal, white, man; of the impossible relation, animal, white, garment. It is evident then that if the proposition relating to [20] the major extreme is universal, a deduction always results, but if the one relating to the minor is universal nothing at all can ever be proved.

16 · Whenever one proposition indicates necessity, the other possibility, there will be a deduction when the terms are related as before; and a perfect [25] deduction when the necessity relates to the minor extreme. If the terms are affirmative the conclusion will be possible, not simple, whether they are universal or not; but if one is affirmative, the other negative, when the affirmative is necessary the conclusion will be possible, not negative and simple; but when the negative is necessary the conclusion will be both possible negative, and simple negative, [30] whether the terms are universal or not. Possibility in the conclusion must be understood in the same manner as before. There cannot be a deduction to a necessary negative; for ‘not necessarily to belong’ is different from ‘necessarily not [35] to belong’.

If the terms are affirmative, clearly the conclusion which follows is not necessary. Suppose  $A$  necessarily belongs to every  $B$ , and let  $B$  be possible for every  $C$ . We shall have an imperfect deduction that  $A$  may belong to every  $C$ . That it is imperfect is clear from the proof; for it will be proved in the same manner as above. [36<sup>a</sup>1] Again, let  $A$  be possible for every  $B$ , and let  $B$  necessarily belong to every  $C$ . We shall then have a deduction that  $A$  may belong to every  $C$ , not that  $A$  does belong to [5] every  $C$ ; and it is perfect, not imperfect; for it is perfected directly through the original propositions.



But if the propositions are not similar in quality, suppose first that the negative is necessary, and let  $A$  be possible for no  $B$ , but let  $B$  be possible for every  $C$ . It is necessary then that  $A$  belongs to no  $C$ . For suppose  $A$  to belong to every  $C$  or to some [10]  $C$ . Now we assumed that  $A$  is not possible for any  $B$ . Since then the negative is convertible,  $B$  is not possible for any  $A$ . But  $A$  is supposed to belong to every  $C$  or to some  $C$ . Consequently  $B$  will not be possible for any  $C$  or for every  $C$ . But it was [15] originally laid down that  $B$  is possible for every  $C$ . And it is clear that the possibility of not belonging can be deduced, since the fact of not belonging can be. Again, let the affirmative proposition be necessary, and let  $A$  possibly not belong to any  $B$ , and let  $B$  necessarily belong to every  $C$ . The deduction will be perfect, but it will [20] establish a possible negative, not a simple negative. For the proposition relating to the major was assumed in this way; and further it is not possible to prove *per impossibile*. For if it were supposed that  $A$  belongs to some  $C$ , and it is laid down that  $A$  possibly does not belong to any  $B$ , no impossible relation between  $B$  and  $C$  [25] follows from this. But if the negative relates to the minor extreme, when it indicates possibility a deduction is possible by conversion, as above; but when impossibility, not. Nor again when both are negative, and the one relating to the minor is not possible. The same terms as before serve both for the positive relation, white, [30] animal, snow, and for the negative relation, white, animal, pitch.

The same relation will obtain in particular deductions. Whenever the negative is necessary, the conclusion will be negative and simple: e.g. if it is not possible that [35]  $A$  should belong to any  $B$ , but  $B$  may belong to some  $C$ , it is necessary that  $A$  should not belong to some  $C$ . For if  $A$  belongs to every  $C$ , but cannot belong to any  $B$ , neither can  $B$  belong to any  $A$ . So if  $A$  belongs to every  $C$ ,  $B$  can belong to no  $C$ . But it was laid down that  $B$  may belong to some  $C$ . But when the particular affirmative [36<sup>b</sup>1] in the negative deduction, i.e.  $BC$ , or the universal in the affirmative i.e.  $AB$ , is necessary, there will not be a simple conclusion. The demonstration is the same as before. But if the term relating to the minor extreme is universal, and possible, whether affirmative or negative, and the particular is necessary, there cannot be a [5] deduction. Terms where the relation is positive and necessary: animal, white, man; where it is necessary and negative: animal, white, garment. But when the universal is necessary, the particular possible, if the universal is negative we may take the [10] terms animal, white, raven to illustrate the positive relation, or animal, white, pitch to illustrate the negative; and if the universal is affirmative we may take the terms animal, white, swan to

illustrate the positive relation, and animal, white, snow to illustrate the impossible relation. Nor again is a deduction possible when the propositions are indefinite, or both particular. Terms applicable in either case to illustrate the positive relation are animal, white, man; to illustrate the negative, [15] animal, white, inanimate. For the relation of animal to some white, and of white to some inanimate, is both necessary and positive and necessary and negative. Similarly if the relation is possible; so the terms may be used for all cases.

Clearly then from what has been said a deduction results or not from similar [20] relations of the terms whether we are dealing with simple or with necessary propositions, with this exception, that if the negative proposition is simple the conclusion is possible, but if the negative is necessary the conclusion is both possible and negative simple. [It is clear also that all deductions are imperfect and are [25] perfected by means of the figures above mentioned.]<sup>11</sup>

**17** · In the second figure whenever both propositions are possible, no deduction is possible, whether they are affirmative or negative, universal or particular. But when one indicates belonging, the other possibility, if the affirmative indicates belonging no deduction is possible, but if the universal negative does a [30] conclusion can always be drawn. Similarly when one proposition is necessary, the other possible. Here also we must understand the term ‘possible’ in the conclusions in the same sense as before.

First we must prove that the negative possible proposition is not convertible, [35] e.g. if *A* may belong to no *B*, it does not follow that *B* may belong to no *A*. For suppose it to follow and assume that *B* may belong to no *A*. Since then possible affirmations are convertible with negations, whether they are contraries or contradictories, and since *B* may belong to no *A*, it is clear that *B* may belong to [37<sup>a</sup>1] every *A*. But this is false; for if all this can be that, it does not follow that all that can be this: consequently the negative proposition is not convertible. Further, there is no reason why *A* may not belong to no *B*, while *B* necessarily does not belong to some [5] *A*; e.g. it is possible that no man should be white (for it is also possible that every man should be white), but it is not true to say that it is possible that no white thing should be a man; for many white things are necessarily not men, and the necessary (as we saw) is other than the possible.

Moreover it is not possible to prove the convertibility of these

propositions by a *reductio ad absurdum*, i.e. by claiming that since it is false that *B* may belong to no [10] *A*, it is true that it cannot belong to no *A* (for the one statement is the contradictory of the other); but if this is so, it is true that *B* necessarily belongs to some *A*; and consequently *A* necessarily belongs to some *B*—but this is impossible. The argument cannot be admitted; for it does not follow that some *A* is necessarily *B*, if it is not possible that no *A* should be *B*. For the latter expression is used in two ways, [15] one if some *A* is necessarily *B*, another if some *A* is necessarily not *B*. For it is not true to say that that which necessarily does not belong to some of the *As* may not belong to every *A*, just as it is not true to say that what necessarily belongs to some *A* may belong to every *A*. If any one then should claim that because it is not possible [20] for *C* to belong to every *D*, it necessarily does not belong to some *D*, he would make a false assumption; for it does belong to every *D*, but because in some cases it belongs necessarily, therefore we say that it is not possible for it to belong to every. Hence both ‘necessarily belongs to some’ and ‘necessarily does not belong to some’ are opposed to ‘may belong to every’. Similarly also they are opposed to ‘may belong to [25] no’. It is clear then that in relation to what is possible and not possible, in the sense originally defined, we must assume, not that *A* necessarily belongs to some *B*, but that *A* necessarily does not belong to some *B*. But if this is assumed, no impossibility results; consequently there is no deduction. It is clear from what has been said that [30] the negative is not convertible.

This being proved, suppose it possible that *A* may belong to no *B* and every *C*. By means of conversion no deduction will result; for such a proposition, as has been said, is not convertible. Nor can a proof be obtained by a *reductio*; for if it is assumed that *B* cannot not belong to every *C*, no false consequence results; for *A* [35] may belong both to every *C* and to no *C*. In general, if there is a deduction, it is clear that its conclusion will be possible because neither of the propositions is simple; and this must be either affirmative or negative. But neither is possible. Suppose the [37<sup>b</sup>1] conclusion is affirmative: it will be proved by an example that the predicate cannot belong to the subject. Suppose the conclusion is negative: it will be proved that it is not possible but necessary. Let *A* be white, *B* man, *C* horse. It is possible then for *A* [5] to belong to all of the one and to none of the other. But it is not possible for *B* to belong or not to belong to *C*. That it is not possible for it to belong, is clear. For no horse is a man. Neither is it possible for it not to belong. For it is necessary that no horse should be a man, but the necessary we found to be different from the possible. [10] No deduction then results. *A*

similar proof can be given if the negative is the other way about, or if both are affirmative or negative. The demonstration can be made by means of the same terms. And whenever one is universal, the other particular, or [15] both are particular or indefinite, or in whatever other way the propositions can be altered, the proof will always proceed through the same terms. Clearly then, if both the propositions are possible, no deduction results.

18 · But if one indicates belonging, the other possibility, if the affirmative [20] indicates belonging and the negative possibility no deduction will be possible, whether the terms are universal or particular. The proof is the same as above, and by means of the same terms. But when the affirmative indicates possibility, and the [25] negative belonging, we shall have a deduction. Suppose *A* belongs to no *B*, but can belong to every *C*. If the negative is converted, *B* will belong to no *A*. But *A ex hypothesi* can belong to every *C*: so a deduction is made, proving by means of the first figure that *B* may belong to no *C*. Similarly also if the negative relates to *C*. But [30] if both are negative, one indicating non-belonging, the other possibility, nothing follows necessarily from these premisses as they stand, but if the possible proposition is converted a deduction is formed to prove that *B* may belong to no *C*, [35] as before; for we shall again have the first figure. But if both are affirmative, no deduction will be possible. Terms for when the relation is positive: health, animal, man; for when it is negative: health, horse, man.

The same will hold good if the deductions are particular. Whenever the [38<sup>a</sup>1] affirmative is simple, whether universal or particular, no deduction is possible (this is proved similarly and by the same examples as above), but when the negative is, a conclusion can be drawn by means of conversion, as before. Again if both the [5] relations are negative, and the simple is universal, although no conclusion follows from the actual propositions, a deduction can be obtained by converting the possible as before. But if the negative is simple, but particular, no deduction is possible, whether the other proposition is affirmative or negative. Nor can a conclusion be [10] drawn when both are indefinite, whether affirmative or negative, or particular. The proof is the same and by the same terms.

19 · If one of the propositions indicates necessity, the other possibility, then if the negative is necessary there is a deduction not merely that it can not belong but also that it does not belong; but if the

affirmative is necessary, no conclusion is [15] possible. Suppose that *A* necessarily belongs to no *B*, but may belong to every *C*. If the negative is converted *B* will belong to no *A*; but *A ex hypothesi* may belong to every *C*: so once more a conclusion is drawn by the first figure that *B* may belong to [20] no *C*. But at the same time it is clear that *B* will not belong to any *C*. For assume that it does; then if *A* cannot belong to any *B*, and *B* belongs to some *C*, *A* cannot belong to some *C*; but *ex hypothesi* it may belong to all. A similar proof can be given [25] if the negative relates to *C*.

Again let the affirmative be necessary, and the other possible; i.e. suppose that *A* may belong to no *B*, but necessarily belongs to every *C*. When the terms are arranged in this way no deduction is possible. For it turns out that *B* necessarily [30] does not belong to *C*. Let *A* be white, *B* man, *C* swan. White then necessarily belongs to swan, but may belong to no man; and man necessarily belongs to no swan. Clearly then we cannot draw a possible conclusion; for that which is necessary is [35] admittedly distinct from that which is possible. Nor again can we draw a necessary conclusion: for that presupposes that both propositions are necessary, or at any rate the negative one. Further it is possible also, when the terms are so arranged, that *B* should belong to *C*; for nothing prevents *C* falling under *B*, *A* being possible for [40] every *B*, and necessarily belonging to *C*; e.g. if *C* is awake, *B* animal, *A* motion. For motion necessarily belongs to what is awake, and is possible for every animal; and [38<sup>b</sup>1] everything that is awake is animal. Clearly then the conclusion cannot be negative and simple, if the relation must be positive when the terms are related as above. Nor can the opposite affirmations be established: consequently no deduction is possible. A similar proof is possible if the affirmative is the other way about. [5]

But if the propositions are similar in quality, when they are negative a deduction can always be formed by converting the possible as before. Suppose *A* necessarily does not belong to *B*, and possibly may not belong to *C*: if the [10] propositions are converted *B* belongs to no *A*, and *A* may possibly belong to every *C*; thus we have the first figure. Similarly if the negative relates to *C*. But if they are affirmative there cannot be a deduction. Clearly the conclusion cannot be a negative simple or a negative necessary proposition because no negative has been [15] laid down either in the simple or in the necessary mode. Nor can the conclusion be a possible negative proposition. For if the terms are so related, *B* necessarily will not belong to *C*; e.g. suppose that *A* is white, *B* swan, *C* man. Nor can the opposite [20] affirmations be established, since

we have shown that *B* necessarily does not belong to *C*. A deduction then is not possible at all.

Similar relations will obtain in particular deductions. For whenever the [25] negative is universal and necessary, a deduction will always be possible to prove both that it may and that it does not (the proof proceeds by conversion); but when the affirmative is universal and necessary, no conclusion can be drawn. This can be proved in the same way as for universal deductions, and by the same terms. Nor is a conclusion possible when both are affirmative: this also may be proved as above. But [30] when both are negative, and the one which signifies non-belonging is universal and necessary, though nothing follows necessarily from the premisses as they are stated, [35] a conclusion can be drawn as above if the possible proposition is converted. But if both are indefinite or particular, no deduction can be formed. The same proof will serve, and the same terms.

It is clear then from what has been said that if the universal and negative proposition is necessary, a deduction is always possible, proving not merely that it [40] can not belong but also that it does not; but if the affirmative is necessary no conclusion can be drawn. It is clear too that a deduction is possible or not under the [39<sup>a</sup>1] same conditions whether simple or necessary. And it is clear that all the deductions are imperfect, and are completed by means of the figures mentioned.

[5] **20** · In the last figure a deduction is possible whether both or only one of the propositions is possible. When the propositions indicate possibility the conclusion will be possible; and also when one indicates possibility, the other belonging. But when the other is necessary, if it is affirmative the conclusion will be neither [10] necessary nor simple; but if it is negative there will be a deduction that it does not belong, as above. In these also we must understand the expression ‘possible’ in the conclusion in the same way as before.

[15] First let them be possible and suppose that both *A* and *B* may belong to every *C*. Since then the affirmative is convertible into a particular, and *B* may belong to every *C*, it follows that *C* may belong to some *B*. So, if *A* is possible for every *C*, and *C* is possible for some *B*, then *A* must be possible for some *B*. For we have got the [20] first figure. And if *A* may belong to no *C*, but *B* may belong to every *C*, it follows that *A* may not belong to some *B*; for we shall have the first figure again by conversion. But if both should be negative no necessary consequence will

follow [25] from them as they are stated, but if the propositions are converted there will be a deduction as before. For if  $A$  and  $B$  may not belong to  $C$ , if 'may belong' is substituted we shall again have the first figure by means of conversion. But if one of the terms is universal, the other particular, a deduction will be possible, or not, [30] under the same arrangement of the terms as in the case of simple propositions. Suppose that  $A$  may belong to every  $C$ , and  $B$  to some  $C$ . We shall have the first figure again if the particular proposition is converted. For if  $A$  is possible for every [35]  $C$ , and  $C$  for some  $B$ , then  $A$  is possible for some  $B$ . Similarly if  $BC$  is universal. Likewise also if  $AC$  is negative, and  $BC$  affirmative; for we shall again have the first figure by conversion. But if both should be negative—the one universal and the [39<sup>b</sup>1] other particular—although no conclusion will follow from them as they are put, it will follow if they are converted, as above. But when both are indefinite or particular, no deduction can be formed; for  $A$  must belong both to every  $B$  and to no  $B$ . To illustrate the affirmative relation take the terms animal, man, white; to [5] illustrate the negative, take the terms horse, man, white, white being the middle term.

21 · If one of the propositions indicates belonging, the other possibility, the conclusion will be that it is possible, not that it belongs; and a deduction will be [10] possible under the same arrangement of the terms as before. First let them be affirmative: suppose that  $A$  belongs to every  $C$ , and  $B$  may belong to every  $C$ . If  $BC$  is converted, we shall have the first figure, and the conclusion that  $A$  may belong to some  $B$ . For when one of the propositions in the first figure indicates possibility, the [15] conclusion also (as we saw) is possible. Similarly if  $BC$  indicates belonging,  $AC$  possibility; or if  $AC$  is negative,  $BC$  affirmative, no matter which of the two is simple; in both cases the conclusion will be possible; for the first figure is obtained once more, and it has been proved that if one proposition indicates possibility in that [20] figure the conclusion also will be possible. But if the negative relates to the minor extreme, or if both are negative, no conclusion can be drawn from them as they stand, but if they are converted a deduction is obtained as before. [25]

If one of the propositions is universal, the other particular, then when both are affirmative, or when the universal is negative, the particular affirmative, we shall have the same sort of deductions; for all are completed by means of the first figure. So it is clear that the deduction will be not that it belongs but that it is possible. But [30] if the

affirmative is universal, the negative particular, the proof will proceed by a *reductio ad impossibile*. Suppose that *B* belongs to every *C*, and *A* may not belong to some *C*: it follows that *A* may not belong to some *B*. For if *A* necessarily belongs [35] to every *B*, and *B* (as has been assumed) belongs to every *C*, *A* will necessarily belong to every *C*; for this has been proved before. But it was assumed that *A* may not belong to some *C*.

Whenever both are indefinite or particular, no deduction will be possible. The [40<sup>a</sup>1] demonstration is the same as before, and proceeds by means of the same terms.

**22** · If one of the propositions is necessary, the other possible, when the [5] terms are affirmative a possible conclusion can always be drawn; when one is affirmative, the other negative, if the affirmative is necessary a possible negative can be inferred; but if the negative is necessary both a possible and a simple negative conclusion are possible. But a necessary negative conclusion will not be [10] possible, any more than in the other figures.

Suppose first that the terms are affirmative, i.e. that *A* necessarily belongs to every *C*, and *B* may belong to every *C*. Since then *A* must belong to every *C*, and *C* may belong to some *B*, it follows that *A* may (not does) belong to some *B*; for so it [15] resulted in the first figure. A similar proof may be given if *BC* is necessary, and *AC* is possible. Again suppose one is affirmative, the other negative, the affirmative being necessary, i.e. suppose *A* may belong to no *C*, but *B* necessarily belongs to [20] every *C*. We shall have the first figure once more; and—since the negative proposition indicates possibility—it is clear that the conclusion will be possible; for when the propositions stand thus in the first figure, the conclusion (as we found) is possible. But if the negative proposition is necessary, the conclusion will be not only [25] that *A* may not belong to some *B* but also that it does not belong to some *B*. For suppose that *A* necessarily does not belong to *C*, but *B* may belong to every *C*. If the affirmative *BC* is converted, we shall have the first figure, and the negative proposition is necessary. But when the propositions stood thus, it resulted that *A* [30] might not belong to some *C*, and that it did not belong to some *C*; consequently here it follows that *A* does not belong to some *B*. But when the negative relates to the minor extreme, if it is possible we shall have a deduction by altering the proposition, [35] as before; but if it is necessary no deduction can be formed. For *A* both necessarily belongs to every *B*, and cannot belong to any *B*. To illustrate



the former take the terms sleep, sleeping horse, man; to illustrate the latter take the terms sleep, waking horse, man.

Similar results will obtain if one of the terms is related universally to the [40<sup>b</sup>1] middle, the other in part. If both are affirmative, the conclusion will be possible, not simple; and also when one is negative, the other affirmative, the latter being necessary. But when the negative is necessary, the conclusion also will be a simple [5] negative; for the same kind of proof can be given whether the terms are universal or not. For the deductions must be made perfect by means of the first figure, so that a result which follows in the first figure follows also in the third. But when the negative is universal and relates to the minor extreme, if it is possible a deduction [10] can be formed by means of conversion; but if it is necessary a deduction is not possible. The proof will follow the same course as for the universal deductions; and the same terms may be used.

It is clear then in this figure also when and how a deduction can be formed, and when the conclusion is possible, and when it is simple. It is evident also that all [15] deductions in this figure are imperfect, and that they are made perfect by means of the first figure.

**23** · It is clear from what has been said that the deductions in these figures are made perfect by means of the universal deductions in the first figure and are [20] reduced to them. That every deduction without qualification can be so treated, will be clear presently, when it has been proved that every deduction is formed through one or other of these figures.

It is necessary that every demonstration and every deduction should prove either that something belongs or that it does not, and this either universally or in [25] part, and further either probatively or hypothetically. One sort of hypothetical proof is the *reductio ad impossibile*. Let us speak first of probative deductions; for after it has been proved in their case, the truth of our contention will be clear with regard to those which are proved *per impossibile*, and in general hypothetically.

[30] If then one wants to deduce that *A* belongs or does not belong to *B*, one must assume something of something. If now *A* should be assumed of *B*, the proposition originally in question will have been assumed. But if *A* should be assumed of *C*, but *C* should not be assumed of anything, nor anything of it, nor anything else of *A*, no [35] deduction will be possible. For nothing necessarily follows from the assumption of some one thing concerning some one thing. Thus we must take another proposition as

well. If then *A* be assumed of something else, or something else of *A*, or something different of *C*, nothing prevents a deduction being formed, but it will not be in relation to *B* through the propositions taken. Nor when *C* belongs to something [41<sup>a</sup>1] else, and that to something else and so on, no connexion however being made with *B*, will a deduction be possible in relation to *B*. For in general we stated that no deduction can establish the attribution of one thing to another, unless some middle term is taken, which is somehow related to each by way of predication. For a deduction in general is made out of propositions, and a deduction referring to *this* [5] out of propositions with the same reference, and a deduction relating *this* to *that* proceeds through propositions which relate this to that. But it is impossible to take a proposition in reference to *B*, if we neither affirm nor deny anything of it; or again to take a proposition relating *A* to *B*, if we take nothing common, but affirm or deny peculiar attributes of each. So we must take a middle term relating to both, which [10] will connect the predications, if we are to have a deduction relating this to that. If then we must take something common in relation to both, and this is possible in three ways (either by predicating *A* of *C*, and *C* of *B*, or *C* of both, or both of *C*), and [15] these are the figures of which we have spoken, it is clear that every deduction must be made in one or other of these figures. The argument is the same if several middle terms should be necessary to establish the relation to *B*; for the figure will be the same whether there is one middle term or many. [20]

It is clear then that probative deductions are effected by means of the aforesaid figures; the following considerations will show that *reductions ad impossibile* also are effected in the same way. For all who effect an argument *per impossibile* deduce what is false, and prove the original conclusion hypothetically when something impossible results from the assumption of its contradictory; e.g. that the [25] diagonal of the square is incommensurate with the side, because odd numbers are equal to evens if it is supposed to be commensurate. One deduces that odd numbers come out equal to evens, and one proves hypothetically the incommensurability of the diagonal, since a falsehood results from its contradictory. For this we found to [30] be deducing *per impossibile*, viz. proving something impossible by means of an hypothesis conceded at the beginning. Consequently, since the falsehood is established in reductions *ad impossibile* by a probative deduction, and the original conclusion is proved hypothetically, and we have already stated that probative [35] deductions are effected by means of these figures, it is evident that deductions *per impossibile* also will be made through these figures.

Likewise all the other hypothetical deductions; for in every case the deduction leads up to the substituted proposition; but the original thesis is reached by means of a concession or some other hypothesis. But if this is true, every demonstration and every deduction must [41<sup>b</sup>1] be formed by means of the three figures mentioned above. But when this has been shown it is clear that every deduction is perfected by means of the first figure and is reducible to the universal deductions in this figure. [5]

24 · Further in every deduction one of the terms must be affirmative, and universality must be present: unless one of the premisses is universal either a deduction will not be possible, or it will not refer to the subject proposed, or the original position will be begged. Suppose we have to prove that pleasure in music is [10] good. If one should claim that pleasure is good without adding ‘every’, no deduction will be possible; if one should claim that some pleasure is good, then if it is different from pleasure in music, it is not relevant to the subject proposed; if it is this very pleasure, one is assuming that which was originally proposed. This is more obvious in geometrical proofs, e.g. that the angles at the base of an isosceles triangle are [15] equal. Suppose the lines *A* and *B* have been drawn to the centre. If then one should assume that the angle *AC* is equal to the angle *BD*, without claiming generally that angles of semicircles are equal; and again if one should assume that the angle *C* is equal to the angle *D*, without the additional assumption that every angle of a segment is equal to every other angle of the same segment; and further if one should assume that when equal angles are taken from the whole angles, which [20] are themselves equal, the remainders *E* and *F* are equal, he will beg the original position, unless he also assumes that when equals are taken from equals the remainders are equal.

It is clear then that in every deduction there must be a universal, and that a universal is proved only when all the terms are universal, while a particular is [25] proved in both cases; consequently if the conclusion is universal, the terms also must be universal, but if the terms are universal it is possible that the conclusion may not be universal. And it is clear also that in every deduction either both or one of the propositions must be like the conclusion. I mean not only in being affirmative or [30] negative, but also in being necessary, simple, or possible. We must consider also the other forms of predication.

It is clear also when a deduction in general can be made and when it

cannot; and when a potential, when a perfect deduction can be formed; and that if a deduction is formed the terms must be arranged in one of the ways that have been [35] mentioned.

25 · It is clear too that every demonstration will proceed through three terms and no more, unless the same conclusion is established by different pairs of propositions; e.g. *E* may be established through *A* and *B*, and through *C* and *D*, or through *A* and *B*, or *A* and *C* and *D*. For nothing prevents there being several middles for the same terms. But in that case there is not one but several deductions. [42<sup>a</sup>1] Or again when each of *A* and *B* is obtained by deduction, e.g. *A* by means of *D* and *E*, and again *B* by means of *F* and *G*. Or one may be obtained by deduction, the other by induction. But thus also the deductions are many; for the conclusions are [5] many, e.g. *A* and *B* and *C*.

But if this can be called one deduction, not many, the same conclusion may be reached by several terms in this way, but it cannot be reached as *C* is established by means of *A* and *B*. Suppose that *E* is inferred from *A*, *B*, *C*, and *D*. It is necessary [10] then that of these one should be related to another as whole to part; for it has already been proved that if a deduction is formed some of its terms must be related in this way. Suppose then that *A* stands in this relation to *B*. Some conclusion then follows from them. It must either be *E* or one or other of *C* and *D*, or something other than these.

[15] If it is *E* the deduction will have *A* and *B* for its sole premisses. But if *C* and *D* are so related that one is whole, the other part, some conclusion will follow from them also; and it must be either *E*, or one or other of *A* and *B*, or something other than these. And if it is *E*, or *A* or *B*, either the deductions will be more than one, or the same thing happens to be inferred by means of several terms in the sense which we saw to be possible. But if the conclusion is other than *E* or *A* or *B*, the deductions [20] will be many, and unconnected with one another. But if *C* is not related to *D* as to make a deduction, the propositions will have been assumed to no purpose, unless for the sake of induction or of obscuring the argument or something of the sort.

But if from *A* and *B* there follows not *E* but some other conclusion, and if from [25] *C* and *D* either *A* or *B* follows or something else, then there are several deductions, and they do not establish the conclusion proposed; for we assumed that the deduction proved *E*. And if no conclusion follows from *C* and *D*, it turns out that these propositions have

been assumed to no purpose, and the deduction does not prove the original proposition.

So it is clear that every demonstration and every deduction will proceed [30] through three terms only.

This being evident, it is clear that a conclusion follows from two propositions and not from more than two for the three terms make two propositions unless a new proposition is assumed, as was said at the beginning, to perfect the deductions. It is [35] clear therefore that in whatever deductive argument the propositions through which the main conclusion follows (for some of the preceding conclusions must be propositions) are not even in number, this argument either has not been deduced or it has assumed more than was necessary to establish its thesis.

If then deductions are taken with respect to their main propositions, every [42<sup>b</sup>1] deduction will consist of an even number of propositions and an odd number of terms (for the terms exceed the propositions by one), and the conclusions will be half the number of the propositions. But whenever a conclusion is reached by means of preliminary deductions or by means of several continuous middle terms, e.g. *AB* [5] by means of *C* and *D*, the number of the terms will similarly exceed that of the propositions by one (for the extra term must either be added outside or inserted; but in either case it follows that the relations of predication are one fewer than the terms related, and the propositions will be equal in number to the relations of predication). [10] The propositions however will not always be even, the terms odd; but they will alternate—when the propositions are even, the terms must be odd; when the terms are even, the propositions must be odd; for along with one term one proposition is added, if a term is added from any quarter. Consequently since the propositions were (as we saw) even, and the terms odd, we must make them alternately even and [15] odd at each addition. But the conclusions will not follow the same arrangement either in respect to the terms or to the propositions. For if one term is added, conclusions will be added less by one than the pre-existing terms; for the conclusion is drawn not in relation to the single term last added, but in relation to all the rest, [20] e.g. if to *ABC* the term *D* is added, two conclusions are thereby added, one in relation to *A*, the other in relation to *B*. Similarly with any further additions. And similarly too if the term is inserted in the middle; for a deduction will not be effected in relation to one term only. Consequently the conclusions will be much more [25] numerous than the terms or the propositions.

26 · Since we understand the subjects with which deductions are concerned, what sort of conclusion is established in each figure, and in how many ways this is done, it is evident to us both what sort of problem is difficult and what sort is easy to [30] prove. For that which is concluded in many figures and through many moods is easier; that which is concluded in few figures and through few moods is more difficult to attempt. The universal affirmative is proved by means of the first figure only and by this in only one way; the negative is proved both through the first figure [35] and through the second, through the first in one way, through the second in two. The particular affirmative is proved through the first and through the last figure, in one way through the first, in three through the last. The particular negative is proved in all the figures, but once in the first, in two ways in the second, in three in [43<sup>a</sup>1] the third. It is clear then that the universal affirmative is most difficult to establish and most easy to overthrow. In general, universals are easier game for the destroyer than particulars; for whether the predicate belongs to none or not to some, they are [5] destroyed; and the particular negative is proved in all the figures, the universal negative in two. Similarly with negatives: the original statement is destroyed, whether the predicate belongs to all or to some; and this we found possible in two figures. But particular statements can be refuted in one way only—by proving that the predicate belongs either to all or to none. But particular statements are easier to [10] *establish*; for proof is possible in more figures and through more moods. And in general we must not forget that it is possible to refute statements by means of one another, I mean, universal statements by means of particular, and particular statements by means of universal; but it is not possible to establish universal statements by means of particular, though it is possible to establish particular statements by means of universal. At the same time it is evident that it is easier to [15] refute than to establish.

The manner in which every deduction is produced, the number of the terms and propositions through which it proceeds, the relation of the propositions to one another, the character of the problem proved in each figure, and the number of the figures appropriate to each problem, all these matters are clear from what has been said.

[20] 27 · We must now state how we may ourselves always have a supply of deductions in reference to the problem proposed and by what road we may reach the principles relative to the problem; for no doubt

we ought not only to investigate the construction of deductions, but also to have the power of making them.

[25] Of all the things which exist some are such that they cannot be predicated of anything else truly and universally, e.g. Cleon and Callias, i.e. the individual and sensible, but other things may be predicated of them (for each of these is both man and animal); and some things are themselves predicated of others, but nothing prior [30] is predicated of them; and some are predicated of others, and yet others of them, e.g. man of Callias and animal of man. It is clear then that some things are naturally not said of anything; for as a rule each sensible thing is such that it cannot be predicated [35] of anything, save incidentally—for we sometimes say that that white object is Socrates, or that that which approaches is Callias. We shall explain in another place<sup>12</sup> that there is an upward limit also to the process of predicating; for the present we must assume this. Of these it is not possible to demonstrate another predicate, save as a matter of opinion, but these may be predicated of other things. Neither can individuals be predicated of other things, though other things can be [40] predicated of them. Whatever lies between these limits can be spoken of in both ways: they may be said of others, and others said of them. And as a rule arguments and inquiries are concerned with these things.

We must select the propositions suitable to each problem in this manner: first [43<sup>b</sup>1] we must lay down the subject and the definitions and the properties of the thing; next we must lay down those attributes which follow the thing, and again those which the thing follows, and those which cannot belong to it. (Those to which it [5] cannot belong need not be selected, because the negative is convertible.) Of the attributes which follow we must distinguish those which fall within the definition, those which are predicated as properties, and those which are predicated as accidents, and of the latter those which apparently and those which really belong. The larger the supply a man has of these, the more quickly will he reach a [10] conclusion; and in proportion as he apprehends those which are truer, the more cogently will he demonstrate.

But he must select not those which follow some of the thing but those which follow the thing as a whole, e.g. not what follows some man but what follows every man; for deduction proceeds through universal propositions. If it is indefinite, it is uncertain whether the proposition is universal, but if it is definite, the matter is [15] clear. Similarly one must select those attributes which the subject follows as wholes, for the reason given. But that which follows one must not suppose to follow as a whole,

e.g. that every animal follows man or every science music, but only that it follows, without qualification, as indeed we state it in a proposition—for the other statement is useless and impossible, e.g. that every man is every animal or justice is [20] every good. But that which something follows receives the mark ‘every’. Whenever the subject, for which we must obtain the attributes that follow, is contained by something else, what follows or does not follow the universal must not be selected in dealing with the subordinate term (for these attributes have been taken in dealing [25] with the superior term; for what follows animal also follows man, and what does not belong to animal does not belong to man); but we must choose those attributes which are peculiar to each subject. For some things are peculiar to the species as distinct from the genus; for there must be attributes peculiar to the different species. Nor in the case of the universal should we select those things which the contained term follows, e.g. taking for animal what man follows. It is necessary [30] indeed, if animal follows man, that it should follow all these also. But these belong more properly to the choice of what concerns man. One must take also what follows a thing—and what it follows—for the most part; for in the case of problems about what holds for the most part, deductions depend on propositions, either all or some, [35] which hold for the most part (for the conclusion of each deduction is similar to its principles). Again, we should not select things which follow everything; for no deduction can be made from them (the reason why this is so will be made clear in what follows).

[40] **28** · If men wish to establish something about some whole, they must look to the subjects of that which is being established (the subjects of which it happens to be asserted), and the attributes which follow that of which it is to be predicated. For [44<sup>a</sup>1] if any of these subjects is the same as any of these attributes, the one must belong to the other. But if the purpose is to establish not a universal but a particular proposition, they must look for the terms which each follows; for if any of these are identical, the attribute must belong to some of the subject. Whenever the one term has to belong to none of the other, one must look to the consequents of the subject, [5] and to those attributes which cannot be present in the predicate in question; or conversely to the attributes which cannot be present in the subject, and to the consequents of the predicate. If any members of these groups are identical, one of the terms in question cannot belong to any of the other. For sometimes a deduction in the first figure results, sometimes a deduction in the second.



But if the object is to establish a particular negative proposition, we must find antecedents of the subject [10] in question and attributes which cannot belong to the predicate in question. If any members of these two groups are identical, it follows that one of the terms in question does not belong to some of the other.

Perhaps each of these statements will become clearer in the following way. Suppose the consequents of *A* are designated by *B*, the antecedents of *A* by *C*, [15] attributes which cannot belong to *A* by *D*. Suppose again that the attributes of *E* are designated by *F*, the antecedents of *E* by *G*, and attributes which cannot belong to *E* by *H*. If then one of the *C*s should be identical with one of the *F*s, *A* must belong to every *E*; for *F* belongs to every *E*, and *A* to every *C*: consequently *A* belongs to every [20] *E*. If *C* and *G* are identical, *A* must belong to some *E*; for *A* follows *C*, and *E* follows every *G*. If *F* and *D* are identical, *A* will belong to none of the *E*s by a preliminary deduction; for since the negative is convertible, and *F* is identical with *D*, *A* will [25] belong to none of the *F*s, but *F* belongs to every *E*. Again, if *B* and *H* are identical, *A* will belong to none of the *E*s; for *B* will belong to every *A*, but to no *E*; for it was assumed to be identical with *H*, and *H* belonged to none of the *E*s. If *D* and *G* are [30] identical, *A* will not belong to some of the *E*s; for it will not belong to *G*, because it does not belong to *D*; but *G* falls under *E*; consequently *A* will not belong to some of the *E*s. If *B* is identical with *G*, there will be a converted deduction; for *E* will belong to every *A*, since *B* belongs to *A* and *E* to *B* (for *B* was found to be identical with *G*); but that *A* should belong to every *E* is not necessary, but it must belong to some *E* [35] because it is possible to convert the universal statement into a particular.

It is clear then that in every problem we must look to the aforesaid relations of the subject and predicate; for all deductions proceed through these. But if we are seeking consequents and antecedents we must look especially for those which are primary and universal, e.g. in reference to *E* we must look to *KF* rather than to *F* [44<sup>b</sup>1] alone, and in reference to *A* we must look to *KC* rather than to *C* alone. For if *A* belongs to *KF*, it belongs both to *F* and to *E*; but if it does not follow *KF*, it may yet follow *F*. Similarly we must consider the antecedents of *A* itself; for if a term follows the primary antecedents, it will follow those also which are subordinate, but if it does not follow the former, it may yet follow the latter. [5]

It is clear too that the inquiry proceeds through the three terms and the two propositions, and that all the deductions proceed through the aforesaid figures. For it is proved that *A* belongs to every *E*, whenever an

identical term is found among the *Cs* and *Fs*. This will be the middle term; *A* and *E* will be the extremes. So the [10] first figure is formed. And *A* will belong to some *E*, whenever *C* and *G* are apprehended to be the same. This is the last figure; for *G* becomes the middle term. And *A* will belong to no *E*, when *D* and *F* are identical. Thus we have both the first figure and the middle figure; the first, because *A* belongs to no *F*, since the negative is convertible, and *F* belongs to every *E*; the middle figure because *D* belongs to no [15] *A*, and to every *E*. And *A* will not belong to some *E*, whenever *D* and *G* are identical. This is the last figure; for *A* will belong to no *G*, and *E* will belong to every *G*. Clearly then all the deductions proceed through the aforesaid figures, and we must [20] not select consequents of everything, because no deduction is produced from them. For (as we saw) it is not possible at all to establish a proposition from consequents, and it is not possible to refute by means of a consequent of everything; for the middle term must belong to the one, and not belong to the other.

It is clear too that other methods of inquiry by selection are useless to produce [25] a deduction, e.g. if the consequents of the terms in question are identical, or if the antecedents of *A* are identical with those attributes which cannot belong to *E*, or if those attributes are identical which cannot belong to either term; for no deduction is produced by means of these. For if the consequents are identical, e.g. *B* and *F*, we [30] have the middle figure with both propositions affirmative; if the antecedents of *A* are identical with attributes which cannot belong to *E*, e.g. *C* with *H*, we have the first figure with its proposition relating to the minor extreme negative. If attributes which cannot belong to either term are identical, e.g. *C* and *H*, both propositions are [35] negative, either in the first or in the middle figure. But no deduction is possible in these ways.

It is evident too that we must find out which terms in this inquiry are identical, not which are different or contrary, first because the object of our investigation is the middle term, and the middle term must be not diverse but identical. Secondly, [45<sup>a</sup>1] wherever it happens that a deduction results from taking contraries or terms which cannot belong to the same thing, all arguments can be reduced to the aforesaid moods, e.g. if *B* and *F* are contraries or cannot belong to the same thing. For if these are taken, a deduction will be formed to prove that *A* belongs to none of the *Es*, not [5] however from the assumptions made but in the aforesaid mood. For *B* will belong to every *A* and to no *E*. Consequently *B* must be identical with one of the *Hs*. [Again, if *B* and *G* cannot belong to the same thing, it follows that *A* will not belong to some of [10] the *Es*; for then too

we shall have the middle figure; for  $B$  will belong to every  $A$  and to no  $E$ . Consequently  $B$  must be identical with some of the  $H$ s. For the fact that  $B$  and  $G$  cannot belong to the same thing differs in no way from the fact that  $B$  is [15] identical with some of the  $H$ s; for that includes everything which cannot belong to  $E$ .]<sup>13</sup>

It is clear then that from these inquiries taken by themselves no deduction results; but if  $B$  and  $F$  are contraries  $B$  must be identical with one of the  $H$ s, and the [20] deduction results through these terms. It turns out then that those who inquire in this manner are looking gratuitously for some other way than the necessary way because they have failed to observe the identity of the  $B$ s with the  $H$ s.

**29** · Deductions which lead to impossible conclusions are similar to probative deductions; they also are formed by means of the consequents and antecedents [25] of the terms in question. In both cases the same inquiry is involved. For what is proved probatively may also be deduced *per impossibile* by means of the same terms; and what is proved *per impossibile* may also be proved probatively, e.g. that  $A$  belongs to no  $E$ . For suppose  $A$  to belong to some  $E$ : then since  $B$  belongs to every [30]  $A$  and  $A$  to some  $E$ ,  $B$  will belong to some of the  $E$ s; but it was assumed that it belongs to none. Again we may prove that  $A$  belongs to some  $E$ ; for  $A$  belonged to no  $E$ , and  $E$  belongs to every  $G$ ,  $A$  will belong to none of the  $G$ s; but it was assumed to belong to all. Similarly with the other problems. The proof *per impossibile* will [35] always and in all cases be from the consequents and antecedents of the terms in question. Whatever the problem, the same inquiry is necessary whether one wishes to use a probative deduction or a reduction to impossibility. For both the demonstrations start from the same terms; e.g. suppose it has been proved that  $A$  [40] belongs to no  $E$ , because it turns out that otherwise  $B$  belongs to some  $E$  and this is impossible—if now it is assumed that  $B$  belongs to no  $E$  and to every  $A$ , it is clear [45<sup>b</sup>1] that  $A$  will belong to no  $E$ . Again if it has been deduced probatively that  $A$  belongs to no  $E$ , assume that  $A$  belongs to some  $E$  and it will be proved *per impossibile* to belong to no  $E$ . Similarly with the rest. In all cases it is necessary to find some [5] common term other than the subjects of inquiry, to which the deduction establishing the false conclusion may relate, so that if this proposition is converted, and the other remains as it is, the deduction will be probative by means of the same terms. For the probative deduction differs from the *reductio ad impossibile* in this: [10] in the probative both propositions are

laid down in accordance with the truth, in the *reductio ad impossibile* one is assumed falsely.

These points will be made clearer by the sequel,<sup>14</sup> when we discuss reduction to impossibility: at present this much must be clear, that we must look to the same [15] terms whether we wish to use a probative deduction or a reduction to impossibility. In the other hypothetical deductions (I mean those which proceed by substitution or by positing a certain quality), the inquiry will be directed to the terms of the problem to be proved—not the terms of the original problem, but the substitutes; and the method of the inquiry will be the same as before. But we must consider and [20] determine in how many ways hypothetical deductions are possible.

Each of the problems then can be proved in the manner described; but it is possible to deduce some of them in another way, e.g. universal problems by the inquiry which leads up to a particular conclusion, with the addition of an hypothesis. For if the *Cs* and the *Gs* should be identical, but *E* should be assumed to belong to the *Gs* only, then *A* would belong to every *E*; and again if the *Ds* and the [25] *Gs* should be identical, but *E* should be predicated of the *Gs* only, it follows that *A* will belong to none of the *Es*. Clearly then we must consider the matter in this way also. The method is the same whether the relation is necessary or possible. For the inquiry will be the same, and the deduction will proceed through terms arranged in [30] the same order whether a possible or a simple proposition is proved. We must find in the case of possible relations, as well as terms that belong, terms which can belong though they actually do not; for we have proved that a deduction which establishes a possible relation proceeds through these terms as well. Similarly also with the other modes of predication. [35]

It is clear then from what has been said not only that all deductions can be formed in this way, but also that they cannot be formed in any other. For every deduction has been proved to be formed through one of the aforementioned figures, and these cannot be composed through other terms than the consequents and [40] antecedents of the terms in question; for from these we obtain the propositions and find the middle term. Consequently a deduction cannot be formed by means of [46<sup>a</sup>1] other terms.

**30** · The method is the same in all cases, in philosophy and in any art or study. We must look for the attributes and the subjects of both our

terms, and we [5] must supply ourselves with as many of these as possible, and consider them by means of the three terms, refuting statements in one way, establishing them in another, in the pursuit of truth starting from an arrangement of the terms in accordance with truth, while if we look for dialectical deductions we must start from plausible propositions. The principles of deductions have been stated in [10] general terms, both how they are characterized and how we must hunt for them, so as not to look to everything that is said about the terms of the problem or to the same points whether we are establishing or refuting, or again whether we are establishing of all or of some, and whether we are refuting of all or some; we must look to fewer [15] points and they must be definite. We have also stated how we must select with reference to each thing that is, e.g. about good or knowledge. But in each science the principles which are peculiar are the most numerous. Consequently it is the business of experience to give the principles which belong to each subject. I mean for example that astronomical experience supplies the principles of astronomical science; for once the phenomena were adequately apprehended, the demonstrations [20] of astronomy were discovered. Similarly with any other art or science. Consequently, if the attributes of the thing are apprehended, our business will then be to exhibit readily the demonstrations. For if none of the true attributes of things had been omitted in the survey, we should be able to discover the proof and demonstrate [25] everything which admitted of proof, and to make that clear, whose nature does not admit of proof.

Thus we have explained fairly well in general terms how we must select propositions: we have discussed the matter precisely in the treatise concerning [30] dialectic.<sup>15</sup>

**31** · It is easy to see that division by genera is a small part of the method we have described; for division is, so to speak, a weak deduction; for what it ought to prove, it begs, and it always deduces something more general than the attribute in [35] question. First, this very point had escaped all those who used the method of division; and they attempted to persuade men that it was possible to make a demonstration of substance and essence. Consequently they did not understand what it is possible to deduce by division, nor did they understand that it was possible to deduce in the manner we have described. In demonstrations, when there is a need to deduce that something belongs, the middle term through which the deduction is [46<sup>b</sup>1] formed must always be inferior to and not

comprehend the first of the extremes. But division has a contrary intention; for it takes the universal as middle. Let animal be the term signified by *A*, mortal by *B*, and immortal by *C*, and let man, whose [5] definition is to be got, be signified by *D*. The man who divides assumes that every animal is either mortal or immortal: i.e. whatever is *A* is all either *B* or *C*. Again, always dividing, he lays it down that man is an animal, so he assumes *A* of *D* as belonging to it. Now the deduction is that every *D* is either *B* or *C*, consequently [10] man must be either mortal or immortal, but it is not necessary that man should be a mortal animal—this is begged: and this is what ought to have been deduced. And again, taking *A* as mortal animal, *B* as footed, *C* as footless, and *D* as man, he [15] assumes in the same way that *A* inheres either in *B* or in *C* (for every mortal animal is either footed or footless), and he assumes *A* of *D* (for he assumed man to be a mortal animal); consequently it is necessary that man should be either a footed or a footless animal; but it is not necessary that man should be footed—this he assumes: and it is just this again which he ought to have proved. Always dividing then in this [20] way it turns out that they assume as middle the universal term, and as extremes that which ought to have been the subject of proof and the *differentiae*. In conclusion, they do not make it clear, and show it to be necessary, that this is man or whatever the subject of inquiry may be; for they pursue the other method altogether, never even [25] suspecting the presence of the rich supply of evidence which might be used.

It is clear that it is neither possible to refute by this method, nor to deduce about an accident or property of a thing, nor about its genus, nor in cases in which it is unknown whether it is thus or thus, e.g. whether the diagonal is incommensurate [30] or commensurate. For if he assumes that every length is either commensurate or incommensurate, and the diagonal is a length, he has deduced that the diagonal is either incommensurate or commensurate. But if he should assume that it is incommensurate, he will have assumed what he ought to have proved. He cannot then prove it; for this is his method, but proof is not possible by this method. (Let *A* [35] stand for incommensurate or commensurate, *B* for length, *C* for diagonal). It is clear then that this method of investigation is not suitable for every inquiry, nor is it useful in those cases in which it is thought to be most suitable.

32 · From what has been said it is clear from what elements demonstrations are formed and in what manner, and to what points we

must look in each problem. Our next business is to state how we can reduce deductions to the aforementioned figures; for this part of the inquiry still remains. If we should investigate the [47<sup>a</sup>1] production of deductions and had the power of discovering them, and further if we could resolve the deductions produced into the aforementioned figures, our original project would be brought to a conclusion. It will happen at the same time that what [5] has been already said will be confirmed and its truth made clearer by what we are about to say. For everything that is true must in every respect agree with itself.

First then we must attempt to select the two propositions of the deduction (for [10] it is easier to divide into large parts than into small, and the composite parts are larger than the elements out of which they are made); next we must inquire which are universal and which particular, and if both have not been stated, we must ourselves assume the one which is missing. For sometimes men put forward the universal, but do not posit the proposition which is contained in it, either in writing [15] or in discussion: or men put these forward, but omit those through which they are inferred, and invite the concession of others to no purpose. We must inquire then whether anything unnecessary has been assumed, or anything necessary has been omitted, and we must posit the one and take away the other, until we have reached the two propositions; for unless we have these, we cannot reduce arguments put [20] forward in the way described. In some arguments it is easy to see what is wanting, but some escape us, and appear to be deductions, because something necessary results from what has been laid down, e.g. if the assumptions were made that substance is not annihilated by the annihilation of what is not substance, and that if [25] the elements out of which a thing is made are annihilated, then that which is made out of them is destroyed: these propositions being laid down, it is necessary that any part of substance is substance; this has not however been deduced from the assumptions, but propositions are wanting. Again if it is necessary that animal should exist, if man does, and that substance should exist, if animal does, it is necessary that substance should exist if man does; but as yet the conclusion has not [30] been deduced; for the propositions are not in the shape we described.

We are deceived in such cases because something necessary results from what is assumed, since deduction also is necessary. But that which is necessary is wider than deduction; for every deduction is necessary, but not everything which is necessary is a deduction. Consequently, though something results when certain [35] propositions are assumed, we must

not try to reduce it directly, but must first take the two propositions, then divide them into their terms. We must take that term as middle which is stated in both the propositions; for it is necessary that the middle should be found in both in all the figures.

If then the middle term is a predicate and a subject of predication, or if it is a [47<sup>b</sup>1] predicate, and something else is denied of it, we shall have the first figure; if it both is a predicate and is denied of something, the middle figure; if other things are predicated of it, or one is denied, the other predicated, the last figure. For it was thus that we found the middle term placed in each figure. It is placed similarly too if [5] the propositions are not universal; for the middle term is determined in the same way. Clearly then, if the same term is not said more than once in the course of an argument, a deduction cannot be made; for a middle term has not been taken. Since [10] we know what sort of problem is established in each figure, and in which the universal and in what sort the particular is established, clearly we must not look for all the figures, but for that which is appropriate to the problem in hand. If it is established in more figures than one, we shall recognize the figure by the position of the middle term.

[15] **33** · Men are frequently deceived about deduction because the inference is necessary, as has been said above; sometimes they are deceived by the similarity in the positing of the terms; and this ought not to escape our notice. E.g. if *A* is said of *B*, and *B* of *C*: it would seem that a deduction is possible since the terms stand thus; [20] but nothing necessary results, nor does a deduction. Let *A* represent being eternal, *B* Aristomenes as an object of thought, *C* Aristomenes. It is true then that *A* belongs to *B*. For Aristomenes as an object of thought is eternal. But *B* also belongs to *C*; for [25] Aristomenes is Aristomenes as an object of thought. But *A* does not belong to *C*; for Aristomenes is perishable. For no deduction was made although the terms stood thus: that required that the proposition *AB* should be stated universally. But this is false, that every Aristomenes who is an object of thought is eternal, since [30] Aristomenes is perishable. Again let *C* stand of Miccalus, *B* for musical Miccalus, *A* for perishing to-morrow. It is true to predicate *B* for *C*; for Miccalus is musical Miccalus. Also *A* can be predicted of *B*; for musical Miccalus might perish to-morrow. But to say *A* of *C* is false at any rate. This argument then is identical [35] with the former; for it is not true universally that musical Miccalus perishes to-morrow; but unless this is



assumed, no deduction (as we have shown) is possible.

This deception then arises through ignoring a small distinction. For we accept the conclusion as though it made no difference whether we said 'This belongs to that' or 'That belongs to all of that'.

[48<sup>a</sup>1] **34** · Men will frequently fall into error through not setting out the terms of the proposition well, e.g. suppose *A* to be health, *B* disease, *C* man. It is true to say that *A* cannot belong to any *B* (for health belongs to no disease) and again that *B* [5] belongs to every *C* (for every man is capable of disease). It would seem to follow that health cannot belong to any man. The reason for this is that the terms are not set out well in expression, since if the things which are in the conditions are [10] substituted, no deduction can be made, e.g. if healthy is substituted for health and diseased for disease. For it is not true to say that being healthy cannot belong to one who is diseased. But unless this is assumed no conclusion results, save in respect of possibility; but such a conclusion is not impossible; for it is possible that health [15] should belong to no man. Again the falsity may occur in a similar way in the middle figure: it is not possible that health should belong to any disease, but it is possible that health should belong to every man, consequently it is not possible that disease should belong to any man. In the third figure the falsity results in reference to possibility. For health and disease, and knowledge and ignorance, and in general contraries, may belong to the same thing, but cannot belong to one another. This is [20] not in agreement with what was said before; for we stated that when several things could belong to the same thing, they could belong to one another.

It is evident then that in all these cases the error arises from the setting out of the terms; for if the things that are in the conditions are substituted, no falsity [25] arises. It is clear then that in such propositions what possesses the condition ought always to be substituted for the condition and taken as the term.

**35** · We must not always seek to set out the terms in a single word; for we shall often have phrases to which no single name is equivalent. Hence it is difficult [30] to reduce deductions with such terms. Sometimes too error will result from such a search, e.g. the belief that deduction can establish something immediate. Let *A* stand for two right angles, *B* for triangle, *C* for isosceles triangle. *A* then belongs to *C* because of *B*; but *A* belongs to *B* not in virtue of anything else (for the triangle in

[35] virtue of its own nature contains two right angles); consequently there will be no middle term for *AB*, although it is demonstrable. For it is clear that the middle must not always be assumed to be an individual thing, but sometimes a phrase, as happens in the case mentioned.

**36** · That the first term belongs to the middle, and the middle to the [40] extreme, must not be understood in the sense that they can always be predicated of one another or that the first term will be predicated of the middle in the same way as [48<sup>b</sup>1] the middle is predicated of the last term. The same holds if the premisses are negative. But we must suppose that ‘to belong’ has as many meanings as the ways in which ‘to be’ and ‘it is true to say this is that’ are used. Take for example the statement that there is a single science of contraries. Let *A* stand for there being a [5] single science, and *B* for things which are contrary to one another. Then *A* belongs to *B*, not in the sense that contraries are a single science, but in the sense that it is true to say of the contraries that there is a single science of them.

It happens sometimes that the first term is said of the middle, but the middle is [10] not said of the third term, e.g. if wisdom is knowledge, and wisdom is of the good, the conclusion is that there is knowledge of the good. The good then is not knowledge, though wisdom is knowledge. Sometimes the middle term is said of the [15] third, but the first is not said of the middle, e.g. if there is a science of everything that has a quality, or is a contrary, and the good both is a contrary and has a quality, the conclusion is that there is a science of the good—but the good is not a science, nor is that which has a quality or is a contrary, though the good is both of these. Sometimes neither the first term is said of the middle, nor the middle of the third, [20] while the first is sometimes said of the third, and sometimes not; e.g. if there is a genus of that of which there is a science, and there is a science of the good, we conclude that there is a genus of the good. But nothing is predicated of anything. And if that of which there is a science is a genus, and there is a science of the good, [25] we conclude that the good is a genus. The first term then is predicated of the extreme, but the terms are not said of one another.

The same holds good where the relation is negative. For ‘that does not belong [30] to this’ does not always mean that this is not that, but sometimes that this is not of that or for that, e.g. there is not a motion of a motion or a becoming of a becoming, but there is a becoming of pleasure; so pleasure is not a becoming. Or again it may be said that there is a sign of laughter, but there is not a sign of a sign, consequently laughter is not a sign. This holds in the other cases too, in which a problem is refuted [35] because the genus is asserted in a particular way in relation to it. Again take the inference: opportunity is not the right time; for opportunity belongs to God, but the right time does not, since nothing is useful to God. We must take as terms opportunity, right time, God; but the proposition must be understood according to the case of the noun. For we state this universally without qualification, that the [49<sup>a</sup>1] terms ought always to be stated in the nominative, e.g. man, good, contraries, not in oblique cases, e.g. of man, of good, of contraries, but the propositions ought to be understood with reference to the cases of each term—either the dative, e.g. ‘equal to this’, or the genitive, e.g. ‘double of this’, or the accusative, e.g. ‘that which strikes or sees this’, or the nominative, e.g. ‘man is an animal’, or in whatever other way the [5] word falls in the proposition.

**37** · The expressions ‘this belongs to that’ and ‘this holds true of that’ must be understood in as many ways as there are different categories, and these categories must be taken either with or without qualification, and further as simple or compound; the same holds good of negative expressions. We must consider these [10] points and define them better.

**38** · A term which is repeated in the propositions ought to be joined to the first extreme, not to the middle. I mean for example that if a deduction should be made proving that there is knowledge of justice, that it is good, the expression ‘that it is good’ (or ‘*qua* good’) should be joined to the first term. Let *A* stand for [15] knowledge that it is good, *B* for good, *C* for justice. It is true to predicate *A* of *B*. For of the good there is knowledge that it is good. Also it is true to predicate *B* of *C*. For justice is identical with a good. In this way an analysis of the argument can be made. But if the expression ‘that it is good’ were added to *B*, there will be no [20] analysis; for *A* will be true of *B*, but *B* will not be true of *C*. For to

predicate of justice the term 'good that it is good' is false and not intelligible. Similarly if it should be proved that the healthy is an object of knowledge *quâ* good, or goat-stag an object of knowledge *quâ* not existing, or man perishable *quâ* an object of sense: in [25] every case in which an addition is made to the predicate, the repetition must be joined to the extreme.

The position of the terms is not the same when something is deduced without qualification and when the deduction relates to some particular thing or way or condition, e.g. when the good is proved to be an object of knowledge and when it is proved to be an object of knowledge that it is good. If it has been proved to be an [30] object of knowledge without qualification, we must put as middle term that which is, but if we add the qualification 'that it is good', the middle term must be that which is something. Let *A* stand for knowledge that it is something, *B* stand for something, and *C* stand for good. It is true to predicate *A* of *B*; for *ex hypothesi* there is knowledge of that which is something, that it is something. *B* too is true of *C*; for that which *C* represents is something. Consequently *A* is true of *C*: there will [35] then be knowledge of the good, that it is good: for *ex hypothesi* the term something indicates the thing's proper substance. But if being were taken as middle and being (without qualification) were joined to the extreme, not being something, we should not have had a deduction that there is knowledge of the good, that it is good, but that it is; e.g. let *A* stand for knowledge that it is, *B* for being, *C* for good. Clearly [49<sup>b</sup>1] then in particular deductions we must take the terms in the way stated.

**39** · We ought also to substitute terms which have the same value, word for word, and phrase for phrase, and word and phrase, and always take a word in [5] preference to a phrase; for thus the setting out of the terms will be easier. For example if it makes no difference whether we say that the supposable is not the genus of the opinable or that the opinable is not identical with a particular kind of supposable (for what is meant is the same), it is better to take as terms the supposable and the opinable in preference to the phrase suggested.

**40** · Since for pleasure to be good and for pleasure to be the good are not [10] identical, we must not set out the terms in the same way; but if the deduction is to prove that pleasure is the good, the term must be the good, but if the object is to prove that pleasure is good, the term will

be good. Similarly in all other cases.

**41** · It is not the same, either in fact or in speech, for *A* to belong to all of that to which *B* belongs, and for *A* to belong to all of that to all of which *B* belongs; [15] for nothing prevents *B* from belonging to *C*, though not to every *C*: e.g. let *B* stand for beautiful, and *C* for white. If beauty belongs to something white, it is true to say that beauty belongs to that which is white; but not perhaps to everything that is white. If then *A* belongs to *B*, but not to everything of which *B* is predicated, then [20] whether *B* belongs to every *C* or merely belongs to *C*, it is not necessary that *A* should belong, I do not say to every *C*, but even to *C* at all. But if *A* belongs to everything of which *B* is truly said, it will follow that *A* can be said of all of that of all of which *B* is said. If however *A* is said of that of all of which *B* may be said, [25] nothing prevents *B* belonging to *C*, and yet *A* not belonging to every *C* or to any *C* at all. If then we take three terms it is clear that the expression ‘*A* is said of all of which *B* is said’ means this, ‘*A* is said of all the things of which *B* is said’. And if *B* is said of all of a third term, so also is *A*; but if *B* is not said of all of the third term, there is no [30] necessity that *A* should be said of all of it.

We must not suppose that something absurd results through setting out the terms; for we do not use the existence of this particular thing, but imitate the geometrician who says that this line is a foot long, and straight, and without [35] breadth, when it is not,<sup>16</sup> but does not use those propositions in the sense of deducing anything from them. For in general, unless there is something related as whole to part and something else related to this as part to whole, the prover does not prove [50<sup>a</sup>1] from them, and so no deduction is formed. We use the process of setting out terms like perception by sense, in the interests of the student—not as though it were impossible to demonstrate without them, as it is to demonstrate without the premisses of the deduction.

[5] **42** · We should not forget that in the same deduction not all conclusions are reached through one figure, but one through one figure, another through another. Clearly then we must analyse arguments in accordance with this. Since not every problem is proved in every figure, but certain problems in each figure, it is clear [10] from the conclusion in what figure the premisses should be sought.

43 · In reference to those arguments aiming at a definition which have been directed toward some part of the definition, we must take as a term the point to which the argument has been directed, not the whole definition; for so we shall be less likely to be disturbed by the length of the term: e.g. if a man proves that water is [15] a drinkable liquid, we must take as terms drinkable and water.

44 · Further we must not try to reduce hypothetical deductions; for with the given premisses it is not possible to reduce them. For they have not been proved by deduction, but assented to by agreement. For instance if a man should suppose that [20] unless there is one faculty of contraries, there cannot be one science, and should then argue that not every faculty is of contraries, e.g. of what is healthy and what is sickly; for the same thing will then be at the same time healthy and sickly. He has shown that there is not one faculty of all contraries, but he has not proved that there [25] is not a science. And yet one must agree. But the agreement does not come from a deduction, but from an hypothesis. This argument cannot be reduced; but the proof that there is not a single faculty can. The latter argument no doubt was a deduction; but the former was an hypothesis.

The same holds good of arguments which are brought to a conclusion *per* [30] *impossibile*. These cannot be analysed either; but the reduction to what is impossible can be analysed since it is proved by deduction, though the rest of the argument cannot, because the conclusion is reached from an hypothesis. But these differ from the previous arguments; for in the former a preliminary agreement must be reached if one is to accept the conclusion (e.g. an agreement that if there is [35] proved to be one faculty of contraries, then contraries fall under the same science); whereas in the latter, even if no preliminary agreement has been made, men still accept the reasoning, because the falsity is patent, e.g. the falsity of what follows from the assumption that the diagonal is commensurate, viz. that then odd numbers are equal to evens.

Many other arguments are brought to a conclusion by the help of an hypothesis; these we ought to consider and mark out clearly. We shall describe in the sequel<sup>17</sup> their differences, and the various ways in which hypothetical arguments [50<sup>b</sup>1] are formed; but at present this much must be clear, that it is not possible to resolve such deductions into the figures. And we have explained the reason.

45 · Whatever problems are proved in more than one figure, if they have [5] been deduced in one figure, can be reduced to another figure, e.g. a negative deduction in the first figure can be reduced to the second, and one in the middle figure to the first, not all however but some only. The point will be clear in the sequel. If *A* belongs to no *B*, and *B* to every *C*, then *A* belongs to no *C*. Thus the first [10] figure; but if the negative is converted, we shall have the middle figure. For *B* belongs to no *A*, and to every *C*. Similarly if the deduction is not universal but particular, i.e. if *A* belongs to no *B*, and *B* to some *C*. Convert the negative and you [15] will have the middle figure.

The universal deductions in the second figure can be reduced to the first, but only one of the two particular deductions. Let *A* belong to no *B* and to every *C*. Convert the negative, and you will have the first figure. For *B* will belong to no *A*, [20] and *A* to every *C*. But if the affirmative concerns *B*, and the negative *C*, *C* must be made first term. For *C* belongs to no *A*, and *A* to every *B*; therefore *C* belongs to no *B*. *B* then belongs to no *C*; for the negative is convertible. [25]

But if the deduction is particular, whenever the negative concerns the major extreme, reduction to the first figure will be possible, i.e. if *A* belongs to no *B* and to some *C*: convert the negative and you will have the first figure. For *B* will belong to no *A*, and *A* to some *C*. But when the affirmative concerns the major extreme, no [30] analysis will be possible, i.e. if *A* belongs to every *B*, but not to every *C*; for *AB* does not admit of conversion, nor would there be a deduction if it did.

Again deductions in the third figure cannot all be analysed into the first, though all in the first figure can be analysed into the third. Let *A* belong to *B* and *B* [35] to some *C*. Since the particular affirmative is convertible, *C* will belong to some *B*; but *A* belonged to every *B*; so that the third figure is formed. Similarly if the deduction is negative; for the particular affirmative is convertible; therefore *A* will belong to no *B*, and to some *C*.

Of the deductions in the last figure one only cannot be analysed into the first, [51<sup>a</sup>1] viz. when the negative is not universal: all the rest can be analysed. Let *A* and *B* be predicated of every *C*; then *C* can be converted partially with either *A* or *B*; *C* then belongs to some *B*. Consequently we shall get the first figure, if *A* belongs to every [5] *C*, and *C* to some *B*. If *A* belongs to every *C* and *B* to some *C*, the argument is the same; for *C* is convertible in reference to *B*. But if *B* belongs to every *C* and *A* to some *C*, the first term must be *B*; for *B* belongs to every *C*, and *C* to some *A*, [10]

therefore *B* belongs to some *A*. But since the particular is convertible, *A* will belong to some *B*. If the deduction is negative, when the terms are universal we must take them in a similar way. Let *B* belong to every *C*, and *A* to no *C*; then *C* will belong to some *B*, and *A* to no *C*; and so *C* will be middle term. Similarly if the negative is [15] universal, the affirmative particular; for *A* will belong to no *C*, and *C* to some of the *B*s. But if the negative is particular, no analysis will be possible, i.e. if *B* belongs to [20] every *C*, and *A* does not belong to some *C*: convert *BC* and both propositions will be particular.

It is clear that in order to analyse the figures into one another the proposition which concerns the minor extreme must be converted in both the figures; for when [25] this is altered, the transition to the other figure is made.

One of the deductions in the middle figure can, the other cannot, be analysed into the third figure. Whenever the universal is negative, analysis is possible. For if *A* belongs to no *B* and to some *C*, both *B* and *C* alike are convertible in relation to *A*, [30] so that *B* belongs to no *A*, and *C* to some *A*. *A* therefore is middle term. But when *A* belongs to every *B*, and not to some *C*, analysis will not be possible; for neither of the propositions is universal after conversion.

Deductions in the third figure can be analysed into the middle figure, [35] whenever the negative is universal, i.e. if *A* belongs to no *C*, and *B* to some of every *C*. For *C* then will belong to no *A* and to some *B*. But if the negative is particular, no analysis will be possible; for the particular negative does not admit of conversion.

[40] It is clear then that the same deductions cannot be analysed in these figures which could not be analysed into the first figure, and that when deductions are [51<sup>b</sup>1] reduced to the first figure these alone are confirmed by reduction to what is impossible.

It is clear from what we have said how we ought to reduce deductions, and that the figures may be analysed into one another.

[5] **46** · In establishing or refuting, it makes some difference whether we suppose the expressions ‘not to be this’ and ‘to be not-this’ are identical or different in meaning, e.g. ‘not to be white’ and ‘to be not-white’. For they do not mean the same thing, nor is ‘to be not-white’ the negation of ‘to be white’, but rather ‘not to be [10] white’. The reason for this is as follows. The relation of ‘he can walk’ to ‘he can not-walk’ is similar to the relation of ‘it is white’ to ‘it is not-white’; so is that of ‘he



knows what is good' to 'he knows what is not-good'. For there is no difference between the expressions 'he knows what is good' and 'he is knowing what is good', or [15] 'he can walk' and 'he is able to walk': therefore there is no difference between their opposites 'he cannot walk'—'he is not able to walk'. If then 'he is not able to walk' means the same as 'he is able not to walk', these will belong at the same time to the same person (for the same man can both walk and not-walk, and is possessed of [20] knowledge of what is good and of what is not-good), but an affirmation and a denial which are opposed to one another do not belong at the same time to the same thing. As then not to know what is good is not the same as to know what is not good, so to be not-good is not the same as not to be good. For when two pairs correspond, if the one pair are different from one another, the other pair also must be different. Nor is [25] to be not-equal the same as not to be equal; for there is something underlying the one, viz. that which is not-equal, and this is the unequal, but there is nothing underlying the other. That is why not everything is either equal or unequal, but everything is equal or is not equal. Further the expressions 'it is a not-white log' and 'it is not a white log' do not belong at the same time. For if it is a not-white log, it [30] must be a log: but that which is not a white log need not be a log at all. Therefore it is clear that 'it is not-good' is not the denial of 'it is good'. If then of every single thing either the affirmation or the negation is true if it is not a negation clearly it must in a sense be an affirmation. But every affirmation has a corresponding [35] negation. The negation then of this is 'it is not not-good'.

The relation of these to one another is as follows. Let *A* stand for to be good, *B* for not to be good, let *C* stand for to be not-good and be placed under *B*, and let *D* stand for not to be not-good and be placed under *A*. Then either *A* or *B* will belong to everything, but they will never belong to the same thing; and either *C* or *D* will [40] belong to everything, but they will never belong to the same thing. And *B* must belong to everything to which *C* belongs. For if it is true to say it is not-white, it is [52<sup>a</sup>1] true also to say it is not white; for it is impossible that a thing should simultaneously be white and be not-white, or be a not-white log and be a white log; consequently if the affirmation does not belong, the denial must belong. But *C* does not always belong to *B*; for what is not a log at all, cannot be a not-white log either. On the [5] other hand *D* belongs to everything to which *A* belongs. For either *C* or *D* belongs to everything to which *A* belongs. But since a thing cannot be simultaneously not-white and white, *D* must belong to everything to

which *A* belongs. For of that which is white it is true to say that it is not not-white. But *A* is not true of every *D*. For of that which is not a log at all it is not true to say *A*, viz. that it is a white log. [10] Consequently *D* is true, but *A* is not true, i.e. that it is a white log. It is clear also that *A* and *C* cannot together belong to the same thing, and that *B* and *D* may belong to the same thing.

Privative terms are similarly related to positive terms in respect of this [15] arrangement. Let *A* stand for equal, *B* for not equal, *C* for unequal, *D* for not unequal.

In many things also, to some of which something belongs which does not belong to others, the negation may be true in a similar way, viz. that all are not white or that each is not white, while that each is not-white or all are not-white is [20] false. Similarly also 'every animal is not-white' is not the negation of 'every animal is white' (for both are false) but rather 'not every animal is white'.

Since it is clear that 'it is not-white' and 'it is not white' mean different things, and one is an affirmation, the other a denial, it is evident that the method of proving [25] each cannot be the same, e.g. that whatever is an animal is not white or may not be white, and that it is true to call it not-white; for this means that it is not-white. But we may prove that it is true to call it white or not-white in the same way—for both [30] are proved constructively by means of the first figure. For the expression 'it is true' stands on a similar footing to 'it is'. For the negation of 'it is true to call it white' is not 'it is true to call it not-white' but 'it is not true to call it white'. If then it is to be true to say that whatever is a man is musical or is not-musical, we must assume that [35] whatever is an animal either is musical or is not-musical; and the proof has been made. That whatever is a man is not musical is proved destructively in the three ways mentioned.

In general whenever *A* and *B* are such that they cannot belong at the same time to the same thing, and one of the two necessarily belongs to everything, and again *C* [52<sup>b</sup>1] and *D* are related in the same way, and *A* follows *C* but the relation cannot be converted, then *D* must follow *B* and the relation cannot be converted. And *A* and *D* may belong to the same thing, but *B* and *C* cannot. First it is clear from the [5] following consideration that *D* follows *B*. For since either *C* or *D* necessarily belongs to everything; and since *C* cannot belong to that to which *B* belongs, because it carries *A* along with it and *A* and *B* cannot belong to the same thing; it is clear that *D* must follow *B*. Again since *C* does not convert with *A*, but *C* or *D* belongs to [10] everything, it is possible that *A* and *D*

should belong to the same thing. But *B* and *C* cannot belong to the same thing, because *A* follows *C*; and so something impossible results. It is clear then that *B* does not convert with *D* either, since it is possible that *D* and *A* should belong at the same time to the same thing.

It results sometimes even in such an arrangement of terms that one is deceived [15] through not apprehending the opposites rightly, one of which must belong to everything: e.g. we may reason that if *A* and *B* cannot belong at the same time to the same thing, but it is necessary that one of them should belong to whatever the other does not belong to; and again *C* and *D* are related in the same way; and *A* follows everything which *C* follows: it will result that *B* belongs necessarily to everything to [20] which *D* belongs—but this is false. Assume that *F* stands for the negation of *A* and *B*, and again that *H* stands for the negation of *C* and *D*. It is necessary then that either *A* or *F* should belong to everything; for either the affirmation or the denial [25] must belong. And again either *C* or *H* must belong to everything; for they are related as affirmation and denial. And *ex hypothesi* *A* belongs to everything to which *C* belongs. Therefore *H* belongs to everything to which *F* belongs. Again since either *F* or *B* belongs to everything, and similarly either *H* or *D*, and since *H* follows *F*, *B* must follow *D*; for we know this. If then *A* follows *C*, *B* must follow *D*. But this is false; for as we proved the relation of consequence is reversed in terms so [30] constituted. No doubt it is not necessary that *A* or *F* should belong to everything, or that *F* or *B* should belong to everything; for *F* is not the denial of *A*. For not-good is the negation of good; and not-good is not identical with neither good nor not-good. Similarly also with *C* and *D*. For two negations have been assumed in respect to one term.

## BOOK II

1 · We have already explained the number of the figures, the character and number of the propositions, when and how a deduction is formed; further what we [53<sup>a</sup>1] must look for when refuting and establishing propositions, and how we should investigate a given problem in any branch of inquiry, also by what means we shall obtain principles appropriate to each subject. Since some deductions are universal, [5] others particular, all the universal deductions give more than one result, and of particular deductions the affirmative yield more than one, the negative yield only the stated conclusion. For all propositions are convertible save only the particular negative; and the conclusion states one thing about another. Consequently all other deductions yield more than one conclusion, e.g. if  $A$  has been proved to belong to [10] every or to some  $B$ , then  $B$  must belong to some  $A$ ; and if  $A$  has been proved to belong to no  $B$ , then  $B$  belongs to no  $A$ . This is a different conclusion from the former. But if  $A$  does not belong to some  $B$ , it is not necessary that  $B$  should not belong to some  $A$ ; for it may belong to every  $A$ .

This then is the reason common to all deductions whether universal or [15] particular. But it is possible to give another reason concerning those which are universal. For all the things that are subordinate to the middle term or to the conclusion may be proved by the same deduction, if the former are placed in the middle, the latter in the conclusion; e.g. if the conclusion  $AB$  is proved through  $C$ , then  $A$  must be said of all of whatever is subordinate to  $B$  or  $C$ ; for if  $D$  is in  $B$  as in a [20] whole, and  $B$  is in  $A$ , then  $D$  will be in  $A$ . Again if  $E$  is in  $C$  as in a whole, and  $C$  is in  $A$ , then  $E$  will be in  $A$ . Similarly if the deduction is negative. In the second figure it [25] will be possible to deduce only that which is subordinate to the conclusion, e.g. if  $A$  belong to no  $B$  and to every  $C$ ; we conclude that  $B$  belongs to no  $C$ . If then  $D$  is subordinate to  $C$ , clearly  $B$  does not belong to it. But that  $B$  does not belong to what is subordinate to  $A$ , is not clear by means of the deduction. And yet  $B$  does not belong to  $E$ , if  $E$  is subordinate to  $A$ . But while it has been proved through the [30] deduction that  $B$  belongs to no  $C$ , it has been assumed without proof that  $B$  does not belong to  $A$ , consequently it does not result through the deduction that  $B$  does not belong to  $E$ .

But in particular deductions there will be no necessity of inferring

what is subordinate to the conclusion (for a deduction does not result when this is [35] particular), but whatever is subordinate to the middle term may be inferred, not however through the deduction, e.g. if *A* belongs to every *B* and *B* to some *C*. Nothing can be inferred about that which is subordinate to *C*; something can be inferred about that which is subordinate to *B*, but not through the preceding deduction. Similarly in the other figures: that which is subordinate to the conclusion [40] cannot be proved; the other subordinate can be proved, only not through the deduction, just as in the universal deductions what is subordinate to the middle term [53<sup>b</sup>1] is proved (as we saw) from a proposition which is not demonstrated; consequently either a conclusion is not possible there or else it is possible here too.

2 · It is possible for the premisses of the deduction to be true, or to be false, or [5] to be the one true, the other false. The conclusion is either true or false necessarily. From true premisses it is not possible to draw a false conclusion; but a true conclusion may be drawn from false premisses—true however only in respect to the fact, not to the reason. The reason cannot be established from false premisses: why this is so will be explained in the sequel.<sup>18</sup> [10]

First then that it is not possible to draw a false conclusion from true premisses, is made clear by this consideration. If it is necessary that *B* should be when *A* is, it is necessary that *A* should not be when *B* is not. If then *A* is true, *B* must be true: [15] otherwise it will turn out that the same thing both is and is not at the same time. But this is impossible. (Let it not, because *A* is laid down as a single term, be supposed that it is possible, when a single fact is given, that something should necessarily result. For that is not possible. For what results necessarily is the conclusion, and [20] the means by which this comes about are at the least three terms, and two relations or propositions. If then it is true that *A* belongs to all that to which *B* belongs, and that *B* belongs to all that to which *C* belongs, it is necessary that *A* should belong to all that to which *C* belongs, and this cannot be false; for then the same thing will belong and not belong at the same time. So *A* is posited as one thing, being two premisses taken together.) The same holds good of negative deductions: it is not [25] possible to prove a false conclusion from truths.

But from what is false a true conclusion may be drawn, whether both the premisses are false or only one (provided that this is not either of the premisses indifferently, but the second, if it is taken as wholly false; but if

it is not taken as [30] wholly false, it does not matter which of the two is false). Let  $A$  belong to the whole of  $C$ , but to no  $B$ , neither let  $B$  belong to  $C$ . This is possible, e.g. animal belongs to no stone, nor stone to any man. If then  $A$  is taken to belong to every  $B$  and  $B$  to every  $C$ ,  $A$  will belong to every  $C$ ; consequently though both the premisses are false the [35] conclusion is true; for every man is an animal. Similarly with the negative. For it is possible that neither  $A$  nor  $B$  should belong to any  $C$ , although  $A$  belongs to every  $B$ , e.g. if the same terms are taken and man is put as middle; for neither animal nor man belongs to any stone, but animal belongs to every man. Consequently if one [40] term is taken to belong to none of that to which it does belong, and the other term is taken to belong to all of that to which it does not belong, though both the premisses [54<sup>a</sup>1] are false the conclusion will be true. A similar proof may be given if each premiss is partially false.

But if one only of the premisses is false, when the first premiss is wholly false, i.e.  $AB$ , the conclusion will not be true, but if  $BC$  is wholly false, a true conclusion [5] will be possible. I mean by wholly false the contrary of the truth, e.g. if what belongs to none is assumed to belong to all, or if what belongs to all is assumed to belong to none. Let  $A$  belong to no  $B$ , and  $B$  to every  $C$ . If then the proposition  $BC$  which I take is true, and  $AB$  is wholly false, viz. that  $A$  belongs to every  $B$ , it is impossible [10] that the conclusion should be true; for  $A$  belonged to none of the  $C$ s, since  $A$  belonged to nothing to which  $B$  belonged, and  $B$  belonged to every  $C$ . Similarly there cannot be a true conclusion if  $A$  belongs to every  $B$ , and  $B$  to every  $C$ , but while the true proposition  $BC$  is assumed, the wholly false  $AB$  is also assumed, viz. that  $A$  belongs to nothing to which  $B$  belongs—here the conclusion must be false. For  $A$  [15] will belong to every  $C$ , since  $A$  belongs to everything to which  $B$  belongs, and  $B$  to every  $C$ . It is clear then that when the first premiss is wholly false, whether affirmative or negative, and the other premiss is true, the conclusion cannot be true.

But if the premiss is not wholly false, a true conclusion is possible. For if  $A$  belongs to every  $C$  and to some  $B$ , and if  $B$  belongs to every  $C$ , e.g. animal to every [20] swan and to some white thing, and white to every swan, then if we assume that  $A$  belongs to every  $B$ , and  $B$  to every  $C$ ,  $A$  will belong to every  $C$  truly; for every swan is an animal. Similarly if  $AB$  is negative. For it is possible that  $A$  should belong to some  $B$  and to no  $C$ , and that  $B$  should belong to every  $C$ , e.g. animal to some white [25] thing, but to no snow, and white to all snow. If then one should assume that  $A$  belongs to no  $B$ , and  $B$  to every  $C$ , then  $A$  will belong to no  $C$ .

But if the proposition  $AB$ , which is assumed, is wholly true, and  $BC$  is

wholly false, a true deduction will be possible; for nothing prevents  $A$  belonging to every  $B$  [30] and to every  $C$ , though  $B$  belongs to no  $C$ , e.g. these being species of the same genus which are not subordinate one to the other—for animal belongs both to horse and to man, but horse to no man. If then it is assumed that  $A$  belongs to every  $B$  and  $B$  to every  $C$ , the conclusion will be true, although the proposition  $BC$  is wholly false. [35] Similarly if the proposition  $AB$  is negative. For it is possible that  $A$  should belong neither to any  $B$  nor to any  $C$ , and that  $B$  should not belong to any  $C$ , e.g. a genus to species of another genus—for animal belongs neither to music nor to medicine, nor does music belong to the medicine. If then it is assumed that  $A$  belongs to no  $B$ , and [54<sup>b</sup>1]  $B$  to every  $C$ , the conclusion will be true.

And if  $BC$  is not wholly false but in part only, even so that conclusion may be true. For nothing prevents  $A$  belonging to the whole of  $B$  and of  $C$ , while  $B$  belongs [5] to some  $C$ , e.g. a genus to its species and difference—for animal belongs to every man and to every footed thing, and man to some footed things though not to all. If then it is assumed that  $A$  belongs to every  $B$ , and  $B$  to every  $C$ ,  $A$  will belong to every  $C$ ; and this *ex hypothesi* is true. Similarly if the proposition  $AB$  is negative. For it is [10] possible that  $A$  should neither belong to any  $B$  nor to any  $C$ , though  $B$  belongs to some  $C$ , e.g. a genus to the species of another genus and its difference for animal neither belongs to any wisdom nor to any speculative science, but wisdom belongs to some speculative sciences. If then it should be assumed that  $A$  belongs to no  $B$ , and  $B$  to every  $C$ ,  $A$  will belong to no  $C$ ; and this *ex hypothesi* is true. [15]

In particular deductions it is possible when the first proposition is wholly false, and the other true, that the conclusion should be true; also when the first is false in part, and the other true; and when the first is true, and the particular is false; and [20] when both are false. For nothing prevents  $A$  belonging to no  $B$ , but to some  $C$ , and  $B$  to some  $C$ , e.g. animal belongs to no snow, but to some white thing, and snow to some white thing. If then snow is taken as middle, and animal as first term, and it is assumed that  $A$  belongs to the whole of  $B$ , and  $B$  to some  $C$ , then  $AB$  is wholly false, [25]  $BC$  true, and the conclusion true. Similarly if the proposition  $AB$  is negative; for it is possible that  $A$  should belong to the whole of  $B$ , but not to some  $C$ , although  $B$  belongs to some  $C$ , e.g. animal belongs to every man, but does not follow some white, [30] but man belongs to some white; consequently if man be taken as middle term and it is assumed that  $A$  belongs to no  $B$  but  $B$  belongs to some  $C$ , the conclusion will be true although the proposition  $AB$  is wholly false.

If the proposition  $AB$  is false in part, the conclusion may be true. For nothing [35] prevents  $A$  belonging both to some  $B$  and to some  $C$ , and  $B$  belonging to some  $C$ , e.g. animal to something beautiful and to something great, and beautiful belonging to something great. If then  $A$  is assumed to belong to every  $B$ , and  $B$  to some  $C$ , the [55<sup>a</sup>1] proposition  $AB$  will be partially false,  $BC$  will be true, and the conclusion true. Similarly if the proposition  $AB$  is negative. For the same terms will serve, and in the same positions, to prove the point.

[5] Again if  $AB$  is true, and  $BC$  is false, the conclusion may be true. For nothing prevents  $A$  belonging to the whole of  $B$  and to some  $C$ , while  $B$  belongs to no  $C$ , e.g. animal to every swan and to some black things, though swan belongs to no black thing. Consequently if it should be assumed that  $A$  belongs to every  $B$ , and  $B$  to [10] some  $C$ , the conclusion will be true, although  $BC$  is false. Similarly if the proposition  $AB$  is negative. For it is possible that  $A$  should belong to no  $B$ , and not to some  $C$ , while  $B$  belongs to no  $C$ , e.g. a genus to the species of another genus and to the [15] accident of its own species—for animal belongs to no number and to some white things, and number belongs to nothing white. If then number is taken as middle, and it is assumed that  $A$  belongs to no  $B$ , and  $B$  to some  $C$ , then  $A$  will not belong to some  $C$ , which *ex hypothesi* is true. And the proposition  $AB$  is true,  $BC$  false.

[20] Also if  $AB$  is partially false, and  $BC$  is false too, the conclusion may be true. For nothing prevents  $A$  belonging to some  $B$  and to some  $C$ , though  $B$  belongs to no  $C$ , e.g. if  $B$  is the contrary of  $C$ , and both are accidents of the same genus—for animal belongs to some white things and to some black things, but white belongs to [25] no black thing. If then it is assumed that  $A$  belongs to every  $B$ , and  $B$  to some  $C$ , the conclusion will be true. Similarly if  $AB$  is negative; for the same terms arranged in the same way will serve for the proof.

Also though both premisses are false the conclusion may be true. For it is [30] possible that  $A$  may belong to no  $B$  and to some  $C$ , while  $B$  belongs to no  $C$ , e.g. a genus in relation to the species of another genus, and to the accident of its own species for animal belongs to no number, but to some white things, and number to nothing white. If then it is assumed that  $A$  belongs to every  $B$  and  $B$  to some  $C$ , the [35] conclusion will be true, though both propositions are false. Similarly also if  $AB$  is negative. For nothing prevents  $A$  belonging to the whole of  $B$ , and not to some  $C$ , while  $B$  belongs to no  $C$ , e.g. animal belongs to every swan, and not to some black things, and swan belongs to nothing black. Consequently if it is assumed that  $A$  [55<sup>b</sup>1] belongs to no  $B$ , and  $B$  to



some  $C$ , then  $A$  does not belong to some  $C$ . The conclusion then is true, but the propositions are false.

3 · In the middle figure it is possible in every way to reach a true conclusion through false premisses, whether the deductions are universal or particular, viz. [5] when both propositions are wholly false; when each is partially false; when one is true, the other [wholly] false (it does not matter which of the two premisses is false). [if both premisses are partially false; if one is quite true, the other partially false; if [10] one is wholly false, the other partially true.]<sup>19</sup> For if  $A$  belongs to no  $B$  and to every  $C$ , e.g. animal to no stone and to every horse, then if the propositions are stated contrariwise and it is assumed that  $A$  belongs to every  $B$  and to no  $C$ , though the propositions are wholly false they will yield a true conclusion. Similarly if  $A$  belongs to every  $B$  and to no  $C$ ; for we shall have the same deduction. [15]

Again if one premiss is wholly false, the other wholly true; for nothing prevents  $A$  belonging to every  $B$  and to every  $C$ , though  $B$  belongs to no  $C$ , e.g. a genus to its co-ordinate species. For animal belongs to every horse and man, and no man is a [20] horse. If then it is assumed that animal belongs to all of the one, and none of the other, the one premiss will be wholly false, the other wholly true, and the conclusion will be true whichever term the negative statement concerns.

Also if one premiss is partially false, the other wholly true. For it is possible that  $A$  should belong to some  $B$  and to every  $C$ , though  $B$  belongs to no  $C$ , e.g. [25] animal to some white things and to every raven, though white belongs to no raven. If then it is assumed that  $A$  belongs to no  $B$ , but to the whole of  $C$ , the proposition  $AB$  is partially false,  $AC$  wholly true, and the conclusion true. Similarly if the negative is transposed: the proof can be made by means of the same terms. Also if the [30] affirmative proposition is partially false, the negative wholly true, a true conclusion is possible. For nothing prevents  $A$  belonging to some  $B$ , but not to  $C$  as a whole, while  $B$  belongs to no  $C$ , e.g. animal belongs to some white things, but to no pitch, and white belongs to no pitch. Consequently if it is assumed that  $A$  belongs to the [35] whole of  $B$ , but to no  $C$ ,  $AB$  is partially false,  $AC$  is wholly true, and the conclusion is true.

And if both the propositions are partially false, the conclusion may be true. For it is possible that  $A$  should belong to some  $B$  and to some  $C$ , and  $B$  to no  $C$ , e.g. animal to some white things and to some black things, though white belongs to [56<sup>a1</sup>] nothing black. If then it is assumed that  $A$

belongs to every  $B$  and to no  $C$ , both propositions are partially false, but the conclusion is true. Similarly, if the negative is transposed, the proof can be made by means of the same terms.

It is clear also that the same holds for particular deductions. For nothing [5] prevents  $A$  belonging to every  $B$  and to some  $C$ , though  $B$  does not belong to some  $C$ , e.g. animal to every man and to some white things, though man will not belong to some white things. If then it is stated that  $A$  belongs to no  $B$  and to some  $C$ , the universal proposition is wholly false, the particular is true, and the conclusion is [10] true. Similarly if  $AB$  is affirmative; for it is possible that  $A$  should belong to no  $B$ , and not to some  $C$ , though  $B$  does not belong to some  $C$ , e.g. animal belongs to nothing inanimate, and to some white things, and inanimate will not belong to some [15] white things. If then it is stated that  $A$  belongs to  $B$  and not to some  $C$ , the  $AB$  which is universal is wholly false,  $AC$  is true, and the conclusion is true. Also a true conclusion is possible when the universal is true, and the particular is false. For nothing prevents  $A$  following neither  $B$  nor  $C$  at all, while  $B$  does not belong to some [20]  $C$ , e.g. animal belongs to no number nor to anything inanimate, and number does not follow some inanimate things. If then it is stated that  $A$  belongs to no  $B$  and to some  $C$ , the conclusion will be true, and the universal proposition true, but the particular false. Similarly if the premiss which is stated universally affirmative. For [25] it is possible that  $A$  should belong both to  $B$  and to  $C$  as wholes, though  $B$  does not follow some  $C$ , e.g. a genus in relation to its species and difference—for animal follows every man and footed things as a whole, but man does not follow every footed thing. Consequently if it is assumed that  $A$  belongs to the whole of  $B$ , but [30] does not belong to some  $C$ , the universal proposition is true, the particular false, and the conclusion true.

It is clear too that though both propositions are false they may yield a true conclusion, since it is possible that  $A$  should belong both to  $B$  and to  $C$  as wholes, [35] though  $B$  does not follow some  $C$ . For if it is assumed that  $A$  belongs to no  $B$  and to some  $C$ , the propositions are both false, but the conclusion is true. Similarly if the universal proposition is affirmative and the particular negative. For it is possible that  $A$  should follow no  $B$  and every  $C$ , though  $B$  does not belong to some  $C$ , e.g. animal follows no science but every man, though science does not follow every man. [56<sup>b</sup>1] If then  $A$  is assumed to belong to the whole of  $B$ , and not to follow some  $C$ , the propositions are false but the conclusion is true.

[5] 4 · In the last figure a true conclusion may come through what is false, alike when both are wholly false, when each is partly false, when one is wholly true, the other false, when one is partly false, the other wholly true, and vice versa, and in every other way in which it is possible to alter the propositions. For nothing prevents [10] neither *A* nor *B* from belonging to any *C*, while *A* belongs to some *B*, e.g. neither man nor footed follows anything inanimate, though man belongs to some footed things. If then it is assumed that *A* and *B* belong to every *C*, the propositions will be wholly false, but the conclusion true. Similarly if one is negative, the other [15] affirmative. For it is possible that *B* should belong to no *C*, but *A* to every *C*, and that *A* should not belong to *B*, e.g. black belongs to no swan, animal to every swan, and animal not to everything black. Consequently if it is assumed that *B* belongs to every *C*, and *A* to no *C*, *A* will not belong to some *B*; and the conclusion is true, [20] though the propositions are false.

Also if each is partly false, the conclusion may be true. For nothing prevents both *A* and *B* from belonging to some *C* while *A* belongs to some *B*, e.g. white and beautiful belong to some animals, and white to some beautiful things. If then it is [25] stated that *A* and *B* belong to every *C*, the propositions are partially false, but the conclusion is true. Similarly if *AC* is stated as negative. For nothing prevents *A* from not belonging, and *B* from belonging, to some *C*, while *A* does not belong to every *B*, e.g. white does not belong to some animals, beautiful belongs to some [30] animals, and white does not belong to everything beautiful. Consequently if it is assumed that *A* belongs to no *C*, and *B* to every *C*, both propositions are partly false, but the conclusion is true. Similarly if one is wholly false, the other wholly true. For it is possible that [35] both *A* and *B* should follow every *C*, though *A* does not belong to some *B*, e.g. animal and white follow every swan, though animal does not belong to everything white. Taking such terms, if one assumes that *B* belongs to the whole of *C*, but *A* does not belong to *C* at all, *BC* will be wholly true, *AC* wholly false, and the conclusion true.

Similarly if *BC* is false, *AC* true, the conclusion may be true. The same terms will serve for the proof. Also if both are affirmative, the conclusion may be true. For [57<sup>a</sup>1] nothing prevents *B* from following every *C*, and *A* from not belonging to *C* at all, though *A* belongs to some *B*, e.g. animal belongs to every swan, black to no swan, [5] and black to some animals. Consequently if it is assumed that *A* and *B* belong to every *C*, *BC* is wholly true, *AC* is wholly false, and the conclusion is true. Similarly if *AC* is true:

the proof can be made through the same terms.

Again if one is wholly true, the other partly false, the conclusion may be true. [10] For it is possible that *B* should belong to every *C*, and *A* to some *C*, while *A* belongs to some *B*, e.g. biped belongs to every man, beautiful not to every man, and beautiful to some bipeds. If then it is assumed that both *A* and *B* belong to the whole of *C*, *BC* is wholly true, *AC* partly false, the conclusion true. Similarly if *AC* is true [15] and *BC* partly false, a true conclusion is possible: this can be proved, if the same terms as before are transposed. Also the conclusion may be true if one is negative, the other affirmative. For since it is possible that *B* should belong to the whole of *C*, and *A* to some *C*, and, when they are so, that *A* should not belong to every *B*, [20] therefore if it is assumed that *B* belongs to the whole of *C*, and *A* to no *C*, the negative is partly false, the other wholly true, and the conclusion is true. Again since it has been proved that if *A* belongs to no *C* and *B* to some *C*, it is possible that *A* should not belong to some *B*, it is clear that if *AC* is wholly true, and *BC* partly false, [25] it is possible that the conclusion should be true. For if it is assumed that *A* belongs to no *C*, and *B* to every *C*, *AC* is wholly true, and *BC* is partly false.

It is clear also in the case of particular deductions that a true conclusion may come through what is false, in every possible way. For the same terms must be taken [30] as have been taken when the propositions are universal, positive terms in positive deductions, negative terms in negative. For it makes no difference to the setting out of the terms, whether one assumes that what belongs to none belongs to all or that what belongs to some belongs to all. The same applies to negative deductions. [35]

It is clear then that if the conclusion is false, the premisses of the argument must be false, either all or some of them; but when the conclusion is true, it is not necessary that the premisses should be true, either one or all, yet it is possible, though no part of the deduction is true, that the conclusion may none the less be true; but not necessarily. The reason is that when two things are so related to one [57<sup>b</sup>1] another, that if the one is, the other necessarily is, then if the latter is not, the former will not be either, but if the latter is, it is not necessary that the former should be. But it is impossible that the same thing should be necessitated by the being and by the not-being of the same thing. I mean, for example, that it is impossible that *B* should necessarily be great if *A* is white and that *B* should necessarily be great if *A* [5] is not white. For whenever if this, *A*, is white it is necessary that that, *B*, should be great, and if *B* is

great that *C* should not be white, then it is necessary if *A* is white that *C* should not be white. And whenever it is necessary, if one of two things is, that the other should be, it is necessary, if the latter is not, that the former should not be. [10] If then *B* is not great *A* cannot be white. But if, if *A* is not white, it is necessary that *B* should be great, it necessarily results that if *B* is not great, *B* itself is great. But [15] this is impossible. For if *B* is not great, *A* will necessarily not be white. If then if this is not white *B* must be great, it results that if *B* is not great, it is great, just as if it were proved through three terms.

5 · Circular and reciprocal proof means proof by means of the conclusion [20] and by taking one of the propositions with its predication reversed and inferring the other which was assumed in the original deduction: e.g. suppose we had to prove that *A* belongs to every *C*, and it has been proved through *B*; suppose that *A* should now be proved to belong to *B* by assuming that *A* belongs to *C*, and *C* to *B* before; [25] but the reverse was assumed, viz. that *B* belongs to *C*. Or suppose it is necessary to prove that *B* belongs to *C*, and *A* is assumed to belong to *C*, which was the conclusion and *B* to belong to *A*: the reverse was assumed before viz. that *A* belongs to *B*. In no other way is reciprocal proof possible. For if another term is taken as [30] middle, the proof is not circular; for neither of the propositions assumed is the same as before; and if one of them is assumed, only *one* can be for if both of them are taken the same conclusion as before will result; but it must be different.

If the terms are not convertible, one of the propositions from which the deduction results must be undemonstrated; for it is not possible to demonstrate [35] through these terms that the third belongs to the middle or the middle to the first. If the terms are convertible, it is possible to demonstrate everything reciprocally, e.g. if *A* and *B* and *C* are convertible with one another. Suppose *AC* has been proved through *B* as middle term, and again *AB* through the conclusion and the proposition *BC* converted, and similarly *BC* through the conclusion and the proposition *AB* [58<sup>a</sup>1] converted. But it is necessary to prove both proposition *CB* and *BA*; for we have used these alone without demonstrating them. If then it is assumed that *B* belongs to every *C*, and *C* to every *A*, we shall have a deduction relating *B* to *A*. Again if it is [5] assumed that *C* belongs to every *A*, and *A* to every *B*, *C* must belong to every *B*. In both these deductions the proposition *CA* has been assumed without being demonstrated: the others had been proved. Consequently if we succeed in

demonstrating [10] this, all will have been proved reciprocally. If then it is assumed that  $C$  belongs to every  $B$ , and  $B$  to every  $A$ , both the propositions assumed have been demonstrated, and  $C$  must belong to  $A$ .

It is clear then that only if the terms are convertible is circular and reciprocal demonstration possible (if the terms are not convertible, the matter stands as we [15] said above). But it turns out that even in these we use for the demonstration the very thing that is being proved; for  $C$  is proved of  $B$ , and  $B$  of  $A$ , by assuming that  $C$  is said of  $A$ , and  $C$  is proved of  $A$  through these propositions, so that we use the [20] conclusion for the demonstration.

In negative deductions reciprocal proof is as follows. Let  $B$  belong to every  $C$ , and  $A$  to no  $B$ : we conclude that  $A$  belongs to no  $C$ . If again it is necessary to [25] conclude that  $A$  belongs to no  $B$  (which was previously assumed)  $A$  must belong to no  $C$ , and  $C$  to every  $B$ : thus the proposition is reversed. If it is necessary to conclude that  $B$  belongs to  $C$ ,  $AB$  must no longer be converted as before; for the proposition that  $B$  belongs to no  $A$  is identical with the proposition that  $A$  belongs to no  $B$ . But we must assume that  $B$  belongs to all of that to none of which  $A$  belongs. Let  $A$  belong to no  $C$  (which was the conclusion) and assume that  $B$  belongs to all of that [30] to none of which  $A$  belongs. It is necessary then that  $B$  should belong to every  $C$ . Consequently each of the three propositions has been made a conclusion, and this is circular demonstration, to assume the conclusion and the reverse of one of the propositions, and deduce the remaining one. [35]

In particular deductions it is not possible to demonstrate the universal proposition through the others, but the particular can be demonstrated. Clearly it is impossible to demonstrate the universal; for what is universal is proved through propositions which are universal, but the conclusion is not universal, and the proof must start from the conclusion and the other proposition. Further a deduction cannot be made at all if the other proposition is converted; for the result is that both [58<sup>b</sup>1] propositions are particular. But the particular may be proved. Suppose that  $A$  has been proved of some  $C$  through  $B$ . If then it is assumed that  $B$  belongs to every  $A$ , and the conclusion is retained,  $B$  will belong to some  $C$ ; for we obtain the first figure [5] and  $A$  is middle. But if the deduction is negative, it is not possible to prove the universal proposition, for the reason given above. But it is possible to prove the particular, if  $AB$  is converted as in the universal cases, i.e.  $B$  belongs to some of that to some of which  $A$  does not belong: otherwise no deduction results because the [10] particular proposition is negative.

6 · In the second figure it is not possible to prove an affirmative proposition in this way, but a negative may be proved. An affirmative is not proved because both propositions are not affirmative (for the conclusion is negative) but an [15] affirmative is (as we saw) proved from premisses which are both affirmative. The negative is proved as follows. Let  $A$  belong to every  $B$ , and to no  $C$ : we conclude that  $B$  belongs to no  $C$ . If then it is assumed that  $B$  belongs to every  $A$ , it is necessary that [20]  $A$  should belong to no  $C$ ; for we get the second figure, with  $B$  as middle. But if  $AB$  is negative, and the other affirmative, we shall have the first figure. For  $C$  belongs to every  $A$ , and  $B$  to no  $C$ , consequently  $B$  belongs to no  $A$ ; neither, then, does  $A$  belong [25] to  $B$ . Through the conclusion, therefore, and one proposition, we get no deduction, but if another is assumed in addition, a deduction will be possible. But if the deduction is not universal, the universal proposition cannot be proved, for the same reason as we gave above; but the particular can be proved whenever the universal is affirmative. Let  $A$  belong to every  $B$ , and not to every  $C$ : the conclusion [30] is  $BC$ . If then it is assumed that  $B$  belongs to every  $A$ , but not to every  $C$ ,  $A$  will not belong to some  $C$ ,  $B$  being middle. But if the universal is negative, the proposition  $AC$  will not be proved by the conversion of  $AB$ ; for it turns out that either both or [35] one of the propositions is negative; consequently a deduction will not be possible. But the proof will proceed as in the universal cases, if it is assumed that  $A$  belongs to some of that to some of which  $B$  does not belong.

7 · In the third figure, when both propositions are taken universally, it is not [40] possible to prove them reciprocally; for that which is universal is proved through [59<sup>a</sup>1] propositions which are universal, but the conclusion in this figure is always particular, so that it is clear that it is not possible at all to prove through this figure the universal proposition. But if one is universal, the other particular, proof will [5] sometimes be possible, sometimes not. When both are affirmative, and the universal concerns the minor extreme, proof will be possible, but when it concerns the other extreme, impossible. Let  $A$  belong to every  $C$  and  $B$  to some  $C$ : the conclusion is  $AB$ . If then it is assumed that  $C$  belongs to every  $A$ , it has been proved that  $C$  belongs to [10] some  $B$ , but that  $B$  belongs to some  $C$  has not been proved. And yet it is necessary, if  $C$  belongs to some  $B$ , that  $B$  should belong to some  $C$ . But it is not the same that this should belong to that, and that to this; but we must assume besides that if this belongs to some of that, that belongs to some of this.

But if this is assumed the deduction no longer results from the conclusion and the other proposition. But if  $B$  [15] belongs to every  $C$ , and  $A$  to some  $C$ , it will be possible to prove  $AC$ , when it is assumed that  $C$  belongs to every  $B$ , and  $A$  to some  $B$ . For if  $C$  belongs to every  $B$  and  $A$  to some  $B$ , it is necessary that  $A$  should belong to some  $C$ ,  $B$  being middle.

And whenever one is affirmative, the other negative, and the affirmative is [20] universal, the other can be proved. Let  $B$  belong to every  $C$ , and  $A$  not to some  $C$ : the conclusion is that  $A$  does not belong to some  $B$ . If then it is assumed further that  $C$  belongs to every  $B$ , it is necessary that  $A$  should not belong to some  $C$ ,  $B$  being [25] middle. But when the negative is universal, the other is not proved, except as before, viz. if it is assumed that *that* belongs to some of that, to some of which *this* does not belong, e.g. if  $A$  belongs to no  $C$ , and  $B$  to some  $C$ : the conclusion is that  $A$  does not belong to some  $C$ . If then it is assumed that  $C$  belongs to some of that to some of which  $A$  does not belong, it is necessary that  $C$  should belong to some  $B$ . In no other [30] way is it possible by converting the universal proposition to prove the other; for in no other way can a deduction be formed.

[It is clear then that in the first figure reciprocal proof is made both through the third and through the first figure—if the conclusion is affirmative through the [35] first; if the conclusion is negative through the last. For it is assumed that *that* belongs to all of that to none of which *this* belongs. In the middle figure, when the deduction is universal, proof is possible through the second figure and through the first, but when particular through the second and the last. In the third figure all proofs are made through itself. It is clear also that in the third figure and in the [40] middle figure those deductions which are not made through those figures themselves either are not of the nature of circular proof or are imperfect.]<sup>20</sup>

[59<sup>b</sup>1] **8** · To convert is to alter the conclusion and make a deduction to prove that either the extreme does not belong to the middle or the middle to the last term. For it is necessary, if the conclusion has been converted and one of the propositions [5] stands, that the other should be destroyed. For if it should stand, the conclusion also must stand. It makes a difference whether the conclusion is converted into its opposite or into its contrary. For the same deduction does not result whichever form the conversion takes. This will be made clear by the sequel. (By opposition I mean the relation of ‘to every’ to ‘not to every’, and of ‘to some’ to ‘to



none'; by contrarily I [10] mean the relation of 'to every' to 'to none', and of 'to some' to 'not to some'.) Suppose that *A* has been proved of *C*, through *B* as middle term. If then it should be assumed that *A* belongs to no *C*, but to every *B*, *B* will belong to no *C*. And if *A* belongs to no *C*, and *B* to every *C*, *A* will belong, not to no *B* at all, but not to every *B*. For (as we saw) the universal is not proved through the last figure. In a word it is not [15] possible to refute universally by conversion the proposition which concerns the major extreme; for the refutation always proceeds through the third figure; since it is necessary to take both propositions in reference to the minor extreme. Similarly if the deduction is negative. Suppose it has been proved that *A* belongs to no *C* [20] through *B*. Then if it is assumed that *A* belongs to every *C*, and to no *B*, *B* will belong to no *C*. And if *A* and *B* belong to every *C*, *A* will belong to some *B*; but in the original premiss it belonged to no *B*.

If the conclusion is converted into its opposite, the deductions will be opposite [25] and not universal. For one proposition is particular, so that the conclusion also will be particular. Let the deduction be affirmative, and let it be converted as stated. Then if *A* belongs not to every *C*, but to every *B*, *B* will belong not to every *C*. And if [30] *A* belongs not to every *C*, but *B* belongs to every *C*, *A* will belong not to every *B*. Similarly if the deduction is negative. For if *A* belongs to some *C*, and to no *B*, *B* will belong, not to no *C* at all, but not to some *C*. And if *A* belongs to some *C*, and *B* to [35] every *C*, as was originally assumed, *A* will belong to some *B*.

In particular deductions when the conclusion is converted into its opposite, both propositions may be refuted; but when it is converted into its contrary, neither. For the result is no longer, as in the universal cases, a refutation in which the [40] conclusion reached by conversion lacks universality, but no refutation at all. Suppose that *A* has been proved of some *C*. If then it is assumed that *A* belongs to no [60a1] *C*, and *B* to some *C*, *A* will not belong to some *B*; and if *A* belongs to no *C*, but to every *B*, *B* will belong to no *C*. Thus both are refuted. But neither can be refuted if the conclusion is converted into its contrary. For if *A* does not belong to some *C*, but [5] to every *B*, then *B* will not belong to some *C*. But the original premiss is not yet refuted; for it is possible that *B* should belong to some *C*, and should not belong to some *C*. The universal *AB* cannot be affected by a deduction at all; for if *A* does not belong to some *C*, but *B* belongs to some *C*, neither of the propositions is universal. [10] Similarly if the deduction is negative; for if it should be assumed that *A* belongs to every *C*, both are refuted; but if the assumption is that *A* belongs to some

C, neither is. The demonstration is the same as before.

9 · In the second figure it is not possible to refute the proposition which [15] concerns the major extreme by establishing something contrary to it, whichever form the conversion may take. For the conclusion will always be in the third figure, and in this figure (as we saw) there is no universal deduction. The other can be refuted in a manner similar to the conversion: I mean, if the conclusion is converted into its contrary, contrarily; if into its opposite, oppositely. Let *A* belong to every *B* [20] and to no *C*: conclusion *BC*. If then it is assumed that *B* belongs to every *C*, and *AB* stands, *A* will belong to every *C*, since the first figure is produced. If *B* belongs to [25] every *C*, and *A* to no *C*, then *A* belongs not to every *B*: the figure is the last. But if *BC* is converted into its opposite, *AB* will be proved as before, *AC* oppositely. For if *B* belongs to some *C*, and *A* to no *C*, then *A* will not belong to some *B*. Again if *B* [30] belongs to some *C*, and *A* to every *B*, *A* will belong to some *C*, so that the deduction is opposite. A similar proof can be given if the propositions are the other way about.

If the deduction is particular, when the conclusion is converted into its contrary neither proposition can be refuted, as also happened in the first figure, but [35] if the conclusion is converted into its opposite, both can be refuted. Suppose that *A* belongs to no *B*, and to some *C*: the conclusion is *BC*. If then it is assumed that *B* belongs to some *C*, and *AB* stands, the conclusion will be that *A* does not belong to some *C*. But the original statement has not been refuted; for it is possible that *A* [40] should belong to some *C* and also not to some *C*. Again if *B* belongs to some *C* and *A* to some *C*, no deduction will be possible; for neither of the assumptions is universal. [60<sup>b</sup>1] Consequently *AB* is not refuted. But if the conclusion is converted into its opposite, both can be refuted. For if *B* belongs to every *C*, and *A* to no *B*, *A* will belong to no *C*; but it was assumed to belong to some *C*. Again if *B* belongs to every *C* and *A* to some *C*, *A* will belong to some *B*. The same demonstration can be given if the [5] universal is affirmative.

10 · In the third figure when the conclusion is converted into its contrary, neither of the propositions can be refuted in any of the deductions, but when the conclusion is converted into its opposite, both may be refuted and in all the moods. [10] Suppose it has been proved that *A* belongs to some *B*, *C* being taken as middle, and the propositions

being universal. If then it is assumed that  $A$  does not belong to some  $B$ , but  $B$  belongs to every  $C$ , no deduction is formed about  $A$  and  $C$ . Nor if  $A$  does not belong to some  $B$ , but belongs to every  $C$ , will a deduction be possible about  $B$  [15] and  $C$ . A similar proof can be given if the propositions are not universal. For either both propositions arrived at by the conversion must be particular, or the universal must refer to the minor extreme. But we found that no deduction is possible thus either in the first or in the middle figure. But if the conclusion is converted into its [20] opposite, both the propositions can be refuted. For if  $A$  belongs to no  $B$ , and  $B$  to every  $C$ , then  $A$  belongs to no  $C$ ; again if  $A$  belongs to no  $B$ , and to every  $C$ ,  $B$  belongs to no  $C$ . And similarly if one is not universal. For if  $A$  belongs to no  $B$ , and  $B$  to some  $C$ ,  $A$  will not belong to some  $C$ ; if  $A$  belongs to no  $B$ , and to every  $C$ ,  $B$  will [25] belong to no  $C$ .

Similarly if the deduction is negative. Suppose it has been proved that  $A$  does not belong to some  $B$ ,  $BC$  being affirmative,  $AC$  being negative; for it was thus that, as we saw, a deduction could be made. Whenever then the contrary of the [30] conclusion is assumed a deduction will not be possible. For if  $A$  belongs to some  $B$ , and  $B$  to every  $C$ , no deduction is possible (as we saw) about  $A$  and  $C$ . Nor, if  $A$  belongs to some  $B$ , and to no  $C$ , was a deduction possible concerning  $B$  and  $C$ . Therefore the propositions are not refuted. But when the opposite of the conclusion is assumed, they are refuted. For if  $A$  belongs to every  $B$ , and  $B$  to  $C$ ,  $A$  belongs to every  $C$ ; but  $A$  was supposed originally to belong to no  $C$ . Again if  $A$  belongs to [35] every  $B$ , and to no  $C$ , then  $B$  belongs to no  $C$ ; but it was supposed to belong to every  $C$ . A similar proof is possible if the propositions are not universal. For  $AC$  becomes universal and negative, the other premiss particular and affirmative. If then  $A$  belongs to every  $B$ , and  $B$  to some  $C$ , it results that  $A$  belongs to some  $C$ ; but it was [40] supposed to belong to no  $C$ . Again if  $A$  belongs to every  $B$ , and to no  $C$ , then  $B$  belongs to no  $C$ ; but it was assumed to belong to some  $C$ . If  $A$  belongs to some  $B$  and [61<sup>a</sup>1]  $B$  to some  $C$ , no deduction results; nor yet if  $A$  belongs to some  $B$ , and to no  $C$ . Thus in the former case the propositions are refuted, in the latter they are not.

From what has been said it is clear how a deduction results in each figure when [5] the conclusion is converted; and when it is contrary to the proposition, and when opposite. It is clear that in the first figure the deductions are formed through the middle and the last figures, and the proposition which concerns the minor extreme is always refuted through the middle figure, that which concerns the major through [10] the last figure. In the second figure deductions proceed through the first and the

last figures, and the proposition which concerns the minor extreme is always refuted through the first figure, that which concerns the major extreme through the last. In the third figure the deductions proceed through the first and the middle figures; the proposition which concerns the major is always refuted through the first figure, that [15] which concerns the minor through the middle figure.

11 · It is clear then what conversion is, how it is effected in each figure, and what deduction results. Deduction *per impossibile* is proved when the contradictory of the conclusion is posited and another proposition is assumed; it can be made in all [20] the figures. For it resembles conversion, differing only in this: conversion takes place after a deduction has been formed and both the propositions have been assumed, but a reduction to the impossible takes place not because the opposite has been agreed to already, but because it is clear that it is true. The terms are alike in [25] both, and the premisses of both are assumed in the same way. For example if *A* belongs to every *B*, *C* being middle, then if it is supposed that *A* does not belong to every *B* or belongs to no *B*, but to every *C* (which was true), it follows that *C* belongs to no *B* or not to every *B*. But this is impossible; consequently the supposition is [30] false; its opposite then is true. Similarly in the other figures; for whatever moods admit of conversion admit also of deduction *per impossibile*.

All the problems can be proved *per impossibile* in all the figures, excepting the universal affirmative, which is proved in the middle and third figures, but not in the [35] first. Suppose that *A* belongs not to every *B*, or to no *B*, and take besides another proposition concerning either of the terms, viz. that *C* belongs to every *A*, or that *B* belongs to every *D*; thus we get the first figure. If then it is supposed that *A* does not [40] belong to every *B*, no deduction results whichever term the assumed proposition concerns; but if it is supposed that *A* belongs to no *B*, when *BD* is assumed as well we [61<sup>b</sup>1] shall deduce what is false, but not the problem proposed. For if *A* belongs to no *B*, and *B* belongs to every *D*, *A* belongs to no *D*. Let this be impossible: it is false then [5] that *A* belongs to no *B*. But the universal affirmative is not necessarily true if the universal negative is false. But if *CA* is assumed as well, no deduction results, nor does it do so when it is supposed that *A* does not belong to every *B*. Consequently it is clear that the universal affirmative cannot be proved in the first figure *per* [10] *impossible*.

But the particular affirmative and the universal and particular

negatives can all be proved. Suppose that  $A$  belongs to no  $B$ , and let it have been assumed that  $B$  belongs to every or to some  $C$ . Then it is necessary that  $A$  should belong to no  $C$  or not to every  $C$ . But this is impossible (for let it be true and clear that  $A$  belongs to [15] every  $C$ ); consequently if this is false, it is necessary that  $A$  should belong to some  $B$ . But if the other proposition assumed relates to  $A$ , no deduction will be possible. Nor can a conclusion be drawn when the contrary of the conclusion is supposed, i.e. that  $A$  does not belong to some  $B$ . Clearly then we must suppose the opposite.

Again suppose that  $A$  belongs to some  $B$ , and let it have been assumed that  $C$  [20] belongs to every  $A$ . It is necessary then that  $C$  should belong to some  $B$ . But let this be impossible, so that the supposition is false: in that case it is true that  $A$  belongs to no  $B$ . We may proceed in the same way if  $CA$  has been taken as negative. But if the proposition assumed concerns  $B$ , no deduction will be possible. If the contrary is [25] supposed, we shall have a deduction and an impossible conclusion, but the problem in hand is not proved. Suppose that  $A$  belongs to every  $B$ , and let it have been assumed that  $C$  belongs to every  $A$ . It is necessary then that  $C$  should belong to every  $B$ . But this is impossible, so that it is false that  $A$  belongs to every  $B$ . But we have not yet shown it to be necessary that  $A$  belongs to no  $B$ , if it does not belong to [30] every  $B$ . Similarly if the other proposition taken concerns  $B$ ; we shall have a deduction and a conclusion which is impossible, but the supposition is not refuted. Therefore it is the opposite that we must suppose.

To prove that  $A$  does not belong to every  $B$ , we must suppose that it belongs to [35] every  $B$ ; for if  $A$  belongs to every  $B$ , and  $C$  to every  $A$ , then  $C$  belongs to every  $B$ ; so that if this is impossible, the supposition is false. Similarly if the other proposition assumed concerns  $B$ . The same results if  $CA$  is negative; for thus also we get a deduction. But if the negative concerns  $B$ , nothing is proved. If the supposition is [40] that  $A$  belongs not to every but to some  $B$ , it is not proved that  $A$  belongs not to every  $B$ , but that it belongs to no  $B$ . For if  $A$  belongs to some  $B$ , and  $C$  to every  $A$ , then  $C$  [62<sup>a</sup>1] will belong to some  $B$ . If then this is impossible, it is false that  $A$  belongs to some  $B$ ; consequently it is true that  $A$  belongs to no  $B$ . But if this is proved, the truth is refuted as well; for the original conclusion was that  $A$  belongs to some  $B$ , and does not belong to some  $B$ . Further nothing impossible results from the supposition; for [5] then the supposition would be false, since it is impossible to deduce a false conclusion from true premisses; but in fact it is true; for  $A$  belongs to some  $B$ . Consequently we must not suppose that  $A$  belongs to some  $B$ , but

that it belongs to every  $B$ . Similarly if we should be proving that  $A$  does not belong to some  $B$ ; for if [10] not to belong to some and to belong not to every are the same, the demonstration of both will be identical.

It is clear then that not the contrary but the opposite ought to be supposed in all the deductions. For thus we shall have the necessity, and the claim we make will be reputable. For if of everything either the affirmation or the negation holds good, then if it is proved that the negation does not hold, the affirmation must be true. [15] Again if it is not admitted that the affirmation is true, the claim that the negation is true will be reputable. But in neither way does it suit to maintain the contrary; for it is not necessary that if the universal negative is false, the universal affirmative should be true, nor is it reputable that if the one is false the other is true.

12 · It is clear then that in the first figure all problems except the universal [20] affirmative are proved *per impossibile*. But in the middle and the last figures this also is proved. Suppose that  $A$  does not belong to every  $B$ , and let it have been assumed that  $A$  belongs to every  $C$ . If then  $A$  belongs not to every  $B$ , but to every  $C$ , [25]  $C$  will not belong to every  $B$ . But this is impossible (for suppose it to be clear that  $C$  belongs to every  $B$ ); consequently the supposition is false. It is true then that  $A$  belongs to every  $B$ . But if the contrary is supposed, we shall have a deduction and a result which is impossible; but the problem in hand is not proved. For if  $A$  belongs to [30] no  $B$ , and to every  $C$ ,  $C$  will belong to no  $B$ . This is impossible; so that it is false that  $A$  belongs to no  $B$ . But though this is false, it does not follow that it is true that  $A$  belongs to every  $B$ .

If we want to prove that  $A$  belongs to some  $B$ , suppose that  $A$  belongs to no  $B$ , and let  $A$  belong to every  $C$ . It is necessary then that  $C$  should belong to no  $B$ . Consequently, if this is impossible,  $A$  must belong to some  $B$ . But if it is supposed [35] that  $A$  does not belong to some  $B$ , we shall have the same results as in the first figure.

Again suppose that  $A$  belongs to some  $B$ , and let  $A$  belong to no  $C$ . It is necessary then that  $C$  should not belong to some  $B$ . But originally it belonged to every  $B$ ; consequently the supposition is false;  $A$  then will belong to no  $B$ . [40]

If we want to prove that  $A$  does not belong to every  $B$ , suppose it does belong to every  $B$ , and to no  $C$ . It is necessary then that  $C$  should belong to no  $B$ . But this is [62<sup>b</sup>1] impossible; so that it is true that  $A$  does not belong to every  $B$ . It is clear then that all the deductions can be formed in

the middle figure.

**13** · Similarly they can all be formed in the last figure. Suppose that  $A$  does [5] not belong to some  $B$ , but  $C$  belongs to every  $B$ ; then  $A$  does not belong to some  $C$ . If then this is impossible, it is false that  $A$  does not belong to some  $B$ ; so that it is true that  $A$  belongs to every  $B$ . But if it is supposed that  $A$  belongs to no  $B$ , we shall have a deduction and a conclusion which is impossible; but the problem in hand is not proved; for if the contrary is supposed, we shall have the same results as before. [10]

But to prove that  $A$  belongs to some  $B$ , this supposition must be made. If  $A$  belongs to no  $B$ , and  $C$  to some  $B$ ,  $A$  will belong not to every  $C$ . If then this is false, it is true that  $A$  belongs to some  $B$ .

To prove that  $A$  belongs to no  $B$ , suppose  $A$  belongs to some  $B$ , and let it have [15] been assumed that  $C$  belongs to every  $B$ . Then it is necessary that  $A$  should belong to some  $C$ . But *ex hypothesi* it belongs to no  $C$ , so that it is false that  $A$  belongs to some  $B$ . But if it is supposed that  $A$  belongs to every  $B$ , the problem is not proved.

But this supposition must be made if we are to prove that  $A$  belongs not to [20] every  $B$ . For if  $A$  belongs to every  $B$  and  $C$  to every  $B$ , then  $A$  belongs to some  $C$ . But this we assumed not to be so, so it is false that  $A$  belongs to every  $B$ . But in that case it is true that  $A$  belongs not to every  $B$ . If however it is supposed that  $A$  belongs to some  $B$ , we shall have the same result as before.

[25] It is clear then that in all the deductions which proceed *per impossibile* the opposite must be supposed. And it is plain that in the middle figure an affirmative conclusion, and in the last figure a universal conclusion, are proved in a way.

**14** · Demonstration *per impossibile* differs from probative demonstration in [30] that it posits what it wishes to refute by reduction to a statement admitted to be false; whereas probative demonstration starts from admitted positions. Both, indeed, take two propositions that are admitted, but the latter takes the premisses from which the deduction starts, the former takes one of these, along with the [35] contradictory of the conclusion. Also in the probative case it is not necessary that the conclusion should be familiar, nor that one should suppose beforehand that it is true or not; in the other it is necessary to suppose beforehand

that it is not true. It makes no difference whether the conclusion is affirmative or negative; the method is the same in both cases.

[40] Everything which is concluded probatively can be proved *per impossibile*, and that which is proved *per impossibile* can be proved probatively, through the same [63<sup>a</sup>1] terms. Whenever the deduction is formed in the first figure, the truth will be found in the middle or the last figure, if negative in the middle, if affirmative in the last. Whenever the deduction is formed in the middle figure, the truth will be found in [5] the first, whatever the problem may be. Whenever the deduction is formed in the last figure, the truth will be found in the first and middle figures, if affirmative in the first, if negative in the middle. Suppose that *A* has been proved to belong to no *B*, or not to every *B*, through the first figure. Then the supposition must have been that [10] *A* belongs to some *B*, and it was assumed that *C* belongs to every *A* and to no *B*. For thus the deduction was made and the impossible conclusion reached. But this is the middle figure, if *C* belongs to every *A* and to no *B*. And it is clear from this that *A* belongs to no *B*. Similarly if *A* has been proved not to belong to every *B*. For the [15] supposition is that *A* belongs to every *B*; and it was assumed that *C* belongs to every *A* but not to every *B*. Similarly too, if *CA* should be negative; for thus also we have the middle figure. Again suppose it has been proved that *A* belongs to some *B*. The [20] supposition here is that *A* belongs to no *B*; and it was assumed that *B* belongs to every *C*, and *A* either to every or to some *C*; for in this way we shall get what is impossible. But if *A* and *B* belong to every *C*, we have the last figure. And it is clear from this that *A* must belong to some *B*. Similarly if *B* or *A* should be assumed to belong to some *C*.

[25] Again suppose it has been proved in the middle figure that *A* belongs to every *B*. Then the supposition must have been that *A* belongs not to every *B*, and it was assumed that *A* belongs to every *C*, and *C* to every *B*; for thus we shall get what is impossible. But if *A* belongs to every *C*, and *C* to every *B*, we have the first figure. Similarly if it has been proved that *A* belongs to some *B*; for the supposition then [30] must have been that *A* belongs to no *B*, and it was assumed that *A* belongs to every *C*, and *C* to some *B*. If the deduction is negative, the supposition must have been that *A* belongs to some *B*, and it was assumed that *A* belongs to no *C*, and *C* to every *B*, so that the first figure results. If the deduction is not universal, but proof has been [35] given that *A* does not belong to some *B*, we may infer in the same way. The supposition is that *A* belongs to every *B*, and it was assumed that *A* belongs to no *C*, and *C* belongs to some *B*; for thus we get the first figure.



Again suppose it has been proved in the third figure that *A* belongs to every *B*. [40] Then the supposition must have been that *A* belongs not to every *B*, and it was assumed that *C* belongs to every *B*, and *A* belongs to every *C*; for thus we shall get [63<sup>b</sup>1] what is impossible. And this is the first figure. Similarly if the demonstration establishes a particular proposition: the supposition then must have been that *A* belongs to no *B*, and it was assumed that *C* belongs to some *B*, and *A* to every *C*. If the deduction is negative, the supposition must have been that *A* belongs to some *B*, [5] and it was assumed that *C* belongs to no *A* and to every *B*; and this is the middle figure. Similarly if the demonstration is not universal. The supposition will then be that *A* belongs to every *B*, and it was assumed that *C* belongs to no *A* and to some *B*; [10] and this is the middle figure.

It is clear then that it is possible through the same terms to prove each of the problems probatively as well. Similarly it will be possible if the deductions are probative to reduce them *ad impossibile* in the terms which have been taken, [15] whenever the opposite of the conclusion is taken as a premiss. For the deductions become identical with those which are obtained by means of conversion, so that we obtain immediately the figures through which each problem will be solved. It is clear then that every problem can be proved in both ways, i.e. *per impossibile* and [20] probatively, and it is not possible to separate one method from the other.

**15** · In what figure it is possible to draw a conclusion from propositions which are opposed, and in what figure this is not possible, will be made clear in this way. Verbally four kinds of opposition are possible, viz. ‘to every’-‘to no’, ‘to [25] every’-‘not to every’, ‘to some’-‘to no’, ‘to some’-‘not to some’; but in reality there are only three, for ‘to some’ is only verbally opposed to ‘not to some’. Of these I call those which are universal contraries (‘to every’-‘to no’, e.g. ‘every science is good’, ‘no science is good’); the others I call opposites. [30]

In the first figure no deduction whether affirmative or negative can be made out of opposed propositions: no affirmative deduction is possible because both propositions must be affirmative, but opposites are the one affirmative, the other negative; no negative deduction is possible because opposites affirm and deny the [35] same predicate of the same subject, and the middle term in the first figure is not predicated of both extremes, but one thing is denied of it, and it is affirmed of something else and such propositions are not opposed.

In the middle figure a deduction can be made both of opposites and of contraries. Let *A* stand for good, let *B* and *C* stand for science. If then one assumes [64<sup>a</sup>1] that every science is good, and no science is good, *A* belongs to every *B* and to no *C*, so that *B* belongs to no *C*; no science, then, is a science. Similarly if after assuming [5] that every science is good one assumed that the science of medicine is not good; for *A* belongs to every *B* but to no *C*, so that a particular science will not be a science. Again, if *A* belongs to every *C* but to no *B*, and *B* is science, *C* medicine, and *A* supposition; for after assuming that no science is supposition, one has assumed that [10] a particular science is supposition. This differs from the preceding deduction because the relations between the terms are converted: before, the affirmative concerned *B*, now it concerns *C*. Similarly if one proposition is not universal; for the middle term is always that which is said negatively of one extreme, and affirmatively [15] of the other. Consequently it is possible that opposites may lead to a conclusion, though not always or in every mood, but only if the terms subordinate to the middle are such that they are either identical or related as whole to part. Otherwise it is impossible; for the propositions cannot anyhow be either contraries or opposites.

[20] In the third figure an affirmative deduction can never be made out of opposite propositions, for the reason given in reference to the first figure; but a negative deduction is possible whether the terms are universal or not. Let *B* and *C* stand for [25] science, *A* for medicine. If then one should assume that all medicine is science and that no medicine is science, he has assumed that *B* belongs to every *A* and *C* to no *A*, so that some science will not be a science. Similarly if the proposition *BA* is not assumed universally; for if some medicine is science and again no medicine is [30] science, it results that some science is not science. The propositions are contrary if the terms are taken universally; if one is particular, they are opposite.

We must recognize that it is possible to take opposites in the way we said, viz. [35] ‘all science is good’ and ‘no science is good’ or ‘some science is not good’. This does not usually escape notice. But it is possible to establish one of the opposites by way of other questions, or to assume it in the way suggested in the *Topics*.<sup>21</sup> Since there are three oppositions to affirmations, it follows that opposites may be assumed in six ways—either to all and to no, or to all and not to all, or to some and to no; and the [64<sup>b</sup>1] relations between the terms may be converted; e.g. *A* may belong to every *B* and to no *C*, or to every *C* and to no *B*, or to every of the one, not to every of the other; here too the relation between the terms

may be converted. Similarly in the third figure. [5] So it is clear in how many ways and in what figures a deduction can be made by means of propositions which are opposed.

It is clear too that from false premisses it is possible to draw a true conclusion, as has been said before, but it is not possible if the premisses are opposed. For the [10] deduction is always contrary to the fact, e.g. if a thing is good, it is deduced that it is not good, if an animal, that it is not an animal, because the deduction springs out of a contradiction and the terms presupposed are either identical or related as whole and part. It is evident also that in fallacious reasonings nothing prevents a contradiction to the supposition from resulting, e.g. if something is odd, that it is not [15] odd. For the deduction owed its contrariety to its opposite premisses: if we assume such premisses we shall get a result that contradicts our supposition. But we must recognize that contraries cannot be inferred from a single deduction in such a way that we conclude that what is not good is good, or anything of that sort, unless a proposition of that form is at once assumed (e.g. every animal is white and not [20] white, and man is an animal). Either we must introduce the contradiction by an additional assumption, assuming, e.g., that every science is supposition, and then assuming that medicine is a science, but none of it is supposition (which is the mode in which refutations are made); or we must argue from two deductions. In no other [25] way than this, as was said before, is it possible that the assumptions should be really contrary.

16 · To beg and assume the point at issue is a species of failure to demonstrate the problem proposed; but this happens in many ways. A man may not [30] deduce at all, or he may argue from premisses which are more unknown or equally unknown, or he may establish what is prior by means of what is posterior; for demonstration proceeds from what is more convincing and prior. Now begging the point at issue is none of these; but since some things are naturally known through [35] themselves, and other things by means of something else (the first principles through themselves, what is subordinate to them through something else), whenever a man tries to prove by means of itself what is not known by means of itself, then he begs the point at issue. This may be done by claiming what is at issue at once; it is also possible to make a transition to other things which would naturally be proved through the point at issue, and demonstrate it through them, e.g. if *A* should [65<sup>a</sup>1] be proved through *B*, and *B* through *C*, though it was natural that *C* should

be proved through *A*; for it turns out that those who reason thus are proving *A* by means of itself. This is what those persons do who suppose that they are constructing parallel lines; for they fail to see that they are assuming facts which it [5] is impossible to demonstrate unless the parallels exist. So it turns out that those who reason thus merely say a particular thing is, if it is: in this way everything will be known by means of itself. But that is impossible.

If then it is uncertain whether *A* belongs to *C*, and also whether *A* belongs to *B*, [10] and if one should assume that *A* does belong to *B*, it is not yet clear whether he begs the point at issue, but it is evident that he is not demonstrating; for what is as uncertain as the question to be answered cannot be a principle of a demonstration. If however *B* is so related to *C* that they are identical, or if they are plainly convertible, or the one inheres in the other, the point at issue is begged. For one [15] might equally well prove that *A* belongs to *B* through those terms if they are convertible. (As it is, things prevent such a demonstration, but the method does not.) But if one were to make the conversion, then he would be doing what we have described and effecting a reciprocal proof with three propositions.

Similarly if he should assume that *B* belongs to *C*, this being as uncertain as [20] the question whether *A* belongs to *C*, the point at issue is not yet begged, but no demonstration is made. If however *A* and *B* are identical either because they are convertible or because *A* follows *B*, then the point at issue is begged for the same reason as before. For we have explained the meaning of begging the point at issue, [25] viz. proving by means of itself that which is not clear by means of itself.

If then begging the point at issue is proving by means of itself what is not clear by means of itself, in other words failing to prove when the failure is due to the thesis to be proved and that through which it is proved being equally uncertain, either because predicates which are identical belong to the same subject, or because the same predicate belongs to subjects which are identical, the point at issue may be [30] begged in the middle and third figures in both ways, though, if the deduction is affirmative, only in the third and first figures. If the deduction is negative, it occurs when identical predicates are denied of the same subject; and both propositions do not beg the point at issue in the same way (similarly in the middle figure), because [35] the terms in negative deductions are not convertible. In demonstrations the point at issue is begged when the terms are really related in the manner described, in dialectical arguments when they are believed to be so related.

17 · The objection that this is not the reason why the result is false, which we [65<sup>b</sup>1] frequently make in argument, arises first in the case of a *reductio ad impossibile*, when it is used to contradict that which was being proved by the reduction. For unless a man has contradicted this proposition he will not say, 'That is not the reason', but urge that something false has been assumed in the earlier parts of the argument; nor will he use the formula in the case of a probative demonstration; for here what one contradicts is not posited. Further when anything is refuted [5] probatively by *ABC*, it cannot be objected that the deduction does not depend on the assumption laid down. For we say that something comes about not for that reason, when the deduction is concluded in spite of the refutation of this; but that is not possible in probative cases; since if an assumption is refuted, a deduction can no longer be drawn in reference to it. It is clear then that 'Not for that reason' can only [10] be used in the case of a *reductio ad impossibile*, and when the original supposition is so related to the impossible conclusion, that the conclusion results indifferently whether the supposition is made or not.

The most obvious case in which the falsity does not come about by reason of [15] the supposition is when a deduction drawn from middle terms to an impossible conclusion is independent of the supposition, as we have explained in the *Topics*.<sup>22</sup> For to put that which is not the cause as the cause, is just this: e.g. if a man, wishing to prove that the diagonal of the square is incommensurate with the side, should try to prove Zeno's theorem that motion is impossible, and so establish a *reductio ad* [20] *impossibile*; for the falsity has no connexion at all with the original assumption. Another case is where the impossible conclusion is connected with the supposition, but does not result from it. This may happen whether one traces the connexion [25] upwards or downwards, e.g. if it is laid down that *A* belongs to *B*, *B* to *C*, and *C* to *D*, and it is false that *B* belongs to *D*; for if we eliminated *A* and assumed all the same that *B* belongs to *C* and *C* to *D*, the false conclusion would not depend on the original supposition. Or again trace the connexion upwards; e.g. suppose that *A* belongs to *B*, *E* to *A*, and *F* to *E*, it being false that *F* belongs to *A*. In this way too [30] the impossible conclusion would result, though the original supposition were eliminated. But the impossible conclusion ought to be connected with the original terms: in this way it will depend on the supposition, e.g. when one traces the connexion downwards, the impossible conclusion must be connected with the term which is predicate; for if it is impossible that *A* should belong to *D*, the false [35] conclusion will no longer result after *A* has been eliminated. If one traces

the connexion upwards, the impossible conclusion must be connected with the term which is subject; for if it is impossible that  $F$  should belong to  $B$ , the impossible conclusion will disappear if  $B$  is eliminated. Similarly when the deductions are negative.

It is clear then that when the impossibility is not related to the original terms, [66<sup>a</sup>1] the falsity does not result by reason of the supposition. Or perhaps even so it may sometimes be independent. For if it were laid down that  $A$  belongs not to  $B$  but to  $K$ , and that  $K$  belongs to  $C$  and  $C$  to  $D$ , the impossible conclusion would still stand (similarly if one takes the terms in an ascending series); consequently since the [5] impossibility results whether the first assumption is suppressed or not, it does not hold by reason of the supposition. Or perhaps we ought not to understand the statement that the false conclusion results even if the assumption does not hold, in the sense that if something else were supposed the impossibility would result; but rather in the sense that when it is eliminated, the same impossibility results through [10] the remaining propositions; since it is not perhaps absurd that the same false result should follow from several suppositions, e.g. that parallels meet, both on the assumption that the interior angle is greater than the exterior and on the assumption that a triangle contains more than two right angles. [15]

18 · A false argument comes about by reason of the first falsity in it. Every deduction is made out of two or more propositions. If then it is drawn from two, one or both of them must be false; for (as was proved) a false deduction cannot be drawn from true premisses. But if from more than two, e.g. if  $C$  is established through  $A$  [20] and  $B$ , and these through  $D$ ,  $E$ ,  $F$ , and  $G$ , one of these higher propositions must be false, and the argument fails by reason of this; for  $A$  and  $B$  are inferred by means of them. Therefore the conclusion and the falsity come about by reason of one of them.

19 · In order to avoid being argued down, we must take care, whenever an [25] opponent sets up an argument without disclosing the conclusions, not to grant him the same term twice over in his propositions, since we know that a deduction cannot be drawn without a middle term, and that term which is stated more than once is the middle. How we ought to watch out for the middle in reference to each conclusion, is evident from our knowing what kind of thesis is proved in each figure. This will [30] not escape us since we know how we are

maintaining the argument.

That which we urge men to beware of in their admissions, they ought in attack to try to conceal. This will be possible first, if, instead of drawing the conclusions of [35] preliminary deductions, they make the necessary assumptions and leave the conclusions in the dark; secondly if instead of inviting assent to propositions which are closely connected they take as far as possible those that are not connected by middle terms. For example suppose that *A* is to be inferred to be true of *F*; *B*, *C*, *D*, and *E* being middle terms. One ought then to ask whether *A* belongs to *B*, and next whether *D* belongs to *E*, instead of asking whether *B* belongs to *C*; after that he may [66<sup>b</sup>1] ask whether *B* belongs to *C*, and so on. If the deduction is drawn through one middle term, he ought to begin with that: in this way he will most likely deceive his opponent.

20 · Since we know when a deduction can be formed and how its terms must [5] be related, it is clear when refutation will be possible and when impossible. A refutation is possible whether everything is conceded, or the answers alternate (one, I mean, being affirmative, the other negative). For, as has been shown, a deduction is possible both in the former and in the latter case: consequently, if what is laid [10] down is contrary to the conclusion, a refutation must take place; for a refutation is a deduction which establishes the contradictory. But if nothing is conceded, a refutation is impossible; for no deduction is possible (as we saw) when all the terms are negative; therefore no refutation is possible. For if a refutation were possible, a [15] deduction must be possible; although if a deduction is possible it does not follow that a refutation is possible. Similarly refutation is not possible if nothing is conceded universally; since refutation and deduction are defined in the same way.

21 · It sometimes happens that just as we are deceived in the arrangement of the terms, so error may arise in our thought about them, e.g. if it is possible that the [20] same predicate should belong to more than one subject primarily, but although knowing the one, a man may forget the other and think the predicate belongs to none of it. Suppose that *A* belongs to *B* and to *C* in virtue of themselves, and that *B* and *C* belong to every *D* in the same way. If then a man thinks that *A* belongs to every *B*, and *B* to *D*, but *A* to no *C*, and *C* to every *D*, he will have knowledge and [25] ignorance of the same thing in respect of the same thing. Again if a man were to make a mistake about the members of a

single series; e.g. suppose  $A$  belongs to  $B$ ,  $B$  to  $C$ , and  $C$  to  $D$ , but someone thinks that  $A$  belongs to every  $B$ , but to no  $C$ : he will [30] both know that  $A$  belongs to  $C$ , and believe that it does not. Does he then actually maintain after this that what he knows, he does not believe? For he knows in a way that  $A$  belongs to  $C$  through  $B$ , knowing the particular by virtue of his universal knowledge; so that what he knows in a way, this he maintains he does not believe at all; but that is impossible.

[35] In the former case, where the middle term does not belong to the same series, it is not possible to believe both the propositions with reference to each of the two middle terms: e.g. that  $A$  belongs to every  $B$ , but to no  $C$ , and both  $B$  and  $C$  belong to every  $D$ . For it turns out that the first proposition is either wholly or partially contrary. For if he believes that  $A$  belongs to everything to which  $B$  belongs, and he [67<sup>a</sup>1] knows that  $B$  belongs to  $D$ , then he knows that  $A$  belongs to  $D$ . Consequently if again he thinks that  $A$  belongs to nothing to which  $C$  belongs, he does not think that  $A$  belongs to some of that to which  $B$  belongs; but if he thinks that  $A$  belongs to everything to which  $B$  belongs, and again does not think that  $A$  belongs to some of that to which  $B$  belongs, these beliefs are wholly or partially contrary. [5]

In this way then it is not possible to believe; but nothing prevents a man believing one proposition of each deduction or both of one: e.g.  $A$  belongs to every  $B$ , and  $B$  to  $D$ , and again  $A$  belongs to no  $C$ . An error of this kind is similar to the error into which we fall concerning particulars: e.g. if  $A$  belongs to everything to which  $B$  belongs, and  $B$  to every  $C$ ,  $A$  will belong to every  $C$ . If then a man knows that  $A$  [10] belongs to everything to which  $B$  belongs, he knows also that  $A$  belongs to  $C$ . But nothing prevents his being ignorant that  $C$  exists; e.g. let  $A$  stand for two right angles,  $B$  for triangle,  $C$  for a sensible triangle. A man might believe that  $C$  did not exist, though he knew that every triangle contains two right angles; consequently he [15] will know and not know the same thing at the same time. For knowing that every triangle has its angles equal to two right angles is not simple—it may obtain either by having universal knowledge or by particular. Thus by universal knowledge he knows that  $C$  contains two right angles, but not by particular; consequently his [20] knowledge will not be contrary to his ignorance. The argument in the *Meno*<sup>23</sup> that learning is recollection may be criticized in a similar way. For it never happens that a man has foreknowledge of the particular, but in the process of induction he receives a knowledge of the particulars, as though by an act of recognition. For we know some things directly; e.g. that the angles are equal to two right angles, if we



[25] see that the figure is a triangle. Similarly in all other cases.

By universal knowledge then we see the particulars, but we do not know them by the kind of knowledge which is proper to them; consequently it is possible that we may make mistakes about them, but not that we should have the knowledge and error that are contrary to one another: rather we have universal knowledge but make a mistake in regard to the particular. Similarly in the cases stated above. The [30] error in respect of the middle term is not contrary to the knowledge obtained through the deduction, nor is the belief in respect of the middle terms. Nothing prevents a man who knows both that *A* belongs to the whole of *B*, and that *B* again belongs to *C*, thinking that *A* does not belong to *C*, e.g. knowing that every mule is [35] sterile and that this is a mule, and thinking that this animal is with foal; for he does not know that *A* belongs to *C*, unless he considers the two things together. So it is evident that if he knows the one and does not know the other, he will fall into error. And this is the relation of universal knowledge to particular. For we know no sensible thing, once it has passed beyond the range of our senses, even if we happen [67<sup>b</sup>1] to have perceived it, except by means of the universal and by possessing (but not actualising) particular. For knowing is spoken of in three ways: it may be either universal knowledge or knowledge proper to the matter in hand or actualising such [5] knowledge; consequently three kinds of error also are possible. Nothing then prevents a man both knowing and being mistaken about the same thing, provided that his knowledge and his error are not contrary. And this happens also to the man who knows each proposition separately and who has not previously considered the particular question. For when he believes that the mule is with foal he does not have [10] knowledge actualised, nor on the other hand has his belief caused an error contrary to his knowledge; for the error contrary to the universal knowledge would be a deduction.

But he who believes the essence of good is the essence of bad will believe the same thing to be the essence of good and the essence of bad. Let *A* stand for the essence of good and *B* for the essence of bad, and again *C* for the essence of good. [15] Since then he believes *B* and *C* identical, he will believe that *C* is *B*, and similarly that *B* is *A*; consequently that *C* is *A*. For just as we saw that if *B* is true of all of which *C* is true, and *A* is true of all of which *B* is true, and *A* is true of all of which *B* [20] is true, *A* is true of *C*, similarly with believing. Similarly also with being; for we saw that if *C* is the same as *B*, and *B* as *A*, *C* is the same as *A*. Similarly therefore with opining. Perhaps then this is

necessary if a man will grant the first point. But presumably that is false, that any one could think the essence of good to be the [25] essence of bad (save accidentally—for it is possible to believe this in many different ways). But we must consider this matter better.

22 · Whenever the extremes are convertible it is necessary that the middle should be convertible with both. For if *A* belongs to *C* through *B*, then if *A* and *C* are [30] convertible and *C* belongs to everything to which *A* belongs, *B* is convertible with *A*, and *B* belongs to everything to which *A* belongs, through *C* as middle; and *C* is convertible with *B* through *A* as middle. Similarly in the negative case, e.g. if *B* belongs to *C*, but *A* does not belong to *B*, neither will *A* belong to *C*. If then *B* is [35] convertible with *A*, *C* will be convertible with *A*. Suppose *B* does not belong to *A*; neither then will *C*; for *ex hypothesi* *B* belonged to every *C*. And if *C* is convertible with *B*, *A* is convertible with it too; for *C* is said of that of all of which *B* is said. And if *C* is convertible in relation to *A* as well, *B* also will be convertible. For *C* belongs to [68<sup>a</sup>1] that to which *B* belongs; but *C* does not belong to that to which *A* belongs. And this alone starts from the conclusion: the others differ here from the affirmative deduction.

[5] Again if *A* and *B* are convertible, and similarly *C* and *D*, and if *A* or *C* must belong to anything whatever, then *B* and *D* will be such that one or other belongs to anything whatever. For since *B* belongs to that to which *A* belongs, and *D* belongs to that to which *C* belongs, and since *A* or *C* belongs to everything, but not together, it is clear that *B* or *D* belongs to everything, but not together. For two deductions have been put together. Again if *A* or *B* belongs to everything and if *C* or *D* belongs to everything, but they do not belong together, then when *A* and *C* are convertible *B* and *D* are convertible. For if *B* does not belong to something to which *D* belongs, it is [15] clear that *A* belongs to it. But if *A* then *C*; for they are convertible. Therefore *C* and *D* belong together. But this is impossible. For example if that which is uncreated is incorruptible and that which is incorruptible is uncreated, it is necessary that what [10] is created should be corruptible and what is corruptible should have been created.<sup>24</sup>

When *A* belongs to the whole of *B* and to *C* and is affirmed of nothing else, and *B* also belongs to every *C*, it is necessary that *A* and *B* should be convertible; for since *A* is said of *B* and *C* only, and *B* is affirmed both of itself and of *C*, it is clear [20] that *B* will be said of everything of which *A* is said, except *A* itself. Again when *A* and *B* belong to the whole of *C*, and

C is convertible with B, it is necessary that A should belong to every B; for since A belongs to every C, and C to B by conversion, A will belong to every B.

When, of two opposites A and B, A is preferable to B, and similarly D is [25] preferable to C, then if A and C together are preferable to B and D together, A is preferable to D. For A is as much to be pursued as B is to be avoided, since they are opposites; and C is similarly related to D, since they also are opposites. If then A is as desirable as D, B is as much to be avoided as C (since each is to the same extent as [30] each—the one an object of aversion, the other an object of desire). Therefore A and C together will be as much to be desired or avoided as B and D together. But since A and C are preferable to B and D, A cannot be as desirable as D; for then B along with D would be as desirable as A along with C. But if D is preferable to A, then B must be less to be avoided than C; for the less is opposed to the less. But the greater [35] good and lesser evil are preferable to the lesser good and greater evil: the whole BD, then, is preferable to the whole AC. But *ex hypothesi* this is not so. A then is preferable to D, and C consequently is less to be avoided than B. If then every lover in virtue of his love would prefer A, viz. that the beloved should be such as to grant a [68<sup>b</sup>1] favour, and yet should not grant it (for which C stands), to the beloved's granting the favour (represented by D) without being such as to grant it (represented by B), it is clear that A (being of such a nature) is preferable to granting the favour. To receive affection then is preferable in love to sexual intercourse. Love then aims at affection rather than at intercourse. And if it aims most at affection, then this is its end. Intercourse then either is not an end at all or is an end relative to the receiving [5] of affection. And indeed the same is true of the other desires and arts.

23 · It is clear then how the terms are related in conversion, and in respect of being preferable or more to be avoided. We must now state that not only dialectical and demonstrative deductions are formed by means of the aforesaid [10] figures, but also rhetorical deductions and in general any form of persuasion, however it may be presented. For every belief comes either through deduction or from induction.

Now induction, or rather the deduction which springs out of induction, consists [15] in deducing a relation between one extreme and the middle by means of the other extreme, e.g. if B is the middle term between A and C, it consists in proving through C that A belongs to B. For

this is the manner in which we make inductions. For example, let *A* stand for long-liver, *B* for bileless, and *C* for the particular long-lived [20] animals, e.g. man, horse, mule. *A* then belongs to the whole of *C*; [for whatever is bileless is long-lived].<sup>25</sup> But *B* also (not possessing bile) belongs to every *C*. If then *C* is convertible with *B*, and the middle term is not wider in extension, it is necessary that *A* should belong to *B*. For it has already been proved that if two things belong to [25] the same thing, and the extreme is convertible with one of them, then the other predicate will belong to one that is converted. But we must apprehend *C* as made up of all the particulars. For induction proceeds through an enumeration of all the cases.

[30] Such is the deduction which establishes primary and immediate propositions; for where there is a middle term the deduction proceeds through the middle term; when there is no middle term, through induction. And in a way induction is opposed to deduction; for the latter proves the extreme to belong to the third term by means of the middle, the former proves the extreme to belong to the middle by means of the [35] third. In the order of nature, deduction through the middle term is prior and more familiar, but deduction through induction is clearer to *us*.

24 · We have an example when the extreme is proved to belong to the middle by means of a term which resembles the third. It must be familiar both that the middle belongs to the third term, and that the first belongs to that which resembles the third. For example let *A* be evil, *B* making war against neighbours, *C* [69a1] Athenians against Thebans, *D* Thebans against Phocians. If then we wish to prove that to fight with the Thebans is an evil, we must assume that to fight against neighbours is an evil. Conviction of this is obtained from similar cases, e.g. that the [5] war against the Phocians was an evil to the Thebans. Since then to fight against neighbours is an evil, and to fight against the Thebans is to fight against neighbours, it is clear that to fight against the Thebans is an evil. Now it is clear that *B* belongs to *C* and to *D* (for both are cases of making war upon one's neighbours) and that *A* [10] belongs to *D* (for the war against the Phocians did not turn out well for the Thebans); but that *A* belongs to *B* will be proved through *D*. Similarly if the conviction in the relation of the middle term to the extreme should be produced by several similar cases. Clearly then an example stands neither as part to whole, nor [15] as whole to part, but rather as part to part, when both are subordinate to the same term, and one of them is familiar. It differs from

induction, because induction starting from all the particular cases proves (as we saw) that the extreme belongs to the middle, and does not connect the deduction to the extreme, whereas argument by example does make this connexion and does not draw its proof from all the particular cases.

[20] **25** · By reduction we mean an argument in which the first term clearly belongs to the middle, but the relation of the middle to the last term is uncertain though equally or more convincing than the conclusion; or again an argument in which the terms intermediate between the last term and the middle are few. For in any of these cases it turns out that we approach more nearly to knowledge. For [25] example let *A* stand for what can be taught, *B* for knowledge, *C* for justice. Now it is clear that knowledge can be taught; but it is uncertain whether virtue is knowledge. If now *BC* is equally or more convincing than *AC*, we have a reduction; for we are nearer to knowledge, since we have made an extra assumption, being before without knowledge that *A* belongs to *C*.<sup>26</sup> Or again suppose that the terms intermediate between *B* and *C* are few; for thus too we are nearer knowledge. For example let *D* [30] stand for squaring, *E* for rectilinear figure, *F* for circle. If there were only one term intermediate between *E* and *F* (viz. that the circle is made equal to a rectilinear figure by the help of lunules), we should be near to knowledge. But when *BC* is not more convincing than *AC*, and the intermediate terms are not few, I do not call this [35] reduction; nor again when *BC* is immediate—for such a statement is knowledge.

**26** · An objection is a proposition contrary to a proposition. It differs from a proposition, because it may be particular, but a proposition either cannot be particular at all or not in universal deductions. An objection is brought in two ways [69<sup>b</sup>1] and through two figures; in two ways because every objection is either universal or particular, by two figures because objections are brought in opposition to the proposition, and opposites can be proved only in the first and third figures. When a [5] man claims that something belongs to all of a given subject, we object either that it belongs to none or that it does not belong to some; and of these, the former is proved from the first figure, the latter from the third. For example let *A* stand for there being a single science, *B* for contraries. If a man proposes that contraries are subjects of a single science, the objection may be either that opposites are never [10] subjects of a single science, and contraries are opposites, so that we get the first figure; or

that the knowable and the unknowable are not subjects of a single science—this is the third figure; for it is true of *C* (the knowable and the unknowable) that they are contraries, and it is false that they are the subjects of a single science.

Similarly if the proposition is negative. For if a man claims that contraries are [15] not subjects of a single science, we reply either that all opposites or that certain contraries, e.g. what is healthy and what is sickly, are subjects of the same science: the former argument issues from the first, the latter from the third figure.

In general, in all cases if a man urges a universal objection he must frame his contradiction with reference to the universal of the terms proposed, e.g. if a man [20] claims that contraries are not subjects of the same science, his opponent must reply that there is a single science of all opposites. Thus we must have the first figure; for the term which is universal relative to the original subject becomes the middle term.

If the objection is particular, the objector must frame his contradiction with reference to a term relatively to which the subject of the proposition is universal, e.g. he will point out that the knowable and the unknowable are not subjects of the same [25] science; for contraries are universal relatively to these. And we have the third figure; for the particular term assumed is middle, e.g. the knowable and the unknowable. Premises from which it is possible to draw the contrary conclusion are what we start from when we try to make objections. Consequently we bring objections in these figures only; for in them only are opposite deductions possible, [30] since the second figure cannot produce an affirmative conclusion.

Besides, an objection in the middle figure would require a fuller argument, e.g. if it should not be granted that *A* belongs to *B*, because *C* does not follow *B*. This can [35] be made clear only by other propositions. But an objection ought not to turn off into other things, but have its other proposition quite clear immediately. [For this reason also this is the only figure from which proof by signs cannot be obtained.]<sup>27</sup>

We must consider too the other kinds of objection, namely the objection from contraries, from similars, and from common opinion, and inquire whether a [70<sup>a</sup>1] particular objection cannot be elicited from the first figure or a negative objection from the second.<sup>28</sup>

**27** · A probability and a sign are not identical, but a probability is a reputable proposition: what men know to happen or not to happen, to be

or not to be, [5] for the most part thus and thus, is a probability, e.g. envious men hate, those who are loved show affection. A sign is meant to be a demonstrative proposition either necessary or reputable; for anything such that when it is another thing is, or when it has come into being the other has come into being before or after, is a sign of the [10] other's being or having come into being. An enthymeme is a deduction starting from probabilities or signs,<sup>29</sup> and a sign may be taken in three ways, corresponding to the position of the middle term in the figures. For it may be taken as in the first figure or the second or the third. For example the proof that a woman is with child because she has milk is in the first figure: for to have milk is the middle term. Let *A* [15] represent to be with child, *B* to have milk, *C* woman. The proof that wise men are good, since Pittacus is good, comes through the last figure. Let *A* stand for good, *B* for wise men, *C* for Pittacus. It is true then to predicate both *A* and *B* of *C*—only men do not say the latter, because they know it, though they state the former. The [20] proof that a woman is with child because she is pale is meant to come through the middle figure; for since paleness follows women with child and is a concomitant of this woman, people suppose it has been proved that she is with child. Let *A* stand for paleness, *B* for being with child, *C* for woman.

Now if the one proposition is stated, we have only a sign, but if the other is [25] stated as well, a deduction, e.g. Pittacus is generous; for ambitious men are generous and Pittacus is ambitious. Or again: Wise men are good; for Pittacus is not only good but wise. In this way then deductions are formed, only that which [30] proceeds through the first figure is irrefutable if it is true (for it is universal), that which proceeds through the last figure is refutable even if the conclusion is true, since the deduction is not universal nor relevant to the matter in question; for though Pittacus is good, it is not therefore necessary that all other wise men should be good. But the deduction which proceeds through the middle figure is always [35] refutable in any case; for a deduction can never be formed when the terms are related in this way; for though a woman with child is pale, and this woman also is pale, it is not necessary that she should be with child. Truth then may be found in signs whatever their kind, but they have the differences we have stated.

We must either divide signs in the way stated, and among them designate the [70<sup>b</sup>1] middle term as the evidence (for people call that the evidence which makes us know, and the middle term above all has this character), or else we must call the arguments derived from the extremes signs, that derived from the middle term the evidence; for that which is

proved through the first figure is most reputable and [5] most true.

It is possible to infer character from physical features, if it is granted that the body and the soul are changed together by the natural affections (No doubt by learning music a man has made some change in his soul, but this is not one of those affections which are natural to us; but rather such natural motions as anger and [10] desire.) If then this were granted and also that there is one sign for one affection, and if we could state the affection and sign proper to each kind of animal, we shall be able to infer character from physical features. For if there is an affection which belongs properly to an individual genus, e.g. courage to lions, it is necessary that [15] there should be a sign of it; for *ex hypothesi* body and soul are affected together. Suppose this sign is the possession of large extremities: this may belong to other genera also though not universally. For the sign is proper in the sense that it is proper to the whole genus, though not proper to it alone, according to our usual manner of speaking. This then will be found in other genera too, and man may be [20] brave, and some other genera of animal as well. They will then have the sign; for *ex hypothesi* there is one sign for one affection. If then this is so, and we can collect signs of this sort in these animals which have only one affection proper to them, and each affection has its sign, since it is necessary that it should have a single sign, we [25] shall then be able to infer character from physical features. But if the genus as a whole has two properties, e.g. if the lion is both brave and generous, how shall we know which of the signs which are its proper concomitants is the sign of which affection? Perhaps if both belong to some other genus though not to the whole of it, and if, in those genera in which each is found though not in the whole of their members, some members possess one of the affections and not the other: e.g. if a man is brave but not generous, but possesses, of the two signs, *this* one, it is clear [30] that this is the sign of courage in the lion also.

To judge character from physical features, then, is possible in the first figure if the middle term is convertible with the first extreme, but is wider than the third term and not convertible with it: e.g. let *A* stand for courage, *B* for large extremities, [35] and *C* for lion. *B* then belongs to everything to which *C* belongs, but also to others. But *A* belongs to everything to which *B* belongs, and to nothing besides, but is convertible with *B*: otherwise, there would not be one sign for one affection.



<sup>1</sup>‘Understanding’ here, and throughout the *Analytics*, translates ἐπιστήμη.

<sup>2</sup>‘Proposition’ here and hereafter translates πρότασις.

<sup>3</sup>‘Deduction’ here and hereafter translates συλλογισμός.

<sup>4</sup>See *Topics* 102<sup>a</sup>27–30.

<sup>5</sup>See *Posterior Analytics* I 4–12.

<sup>6</sup>See [Chapters 13–17](#).

<sup>7</sup>See Chapter 46.

<sup>8</sup>Ross excises the passage in brackets.

<sup>9</sup>Aristotle’s promise is not kept in any text we possess.

<sup>10</sup>Ross excises the passage in brackets.

<sup>11</sup>Ross excises the bracketed sentence (see 39<sup>a</sup>1).

<sup>12</sup>See *Posterior Analytics* I 19–22.

<sup>13</sup>Ross excises the passage in brackets.

<sup>14</sup>See *Prior Analytics* II 14.

<sup>15</sup>i.e. the *Topics*.

<sup>16</sup>Omitting τήν before ποδιαίαν and reading οὔσαν for οὔσας.

<sup>17</sup>This promise is not kept in Aristotle’s extant works.

<sup>18</sup>See 57<sup>a</sup>40–b17.

<sup>19</sup>Ross excises the bracketed phrases.

<sup>20</sup>Ross excises this paragraph.

<sup>21</sup>See *Topics* VIII 1.

<sup>22</sup>See *Sophistical Refutations* 167<sup>b</sup>21–36.

<sup>23</sup>See Plato, *Meno* 81B–86B.

<sup>24</sup>In the manuscripts, this sentence appears after ‘not together’, line 8: it was transposed by Pacius.

<sup>25</sup>Tredennick suggests this excision: Ross changes ‘whatever is bileless’ to ‘C’.

<sup>26</sup>Reading προσειληφέναι, τὴν ΑΓ.

<sup>27</sup>Excised by Ross.

<sup>28</sup>Some of these matters are considered in *Rhetoric* II 25.

<sup>29</sup>This sentence is transposed to the start of the chapter by Ross.

# POSTERIOR ANALYTICS\*\*

*Jonathan Barnes*

## BOOK I

[71<sup>a</sup>1] 1 · All teaching and all intellectual learning come about from already existing knowledge. This is evident if we consider it in every case; for the mathematical sciences are acquired in this fashion, and so is each of the other arts. [5] And similarly too with arguments—both deductive and inductive arguments proceed in this way; for both produce their teaching through what we are already aware of, the former getting their premisses as from men who grasp them, the latter proving the universal through the particular's being clear. (And rhetorical arguments [10] too persuade in the same way; for they do so either through examples, which is induction, or through enthymemes, which is deduction.)

It is necessary to be already aware of things in two ways: of some things it is necessary to believe already that they are, of some one must grasp what the thing said is, and of others both—e.g. of the fact that everything is either affirmed or [15] denied truly, one must believe that it is; of the triangle, that it signifies *this*; and of the unit both (both what it signifies and that it is). For each of these is not equally clear to us.

But you can become familiar by being familiar earlier with some things but getting knowledge of the others at the very same time—i.e. of whatever happens to be under the universal of which you have knowledge. For that every triangle has [20] angles equal to two right angles was already known; but that there is a triangle in the semicircle here became familiar at the same time as the induction. (For in some cases learning occurs in this way, and the last term does not become familiar through the middle—in cases dealing with what are in fact particulars and not said of any underlying subject.)

[25] Before the induction, or before getting a deduction, you should perhaps be said to understand in a way—but in another way not. For if

you did not know if it is *simpliciter*, how did you know that it has two right angles *simpliciter*? But it is clear that you understand it in *this* sense—that you understand it universally—but you do not understand it *simpliciter*. (Otherwise the puzzle in the *Meno*<sup>1</sup> will result; for [30] you will learn either nothing or what you know.)

For one should not argue in the way in which some people attempt to solve it: Do you or don't you know of every pair that it is even? And when you said Yes, they brought forward some pair of which you did not think that it was, nor therefore that it was even. For they solve it by denying that people know of every pair that it is even, but only of anything of which they know that it is a pair.—Yet they know it of [71<sup>b</sup>]1 that which they have the demonstration about and which they got their premisses about; and they got them not about everything of which they know that it is a triangle or that it is a number, but of every number and triangle *simpliciter*. For no proposition of such a type is assumed (that *what you know to be a number... or what you know to be rectilineal . . .*), but they are assumed as holding of every [5] case.

But nothing, I think, prevents one from in a sense understanding and in a sense being ignorant of what one is learning; for what is absurd is not that you should know in some sense what you are learning, but that you should know it in *this* sense, i.e. in the way and sense in which you are learning it.

2 · We think we understand a thing *simpliciter* (and not in the sophistic fashion accidentally) whenever we think we are aware both that the explanation [10] because of which the object is is its explanation, and that it is not possible for this to be otherwise. It is clear, then, that to understand is something of this sort; for both those who do not understand and those who do understand—the former think they are themselves in such a state, and those who do understand actually are. Hence [15] that of which there is understanding *simpliciter* cannot be otherwise.

Now whether there is also another type of understanding we shall say later; but we say now that we do know through demonstration. By demonstration I mean a scientific deduction; and by scientific I mean one in virtue of which, by having it, we understand something.

If, then, understanding is as we posited, it is necessary for demonstrative [20] understanding in particular to depend on things which are true and primitive and immediate and more familiar than and

prior to and explanatory of the conclusion (for in this way the principles will also be appropriate to what is being proved). For there will be deduction even without these conditions, but there will not be demonstration; for it will not produce understanding.

Now they must be true because one cannot understand what is not the [25] case—e.g. that the diagonal is commensurate. And they must depend on what is primitive and non-demonstrable because otherwise you will not understand if you do not have a demonstration of them; for to understand that of which there is a demonstration non-accidentally is to have a demonstration. They must be both explanatory and more familiar and prior—explanatory because we only understand [30] when we know the explanation; and prior, if they are explanatory, and we are already aware of them not only in the sense of grasping them but also of knowing that they are.

Things are prior and more familiar in two ways; for it is not the same to be prior by nature and prior in relation to us, nor to be more familiar and more familiar [72<sup>a</sup>1] to us. I call prior and more familiar in relation to us what is nearer to perception, prior and more familiar *simpliciter* what is further away. What is most universal is [5] furthest away, and the particulars are nearest; and these are opposite to each other.

Depending on things that are primitive is depending on appropriate principles; for I call the same thing primitive and a principle. A principle of a demonstration is an immediate proposition, and an immediate proposition is one to which there is no other prior. A proposition is the one part of a contradiction,<sup>2</sup> one thing said of one; it [10] is dialectical if it assumes indifferently either part, demonstrative if it determinately assumes the one that is true.<sup>3</sup> [A statement is either part of a contradiction.]<sup>4</sup> A contradiction is an opposition of which of itself excludes any intermediate; and the part of a contradiction saying something *of* something is an affirmation, the one saying something *from* something is a denial.

[15] An immediate deductive principle I call a posit if one cannot prove it but it is not necessary for anyone who is to learn anything to grasp it; and one which it is necessary for anyone who is going to learn anything whatever to grasp, I call an axiom (for there are some such things); for we are accustomed to use this name especially of such things. A posit which assumes either of the parts of a [20] contradiction—i.e., I mean, that something is or that something is not—I call a supposition; one without this, a definition. For a definition is a posit (for the arithmetician posits that a unit is what is quantitatively indivisible) but

not a supposition (for what a unit is and that a unit is are not the same).

[25] Since one should both be convinced of and know the object by having a deduction of the sort we call a demonstration, and since this is the case when *these* things on which the deduction depends are the case, it is necessary not only to be already aware of the primitives (either all or some of them) but actually to be better aware of them. For a thing always belongs better to that thing because of which it [30] belongs—e.g. that because of which we love is better loved. Hence if we know and are convinced because of the primitives, we both know and are convinced of them better, since it is because of them that we know and are convinced of what is posterior.

It is not possible to be better convinced than one is of what one knows, of what one in fact neither knows nor is more happily disposed toward than if one in fact knew. But this will result if someone who is convinced because of a demonstration is [35] not already aware of the primitives, for it is necessary to be better convinced of the principles (either all or some of them) than of the conclusion.

Anyone who is going to have understanding through demonstration must not only be familiar with the principles and better convinced of them than of what is [72<sup>b</sup>1] being proved, but also there must be no other thing more convincing to him or more familiar among the opposites of the principles on which a deduction of the contrary error may depend—if anyone who understands *simpliciter* must be unpersuadable.

3 · Now some think that because one must understand the primitives there is [5] no understanding at all; others that there is, but that there are demonstrations of everything. Neither of these views is either true or necessary.

For the one party, supposing that one cannot understand in another way,<sup>5</sup> claim that we are led back *ad infinitum* on the grounds that we would not understand what is posterior because of what is prior if there are no primitives; and they argue correctly, for it is impossible to go through infinitely many things. And if [10] it comes to a stop and there are principles, they say that these are unknowable since there is no *demonstration* of them, which alone they say is understanding; but if one cannot know the primitives, neither can what depends on them be understood *simpliciter* or properly, but only on the supposition that they are the case.

The other party agrees about understanding; for it, they say, occurs

only [15] through demonstration. But they argue that nothing prevents there being demonstration of everything; for it is possible for the demonstration to come about in a circle and reciprocally.

But we say that neither is all understanding demonstrative, but in the case of the immediates it is non-demonstrable—and that this is necessary is evident; for if it [20] is necessary to understand the things which are prior and on which the demonstration depends, and it comes to a stop at some time, it is necessary for these immediates to be non-demonstrable. So as to that we argue thus; and we also say that there is not only understanding but also some principle of understanding by which we become familiar with the definitions.

And that it is impossible to demonstrate *simpliciter* in a circle is clear, if [25] demonstration must depend on what is prior and more familiar; for it is impossible for the same things at the same time to be prior and posterior to the same things—unless one is so in another way (i.e. one in relation to us, the other *simpliciter*), which induction makes familiar. But if so, knowing *simpliciter* will not [30] have been properly defined, but will be twofold. Or is the other demonstration not demonstration *simpliciter* in that it comes from about what is more familiar to us?

There results for those who say that demonstration is circular not only what has just been described, but also that they say nothing other than that this is the case if this is the case—and it is easy to prove everything in this way. It is clear that [35] this results if we posit three terms. (For it makes no difference to say that it bends back through many terms or through few, or through few or two.) For whenever if *A* is the case, of necessity *B* is, and if this then *C*, then if *A* is the case *C* will be the case. Thus given that if *A* is the case it is necessary that *B* is, and if this is that *A* is (for that is what being circular is)—let *A* be *C*: so to say that if *B* is the case *A* is, is [73<sup>a</sup>1] to say that *C* is, and this implies that if *A* is the case *C* is. But *C* is the same as *A*. Hence it results that those who assert that demonstration is circular say nothing but that if *A* is the case *A* is the case. And it is easy to prove everything in this way. [5]

Moreover, not even this is possible except in the case of things which follow one another, as properties do. Now if a single thing is laid down, it has been proved<sup>6</sup> that it is never necessary that anything else should be the case (by a single thing I mean [10] that neither if one term nor if one posit is posited . . .), but two posits are the first and fewest from which it is possible, if at all, actually to deduce something. Now if *A* follows *B* and *C*, and these follow one another and *A*, in this way it is possible to prove all the postulates reciprocally in the first figure, as was proved in the

account [15] of deduction.<sup>7</sup> (And it was also proved that in the other figures either no deduction comes about or none about what was assumed.) But one cannot in any way prove circularly things which are not counterpredicated; hence, since there are few such things in demonstrations, it is evident that it is both empty and impossible to say that demonstration is reciprocal and that because of this there can be demonstration [20] of everything.

4 · Since it is impossible for that of which there is understanding *simpliciter* to be otherwise, what is understandable in virtue of demonstrative understanding will be necessary (it is demonstrative if we have it by having a demonstration). Demonstration, therefore, is deduction from what is necessary. We must therefore [25] grasp on what things and what sort of things demonstrations depend. And first let us define what we mean by holding of every case and what by in itself and what by universally.

Now I say that something holds of every case if it does not hold in some cases and not others, nor at some times and not at others; e.g. if animal holds of every [30] man, then if it is true to call this a man, it is true to call him an animal too; and if he is now the one, he is the other too; and the same goes if there is a point in every line. Evidence: when asked if something holds of every case, we bring our objections in this way—either if in some cases it does not hold or if at some time it does not.

One thing belongs to another in itself both if it belongs to it in what it is—e.g. [35] line to triangle and point to line (for their substance depends on these and they belong in the account which says what they are)—and also if the things it belongs to themselves belong in the account which makes clear what it is—e.g. straight belongs to line and so does curved, and odd and even to number, and prime and [73<sup>b</sup>1] composite, and equilateral and oblong; and for all these there belongs in the account which says what they are in the one case line, and in the others number. And similarly in other cases too it is such things that I say belong to something in itself; [5] and what belongs in neither way I call accidental, e.g. musical or white to animal.

Again, what is not said of some other underlying subject—as what is walking is something different walking (and white),<sup>8</sup> while a substance, and whatever signifies some ‘this,’ is just what it is without being something else. Thus things which are not said of an underlying subject I



call things in themselves, and those which are said of an underlying subject I call accidentals.

[10] Again, in another way what belongs to something because of itself belongs to it in itself, and what does not belong because of itself is accidental—e.g. if it lightened when he was walking, that was accidental; for it was not because of his walking that it lightened, but that, we say, was accidental. But if because of itself, then in itself—e.g. if something died while being sacrificed, it died *in* the sacrifice since it [15] died because of being sacrificed, and it was not accidental that it died while being sacrificed.

Whatever, therefore, in the case of what is understandable *simpliciter*, is said to belong to things in themselves in the sense of inhering in the predicates or of being inhered in, holds both because of themselves and from necessity. For it is not possible for them not to belong, either *simpliciter* or as regards the opposites—e.g. straight or crooked to line, and odd or even to number. For the contrary is either a [20] privation or a contradiction in the same genus—e.g. even is what is not odd among numbers, in so far as it follows. Hence if it is necessary to affirm or deny, it is necessary too for what belongs in itself to belong.

Now let holding of every case and in itself be defined in this fashion; I call [25] universal whatever belongs to something both of every case and in itself and as such. It is evident, therefore, that whatever is universal belongs from necessity to its objects. (To belong in itself and as such are the same thing—e.g. point and straight belong to line in itself (for they belong to it as line), and two right angles belong to [30] triangle as triangle (for the triangle is in itself equal to two right angles).)

Something holds universally whenever it is proved of a chance case and primitively; e.g. having two right angles neither holds universally of figure (yet one may prove of a figure that it has two right angles—but not of a chance figure, nor [35] does one use a chance figure in proving it; for the quadrangle is a figure but it does not have angles equal to two right angles)—and a chance isosceles does have angles equal to two right angles, but not primitively—the triangle is prior. If, then, a chance case is proved primitively to have two right angles or whatever else, it belongs universally to this primitively, and of this the demonstration holds [74<sup>a</sup>1] universally in itself; but of the others it holds in some fashion not in itself, nor does it hold of the isosceles universally, but with a wider extension.

mistakes and that what is being proved does not belong primitively and universally in the way [5] in which it seems to be being proved universally and primitively. We make this error when either we cannot grasp anything higher apart from the particular, or we can but it is nameless for objects different in sort, or that of which it is proved is in fact a whole which is a part of something else. (For the demonstration will hold for the [10] parts and it will hold of every case, but nevertheless the demonstration will not hold of this primitively and universally—I say a demonstration is of this primitively and as such when it is of it primitively and universally.)

Now if someone were to prove that right angles do not meet, the demonstration would seem to hold of this because of its holding of all right angles. But that is not [15] so, if it comes about not because they are equal in *this* way but in so far as they are equal in any way at all.

And if there were no triangles other than the isosceles, having two right angles would seem to belong to it as isosceles.

And it might seem that proportion alternates for things as numbers and as lines and as solids and as times—as once it used to be proved separately, though it is [20] possible for it to be proved of all cases by a single demonstration. But because all these things—numbers, lengths, times, solids—do not constitute a single named item and differ in sort from one another, it used to be taken separately. But now it is proved universally; for it did not belong to things as lines or as numbers, but as *this* which they suppose to belong universally.

[25] For this reason, even if you prove of each triangle either by one or by different demonstrations that each has two right angles—separately of the equilateral and the scalene and the isosceles—you do not yet know of the triangle that it has two right angles, except in the sophistic fashion, nor do you know it of triangle universally,<sup>9</sup> not even if there is no other triangle apart from these. For you do not [30] know it of the triangle as triangle, nor even of every triangle (except in respect of number; but not of every one in respect of sort, even if there is none of which you do not know it.)

So when do you not know universally, and when do you know *simpliciter*? Well, clearly you would know *simpliciter* if it were the same thing to be a triangle and to be equilateral (either for each or for all). But if it is not the same but [35] different, and it belongs as triangle, you do not know. Does it belong as triangle or as isosceles? And when does it belong in virtue of this as primitive? And of what does the demonstration hold universally? Clearly whenever after abstraction it belongs

primitively—e.g. two right angles will belong to bronze isosceles triangle, but also [74<sup>b</sup>1] when being bronze and being isosceles have been abstracted. But not when figure or limit have been. But they are not the first. Then what is first? If triangle, it is in virtue of this that it also belongs to the others, and it is of this that the demonstration holds universally.

[5] **6** · Now if demonstrative understanding depends on necessary principles (for what one understands cannot be otherwise), and what belongs to the objects in themselves is necessary (for in the one case it belongs in what they are; and in the other they belong in what they are to what is predicated of them, one of which [10] opposites necessarily belongs), it is evident that demonstrative deduction will depend on things of this sort; for everything belongs either in this way or accidentally, and what is accidental is not necessary.

Thus we must either argue like this, or, positing as a principle that demonstration is necessary<sup>10</sup> and that if something has been demonstrated it cannot be [15] otherwise—the deduction, therefore, must depend on necessities. For from truths one can deduce *without* demonstrating, but from necessities one cannot deduce without demonstrating; for this is precisely the mark of demonstration.

There is evidence that demonstration depends on necessities in the fact that this is how we bring our objections against those who think they are demonstrating [20]—saying that it is not necessary, if we think either that it is absolutely possible for it to be otherwise, or at least for the sake of argument.

From this it is clear too that those people are silly who think they get their principles correctly if the proposition is reputable and true (e.g. the sophists who assume that to understand is to have understanding). For it is not what is reputable or not<sup>11</sup> that is a principle, but what is primitive in the genus about which the proof [25] is; and not every truth is appropriate.

That the deduction must depend on necessities is evident from this too: if, when there is a demonstration, a man who has not got an account of the reason why does not have understanding, and if it might be that *A* belongs to *C* from necessity but that *B*, the middle term through which it was demonstrated, does not hold from [30] necessity, then he does not know the reason why. For this is not so because of the middle term; for it is possible for that not to be the case, whereas the conclusion is

necessary.

Again, if someone does not know now, though he has got the account and is preserved, and the object is preserved, and he has not forgotten, then he did not know earlier either. But the middle term might perish if it is not necessary; so that though, being himself preserved and the object preserved, he will have the account, [35] yet he does not know. Therefore, he did not know earlier either. And if it has not perished but it is possible for it to perish, the result would be capable of occurring and possible; but it is impossible to know when in such a state.

Now when the conclusion is from necessity, nothing prevents the middle term [75<sup>a</sup>1] through which it was proved from being non-necessary; for one can deduce a necessity from a non-necessity, just as one can deduce a truth from non-truths. But when the middle term is from necessity, the conclusion too is from necessity, just as [5] from truths it is always true; for let *A* be said of *B* from necessity, and this of *C*—then that *A* belongs to *C* is also necessary. But when the conclusion is not necessary, the middle term cannot be necessary either; for let *A* belong to *C* not from necessity, but to *B* and this to *C* from necessity—therefore *A* will belong to *C* [10] from necessity too; but it was supposed not to.

Since, then, if a man understands demonstratively, it must belong from necessity, it is clear that he must have his demonstration through a middle term that is necessary too; or else he will not understand either why or that it is necessary for that to be the case, but either he will think but not know it (if he believes to be [15] necessary what is not necessary) or he will not even think it (equally whether he knows the fact through middle terms or the reason why actually through immediates).

Of accidentals which do not belong to things in themselves in the way in which things belonging in themselves were defined, there is no demonstrative understanding. For one cannot prove the conclusion from necessity; for it is possible for what is [20] accidental not to belong—for that is the sort of accidental I am talking about. Yet one might perhaps puzzle about what aim we should have in asking these questions about them, if it is not necessary for the conclusion to be the case; for it makes no difference if one asks chance questions and then says the conclusion. But we must ask not as though the conclusion were necessary because of what was asked, but [25] because it is necessary for anyone who says them to say it, and to say it truly if they truly hold.

Since in each kind what belongs to something in itself and as such belongs to it [30] from necessity, it is evident that scientific

demonstrations are about what belongs to things in themselves, and depend on such things. For what is accidental is not necessary, so that you do not necessarily know why the conclusion holds—not even if it should always be the case but not in itself (e.g. deductions through signs). For you will not understand in itself something that holds in itself; nor will you [35] understand why it holds. (To understand why is to understand through the explanation.) Therefore the middle term must belong to the third, and the first to the middle, because of itself.

7 · One cannot, therefore, prove anything by crossing from another genus—e.g. something geometrical by arithmetic. For there are three things in demonstrations: [40] one, what is being demonstrated, the conclusion (this is what belongs to some genus in itself); one, the axioms (axioms are the things on which the demonstration [75<sup>b</sup>1] depends); third, the underlying genus of which the demonstration makes clear the attributes and what is accidental to it in itself.

Now the things on which the demonstration depends may be the same; but of things whose genus is different—as arithmetic and geometry, one cannot apply [5] arithmetical demonstrations to the accidentals of magnitudes, unless magnitudes are numbers. (How this is possible in some cases will be said later.)<sup>12</sup>

Arithmetical demonstrations always include the genus about which the demonstration is, and so also do the others; hence it is necessary for the genus to be the same, either *simpliciter* or in some respect, if the demonstration is going to [10] cross. That it is impossible otherwise is clear; for it is necessary for the extreme and the middle terms to come from the same genus. For if they do not belong in themselves, they will be accidentals.

For this reason one cannot prove by geometry that there is a single science of opposites, nor even that two cubes make a cube; nor can one prove by any other [15] science the theorems of a different one, except such as are so related to one another that the one is under the other—e.g. optics to geometry and harmonics to arithmetic. Nor can one prove by geometry anything that belongs to lines not as lines and as from their proper principles—e.g. whether the straight line is the most beautiful of lines or whether it is contrarily related to the circumference; for that [20] belongs to them not as their proper genus but as something common.

8 · It is evident too that, if the propositions on which the deduction depends are universal, it is necessary for the conclusion of such a demonstration and of a demonstration *simpliciter* to be eternal too. There is therefore no demonstration of [25] perishable things, nor understanding of them *simpliciter* but only accidentally, because it does not hold of it universally, but at some time and in some way.

And when there is such a demonstration it is necessary for the one proposition to be non-universal and perishable—perishable because when it is the case the conclusion too will be the case, and non-universal because its subjects will sometimes be and sometimes not be<sup>13</sup>—so that one cannot deduce universally, but only that it holds now. [30]

The same goes for definitions too, since a definition is either a principle of demonstration or a demonstration differing in position or a sort of conclusion of a demonstration.

Demonstrations and sciences of things that come about often—e.g. eclipses of the moon—clearly hold always in so far as they are of such-and-such a thing, but are particular in so far as they do not hold always. As with the eclipse, so in the [35] other cases.

9 · Since it is evident that one cannot demonstrate anything except from its own principles if what is being proved belongs to it as that thing, understanding is not this—if a thing is proved from what is true and non-demonstrable and immediate. (For one can conduct a proof in this way—as Bryson proved the [40] squaring of the circle.) For such arguments prove in virtue of a common feature which will also belong to something else; that is why the arguments also apply to other things not of the same kind. So you do not understand it as that thing but [76<sup>a</sup>1] accidentally; for otherwise the demonstration would not apply to another genus too.

We understand a thing non-accidentally when we know it in virtue of that in virtue of which it belongs, from the principles of that thing as that thing—e.g. we [5] understand having angles equal to two right angles when we know it in virtue of that to which what has been said belongs in itself, from the principles of that thing. Hence if that too belongs in itself to what it belongs to, it is necessary for the middle to be in the same genus.

If this is not so, then the theorems are proved as harmonical theorems are proved through arithmetic. Such things are proved in the same way, but they differ; [10] for the fact falls under a different science (for the

underlying genus is different), but the reason under the higher science under which fall the attributes that belong in themselves. Hence from this too it is evident that one cannot demonstrate anything *simpliciter* except from its own principles. But the principles of these sciences have the common feature.[15]

If this is evident, it is evident too that one cannot demonstrate the proper principles of anything; for those will be principles of everything, and understanding of them will be sovereign over everything. For you understand better if you know from the higher explanations; for you know from what is prior when you know from [20] unexplainable explanations. Hence if you know better and best, that understanding too will be better and best. But demonstration does not apply to another genus—except, as has been said, geometrical demonstrations apply to mechanical or optical demonstrations, and arithmetical to harmonical. [25]

It is difficult to be aware of whether one knows or not. For it is difficult to be aware of whether we know from the principles of a thing or not—and that is what knowing is. We think we understand if we have a deduction from some true and primitive propositions. But that is not so, but it must be of the same genus as the [30] primitives.

10 · I call principles in each genus those which it is not possible to prove to be. Now both what the primitives and what the things dependent on them signify is assumed; but that they are must be assumed for the principles and proved for the [35] rest—e.g. we must assume what a unit or what straight and triangle signify, and that the unit and magnitude are; but we must prove that the others are.

Of the things they use in the demonstrative sciences some are proper to each science and others common—but common by analogy, since things are *useful* in so [40] far as they bear on the genus under the science. Proper: e.g. that a line is *such and such*, and straight so and so; common: e.g. that if equals are taken from equals, the remainders are equal. But each of these is sufficient in so far as it bears on the [76<sup>b1</sup>] genus; for it will produce the same result even if it is not assumed as holding of everything but only for the case of magnitudes—or, for the arithmetician, for numbers.

Proper too are the things which are assumed to be, about which the science considers what belongs to them in themselves—as e.g. arithmetic is about units, and [5] geometry is about points and lines. For they

assume these to be and to be *this*. As to what are attributes of these in themselves, they assume what each signifies—e.g. arithmetic assumes what odd or even or quadrangle or cube signifies, and geometry what irrational or inflection or verging signifies and they prove that they are, [10] through the common items and from what has been demonstrated. And astronomy proceeds in the same way.

For every demonstrative science has to do with three things: what it posits to be (these form the genus of what it considers the attributes that belong to it in itself); and what are called the common axioms, the primitives from which it demonstrates. [15] and thirdly the attributes, of which it assumes what each signifies. Nothing, however, prevents some sciences from overlooking some of these—e.g. from not supposing that its genus is, if it is evident that it is (for it is not equally clear that number is and that hot and cold are), and from not assuming what the attributes [20] signify, if they are clear—just as in the case of the common items it does not assume what to take equals from equals signifies, because it is familiar. But none the less there are by nature these three things, that about which the science proves, what it proves, and the things from which it proves.

What necessarily is the case because of itself and necessarily seems to be the case is not a supposition or a postulate. For demonstration is not addressed to [25] external argument—but to argument in the soul—since deduction is not either. For one can always object to external argument, but not always to internal argument.

Whatever a man assumes without proving it himself although it is provable—if he assumes something that seems to be the case to the learner, he supposes it (and it is a supposition not *simpliciter* but only in relation to the learner); but if he assumes the same thing when there is either no opinion present in the learner or actually a [30] contrary one present, he postulates it. And it is in this that suppositions and postulates differ; for a postulate is what is contrary to the opinion of the learner, which<sup>14</sup> though it is demonstrable is assumed and used without being proved.

Now terms are not suppositions (for they are not said to be or not be [35] anything),<sup>15</sup> but suppositions are among the propositions, whereas one need only grasp the terms; and suppositions are not that (unless someone will say that hearing is a supposition), but rather propositions such that, if they are the case, then by their being the case the conclusion comes about.

Nor does the geometer suppose falsehoods, as some have said, stating



that one [40] should not use a falsehood but that the geometer speaks falsely when he says that the line which is not a foot long is a foot long or that the drawn line which is not straight is straight. But the geometer does not conclude anything from there being [77<sup>a</sup>1] this line which he himself has described, but from what is made clear through them.

Again, every postulate and supposition is either universal or particular; but terms are neither of these.

**11** · For there to be forms or some one thing apart from the many is not [5] necessary if there is to be demonstration; however, for it to be true to say that one thing holds of many is necessary. For there will be no universal if this is not the case; and if there is no universal, there will be no middle term, and so no demonstration either. There must, therefore, be some one and the same thing, non-homonymous, holding of several cases.

That it is not possible to affirm and deny at the same time is assumed by no [10] demonstration—unless the conclusion too is to be proved in this form. It is proved by assuming that the first term is true of the middle and that it is not true to deny it. It makes no difference if one assumes that the middle term is and is not; and the same holds of the third term too. For if it is granted that that of which it is true to [15] say man, even if not-man is also true of it—but provided only that it is true to say that a<sup>16</sup> man is an animal and not not an animal—for<sup>17</sup> it will be true to say that Callias, even if not Callias, is nevertheless an animal and not not an animal. The explanation is that the first term is said not only of the middle but also of something else, because it holds of several cases; so that even if the middle both is it and is not [20] it, that makes no difference with regard to the conclusion.

That everything is affirmed or denied truly is assumed by demonstration *per impossibile*, and that not always universally but as far as is sufficient in so far as it bears on the genus (I say on the genus—i.e. the genus about which one is bringing the demonstrations), as has been said earlier too. [25]

All the sciences associate with one another in respect of the common items (I call common those which they use as demonstrating from them—not those about which they prove nor what they prove); and dialectic associates with them all, and so would any science that attempted to prove universally the common items—e.g. [30] that everything is affirmed or denied, or that equals from equals leave equals, or any things

of the sort. But dialectic is not in this way concerned with any determined set of things, nor with any one genus. For then it would not ask questions; for one cannot ask questions when demonstrating because when opposites are the case the [35] same thing is not proved. This has been proved in the account of deduction.<sup>18</sup>

12 · If a deductive question and a proposition of a contradiction are the same thing, and there are propositions in each science on which the deductions in each depend, then there will be a sort of scientific question from which the [40] deduction appropriate to each science comes about. It is clear, therefore, that not every question will be geometrical (or medical—and similarly in the other cases too), but only those from which either there is proved one of the things about which [77<sup>b</sup>1] geometry is concerned, or<sup>19</sup> something which is proved from the same things as geometry, such as optical matters. And similarly in the other cases too.

And for those one should indeed supply an argument from the principles and conclusions of geometry; but for the principles, the geometer as geometer should not [5] supply an argument; and similarly for the other sciences too. We should not, therefore, ask each scientist every question, nor should he answer everything he is asked about anything, but only those determined by the scope of this science. If one [10] argues in this way with a geometer as geometer it is evident that one will do so correctly, if one proves something from these things; but otherwise, not correctly. And it is clear that one does not refute the geometer either, except incidentally; so that one should not argue about geometry among non-geometers—for the man who [15] argues badly will escape notice. And the same goes for the other sciences too.

Since there are geometrical questions, are there also nongeometrical ones? And in each science which sort of ignorance is it in regard to which they are, say, geometrical? And is a deduction of ignorance a deduction from the opposites (or a [20] paralogism, though a geometrical one)? Or is it a deduction from another art? e.g. a musical question is non-geometrical about geometry, but thinking that parallels meet is geometrical in a sense and non-geometrical in another way. For this is twofold (like being non-rhythmical), and one way of being non-geometrical is by [25] not having geometrical skill (like being non-rhythmical) and the other by having it badly; and it is *this* ignorance and ignorance depending on such principles that is contrary to understanding.

In mathematics paralogism does not occur in the same way, because

the twofold term is always the middle term; for something is said of all this, and this [30] again is said of all something else (of what is predicated one does not say all), and one can as it were see these by thought, though they escape notice in arguments. Is every circle a shape? If you draw one it is clear. Well, is the epic a circle? It is evident that it is not.

One should not bring an objection against it if the proposition is inductive. For just as there is no proposition which does not hold of several cases (for otherwise it [35] will not hold of all cases; but deduction depends on universals), it is clear that there is no objection either. For propositions and objectives are the same thing; for what one brings as an objection might become a proposition, either demonstrative or dialectical.

It happens that some people argue non-deductively because they assume what follows both terms—e.g. Caeneus does when he says that fire consists in multiple [78<sup>a</sup>1] analogy,<sup>20</sup> for fire, he says, is generated quickly, and so is this analogy. In this way there is no deduction; but there is if multiple analogy follows fastest analogy and the fastest changing analogy follows fire.

Now sometimes it is not possible to make a deduction from the assumptions; [5] and sometimes it is possible, but it is not seen.

If it were impossible to prove truth from falsehood, it would be easy to make an analysis; for they would convert from necessity. For let *A* be something that is the case; and if this is the case, then *these* are the case (things which I know to be the case, call them *B*). From these, therefore, I shall prove that the former is the case. [10] (In mathematics things convert more because they assume nothing accidental—and in this too they differ from argumentations—but only definitions.)

A science increases not through the middle terms but by additional assumption—e.g. *A* of *B*, this of *C*, this again of *D*, and so on *ad infinitum*; and [15] laterally—e.g. *A* both of *C* and of *E* (e.g. *A* is definite—or even indefinite—number; *B* is definite odd number; *C* odd number; therefore *A* holds of *C*. And *D* [20] is definite even number; *E* is even number: therefore *A* holds of *E*).

**13** · Understanding the fact and the reason why differ, first in the same science—and in that in two ways: in one way, if the deduction does not come about through immediates (for the primitive explanation is not assumed, but understanding [25] of the reason why occurs in virtue of

the primitive explanation); in another, if it is through immediates but not through the explanation but through the more familiar of the converting terms. For nothing prevents the nonexplanatory one of the counterpredicated terms from sometimes being more familiar, so that the demonstration will occur through this.

E.g. that the planets are near, through their not twinkling: let *C* be the planets, [30] *B* not twinkling, *A* being near. Thus it is true to say *B* of *C*; for the planets do not twinkle. But also to say *A* of *B*; for what does not twinkle is near (let this be got through induction or through perception). So it is necessary that *A* belongs to *C*; so [35] that it has been demonstrated that the planets are near. Now this deduction is not of the reason why but of the fact; for it is not because they do not twinkle that they are near, but because they are near they do not twinkle.

But it is also possible for the latter to be proved through the former, and the demonstration will be of the reason why—e.g. let *C* be the planets, *B* being near, *A* [78<sup>b</sup>1] not twinkling. Thus *B* belongs to *C* and *A* to *B*; so that *A* belongs to *C*. And the deduction is of the reason why; for the primitive explanation has been assumed.

Again, take the way they prove that the moon is spherical through its [5] increases—for if what increases in this way is spherical and the moon increases, it is evident that it is spherical. Now in this way the deduction of the fact comes about; but if the middle term is posited the other way about, we get the deduction of the [10] reason why; for it is not because of the increases that it is spherical, but because it is spherical it gets increases of this sort. Moon, *C*; spherical, *B*; increases, *A*.

But in cases in which the middle terms do not convert and the non-explanatory term is more familiar, the fact is proved but the reason why is not.

Again, in cases in which the middle is positioned outside—for in these too the demonstration is of the fact and not of the reason why; for the explanation is not [15] mentioned. E.g. why does the wall not breathe? Because it is not an animal. For if this were explanatory of breathing—i.e. if the denial is explanatory of something's not belonging, the affirmation is explanatory of its belonging (e.g. if imbalance in the hot and cold elements is explanatory of not being healthy, their balance is [20] explanatory of being healthy), and similarly too if the affirmation is explanatory of something's belonging, the denial is of its not belonging. But when things are set out in this way what we have said does not result; for not every animal breathes. The deduction of such an explanation comes about in the middle figure. E.g. let *A* be [25] animal, *B*

breathing, *C* wall: then *A* belongs to every *B* (for everything breathing is an animal), but to no *C*, so that *B* too belongs to no *C*—therefore the wall does not breathe.

Explanations of this sort resemble those which are extravagantly stated (that [30] consists in arguing by setting the middle term too far away)—e.g. Anacharsis' argument that there are no flute-girls among the Scyths, for there are no vines.

Thus with regard to the same science (and with regard to the position of the middle terms) there are these differences between the deduction of the fact and that of the reason why.

The reason why differs from the fact in another fashion, when each is [35] considered by means of a different science. And such are those which are related to each other in such a way that the one is under the other, e.g. optics to geometry, and [79<sup>a</sup>1] mechanics to solid geometry, and harmonics to arithmetic, and star-gazing to astronomy. Some of these sciences bear almost the same name—e.g. mathematical and nautical astronomy, and mathematical and acoustical harmonics. For here it is for the empirical scientists to know the fact and for the mathematical to know the [5] reason why; for the latter have the demonstrations of the explanations, and often they do not know the fact, just as those who consider the universal often do not know some of the particulars through lack of observation.

These are those which, being something different in substance, make use of forms. For mathematics is about forms, for its objects are not said of any underlying subject—for even if geometrical objects are said of some underlying subject, still it is not *as* being said of an underlying subject that they are studied.

Related to optics as this is related to geometry, there is another science related [10] to it—viz. the study of the rainbow; for it is for the natural scientist to know that fact, and for the student of optics—either *simpliciter* or mathematical—to know the reason why. And many even of those sciences which are not under one another are related like this—e.g. medicine to geometry; for it is for the doctor to know the fact that circular wounds heal more slowly, and for the geometer to know the reason [15] why.

14 · Of the figures the first is especially scientific. For the mathematical sciences carry out their demonstrations through it—e.g. arithmetic and geometry and optics—and so do almost all those which

make inquiry after the reason why; [20] for the deduction of the reason why occurs, either in general or for the most part and in most cases, through this figure. Hence for this reason too it will be especially scientific; for consideration of the reason why has most importance for knowledge.

Next, it is possible to hunt for understanding of what a thing is through this [25] figure alone. For in the middle figure no affirmative deduction comes about; but understanding what a thing is is understanding an affirmation. And in the last figure an affirmative deduction does come about, but it is not universal; but what a thing is is something universal—for it is not in a certain respect that man is a two-footed animal.

Again, this figure has no need of the others, but they are thickened and [30] increased through it until they come to the immediates.

So it is evident that the first figure is most important for understanding.

**15** · Just as it was possible for *A* to belong to *B* atomically, so it is also possible for it to not belong in this way. By belonging or not [35] belonging atomically I mean that there is no middle term for them; for in this way their belonging or not belonging will no longer be in virtue of something else.

Now when either *A* or *B* is in some whole or both are, it is not possible for *A* to belong to *B* primitively. For let *A* be in the whole *C*. Now if *B* is not in the whole *C* (for it is possible that *A* is in some whole and *B* is not in it), there will be a deduction that *A* does not belong to *B*; for if *C* belongs to every *A* and to no *B*, *A* belongs to not [79<sup>b</sup>1] *B*. And similarly too, if *B* is in some whole, e.g. in *D*; for *D* belongs to every *B* and *A* to no *D*, so that *A* will belong to no *B* through a deduction. And it will be proved in the same way again if both are in some whole. [5]

That it is possible for *B* not to be in a whole that *A* is in, or again for *A* not to be in a whole that *B* is in, is evident from those chains of predicates which do not overlap one another. For if nothing in the chain *A,C,D* is predicated of anything in the chain *B,E,F*, and *A* is in the whole *H* (which is in the same chain as it), it is [10] evident that *B* will not be in *H*; for otherwise the chains will overlap. And similarly too if *B* is in some whole.

If neither is in any whole and *A* does not belong to *B*, it is necessary for it to not belong atomically. For if there is to be a middle term, it is

necessary for one of them to be in some whole. For the deduction will be either in the first or in the middle [15] figure. Now if it is in the first, *B* will be in some whole (for the proposition with it as subject must be affirmative); and if it is in the middle, one or other of them will be in some whole (for a deduction comes about if the negative is assumed with either as [20] subject—but with both negative there will not be one).

So it is evident that it is possible for one thing to not belong to another atomically, and we have said when it is possible, and how.

**16** · Ignorance—what is called ignorance not in virtue of a negation but in virtue of a disposition—is error coming about through deduction. In the case of [25] what belongs or does not belong primitively this comes about in two ways: either when one believes *simpliciter* that something belongs or does not belong, or when one gets the belief through deduction. Now for simple belief the error is simple, but when it is through deduction there are several ways of erring.

For let *A* belong to no *B* atomically: now if you deduce that *A* belongs to *B*, [30] assuming *C* as a middle term, you will have erred through deduction. Now it is possible for both the propositions to be false, and it is possible for only one to be. For if neither *A* belongs to any of the *C*'s nor *C* to any of the *B*'s, and each has been [35] assumed the other way about, both will be false. And it is possible that *C* is so related to *A* and *B* that it neither is under *A* nor holds universally of *B*. For it is impossible for *B* to be in any whole (for *A* was said to not belong to it primitively), and it is not necessary that *A* holds universally of everything there is; hence both will be false.

But it is also possible to assume one truly—not, however, whichever you like, [80<sup>a</sup>1] but only *AC*; for the proposition *CB* will always be false because *B* is not in anything, but *AC* may be true—e.g. if *A* belongs atomically both to *C* and to *B* (for when the same thing is predicated primitively of several things neither will be in the [5] other). But it makes no difference even if it belongs non-atomically.

Now error about belonging comes about by these means and in this way only; for in no other figure was there a deduction of belonging. But error about not belonging comes about both in first and in the middle figure.

Now first let us say in how many ways and under what characterization of the [10] propositions it comes about in the first figure. Now it is possible when both premisses are false, e.g. if *A* belongs

atomically both to *C* and to *B*; for if *A* is assumed to belong to no *C* and *C* to every *B*, the propositions are false. It is also [15] possible when one is false, and that whichever you like. For it is possible for *AC* to be true and *CB* false—*AC* true because *A* does not belong to everything there is; *CB* false because it is impossible for *C*, to none of which *A* belongs, to belong to *B* (for the proposition *AC* will no longer be true, and at the same time if they are *both* true [20] the conclusion too will be true). But it is also possible for *CB* to be true while the other is false, i.e. if *B* is both in *C* and in *A*; for it is necessary for the one to be under the other, so that if you assume that *A* belongs to no *C*, the proposition will be false.

[25] So it is evident that both when one proposition is false and when both are the deduction will be false.

In the middle figure it is not possible for both propositions to be false as wholes; for when *A* belongs to every *B*, one cannot assume anything which will belong to all the one and none of the other; but it is necessary to assume the propositions in such a [30] way that something belongs to one and does not belong to the other if there is to be a deduction. So if when assumed in such a way they are false, clearly they will be the other way about when assumed in the contrary way; but this is impossible.

But nothing prevents each being partially false i.e. if *C* were to belong both to some *A* and to some *B*. For if it is assumed to belong to every *A* and to no *B*, both [35] propositions will be false—not, however, as wholes but partially. And if the negative is posited the other way about, the same holds.

It is possible for one of them to be false, and that whichever you like. For what belongs to every *A* also belongs to *B*; so if *C* is assumed to belong to the whole of *A* and to not belong to the whole of *B*, *CA* will be true and *CB* false. Again, what [80b1] belongs to no *B* will not belong to every *A*; for if to *A*, then to *B* too—but it did not belong to *B*. So if *C* is assumed to belong to the whole of *A* and to no *B*, the proposition *CB* is true and the other false. [5]

Similarly too if the negative is transposed. For what belongs to no *A* will not belong to any *B* either; so if *C* is assumed to not belong to the whole of *A* and to belong to the whole of *B*, the proposition *AC*<sup>21</sup> will be true and the other false. And again, what belongs to every *B* it is false to assume belongs to no *A*. For it is [10] necessary, if it belongs to every *B*, for it also to belong to some *A*; so if *C* is assumed to belong to every *B* and to no *A*, *CB* will be true and *CA* false.

So it is evident that both when both are false and when only one is



there will be [15] an erroneous deduction in the case of atomic propositions.

17 · In the case of what belongs non-atomically, when the deduction of the falsehood comes about through the appropriate middle term, it is not possible for both propositions to be false but only the one relating to the major extreme. (I call [20] appropriate a middle term through which the deduction of the contradictory comes about.) For let  $A$  belong to  $B$  through a middle term  $C$ . Now since it is necessary for  $CB$  to be assumed as an affirmative if a deduction comes about, it is clear that this will always be true; for it does not convert. And  $AC$  is false; for if this converted the [25] contrary deduction comes about.

Similarly too if the middle term is taken from another chain—e.g.  $D$ , if it is both in the whole of  $A$  and predicated of every  $B$ ; for it is necessary for the proposition  $DB$  to stand and for the other to be converted, so that the one is always [30] true and the other always false. And *this* sort of error is much the same as that through the appropriate middle.

But if the deduction comes about not through the appropriate middle, then when the middle term is under  $A$  and belongs to no  $B$ , it is necessary for both to be false. For the propositions must be assumed with the contrary character to that [35] which they actually have if there is going to be a deduction; and so assumed both come out false. I.e. if  $A$  belongs to the whole of  $D$  and  $D$  to none of the  $B$ 's; for when these are converted there will be a deduction and the propositions will both be false.

[81<sup>a</sup>1] But when the middle term, i.e.  $D$ , is not under  $A$ ,  $AD$  will be true and  $DB$  false. For  $AD$  is true because  $D$  was not in  $A$ ; and  $DB$  false because if it were true the conclusion too would be true, but it was false.

[5] When the error comes about through the middle figure, it is not possible for both propositions to be false as wholes; for when  $B$  is under  $A$  it is not possible for anything to belong to all the one and none of the other, as was said earlier. But it is possible for one to be false as a whole, and that whichever you like.

[10] For if  $C$  belongs both to  $A$  and to  $B$ , if it is assumed to belong to  $A$  and not to belong to  $B$ , then  $AC$ <sup>22</sup> will be true and the other false. And again, if  $C$  were assumed to belong to  $B$  and to no  $A$ ,  $CB$  will be true and the other false.

[15] Now if the deduction of the error is negative, we have said when and by what means the error will occur. If it is affirmative, then when it is through the appropriate middle term it is impossible for both to be

false; for it is necessary for *CB* to stand if there is to be a deduction, as was said earlier. Hence *CA*<sup>23</sup> will always [20] be false; for this is the proposition that converts.

Similarly too if the middle term were taken from another chain, as was said in the case of negative error too; for it is necessary for *DB* to stand and *AD* to convert. And the error is the same as the earlier one.

[25] When it is not through the appropriate middle term, then if *D* is under *A*, this will be true and the other false; for it is possible for *A* to belong to several things which are not under one another. And if *D* is not under *A*, this clearly will always be false (for it is assumed as an affirmative), but it is possible for *DB* both to be true [30] and false. For nothing prevents *A* from belonging to no *D* and *D* to every *B*, e.g. animal to knowledge, knowledge to music; nor again *A* from belonging to none of the *D*'s and *D* to none of the *B*'s.

So it is evident that if the middle term is not under *A* it is possible both for both propositions to be false and for whichever you like to be.<sup>24</sup>

[35] So it is evident in how many ways and by what means errors in virtue of deduction may come about, both in the case of the immediates and in the case of what is established through demonstration.

18 · It is evident too that if some perception is wanting, it is necessary for some understanding to be wanting too—which it is impossible to get if we learn either by induction or by demonstration, and demonstration depends on universals [81<sup>b</sup>1] and induction on particulars, and it is impossible to consider universals except through induction (since even in the case of what are called abstractions one will be able to make familiar through induction that some things belong to each genus, [5] even if they are not separable, in so far as each thing is *such and such*), and it is impossible to get an induction without perception—for of particulars there is perception; for it is not possible to get understanding of them; for it can be got neither from universals without induction nor through induction without perception.

19 · Every deduction is through three terms; and the one type is capable of [10] proving that *A* belongs to *C* because it belongs to *B* and that to *C*, while the other is negative, having one proposition to the effect that one thing belongs to another and the other to the effect that something does not belong. So it is evident that the principles and what

are called the suppositions are these; for it is necessary to [15] assume these and prove in this way—e.g. that *A* belongs to *C* through *B*, and again that *A* belongs to *B* through another middle term, and that *B* belongs to *C* in the same way.

Now those who are deducing with regard to opinion and only dialectically clearly need only inquire whether their deduction comes about from the most reputable propositions possible; so that even if there is not in truth any middle term [20] for *AB* but there seems to be, anyone who deduces through this has deduced dialectically. But with regard to truth one must inquire on the basis of what actually holds. It is like this: since there is something which itself is predicated of something else nonaccidentally (I mean by accidentally—e.g. we sometimes say that that [25] white thing is a man, not speaking in the same way as when we say that the man is a white thing;<sup>25</sup> for it is not the case that, being something different, he is a white thing, whereas the white thing is a man because the man was accidentally white)—now there are some things such as to be predicated in themselves.

Well, let *C* be such that it itself no longer belongs to anything else and *B* [30] belongs to it primitively and there is nothing else between. And again let *E* belong to *F* in the same way and this to *B*. Now is it necessary for this to come to a stop, or is it possible for it to go on *ad infinitum*?

And again, if nothing is predicated of *A* in itself and *A* belongs to *H* primitively and to nothing prior in between, and *H* belongs to *G* and this to *B*, is it necessary for [35] *this* to come to a stop or is it possible for *this* to go on *ad infinitum*? This differs from the earlier question to this extent, that the one is: Is it possible, beginning from something such that it belongs to nothing else and something else belongs to it, to go upwards *ad infinitum*? while the other has us begin from something such that it is predicated of something else and nothing is predicated of it and consider if it is [82<sup>a</sup>1] possible to go downwards *ad infinitum*.

Again, is it possible for the terms in between to be indefinitely many if the extremes are determined? I mean, e.g., if *A* belong to *C*, and *B* is a middle term for them, and for *B* and *A* there are other middle terms, and for these others, is it [5] possible for *these* to go on *ad infinitum*, or impossible?

This is the same as to inquire whether demonstrations go on *ad infinitum* and whether there is demonstration of everything, or whether some terms are bounded by one another.

I say the same in the case of negative deductions and propositions too; i.e. if  $A$  [10] does not belong to any  $B$ , either it will not belong to  $B$  primitively, or there will be something prior in between to which it does not belong (e.g.  $G$ , which belongs to all  $B$ ), and again another still prior to this (e.g.  $H$ , which belongs to every  $G$ ). For in these cases too either the prior terms it belongs to are indefinitely many or they come to a stop.

[15] (The same does not go for terms that convert. For among counterpredicated terms there is none of which any is predicated primitively or finally (for in this respect at least every term is related to every other in a similar way), and if<sup>26</sup> its predicates are indefinitely many, then the things we are puzzling over are indefinitely many in both directions—unless it is possible that they convert not [20] similarly but the one as an accidental, the other as a predicate.)

20 · Now it is clear that it is not possible for the terms in between to be indefinitely many if the predications come to a stop downwards and upwards—I mean by upwards, towards the more universal; and by downwards, towards the [25] particular. For if when  $A$  is predicated of  $F$  the terms in between—the  $B$ 's—are indefinitely many, it is clear that it would be possible both that from  $A$  downwards one thing should be predicated of another *ad infinitum* (for before  $F$  is reached the terms in between are indefinitely many) and that from  $F$  upwards there are indefinitely many before  $A$  is reached. Hence if these things are impossible, it is also impossible for there to be indefinitely many terms between  $A$  and  $F$ .

[30] For if someone were to say that some of  $A, B, F$  are next to one another so that there are none between them, and that the others cannot be grasped, that makes no difference; for whichever of the  $B$ 's I take, the terms in between in the direction of  $A$  or in the direction of  $F$  will either be indefinitely many or not. Well, it makes no difference which is the first term from which they are indefinitely many—whether [35] at once or not at once—for the terms after these are indefinitely many.

21 · It is evident too that in the case of negative demonstration it will come to a stop if it comes to a stop in both directions in the affirmative case. For let it be possible neither to go upwards from the last term *ad infinitum* (I call last that which [82<sup>b</sup>1] itself belongs to nothing else while something else belongs to it, e.g.  $F$ ), nor from the first to the last (I call first that which itself holds of another while nothing holds of

it). Well, if this is so, it will come to a stop in the case of negation too.

For a thing is proved not to belong in three ways. For either *B* belongs to [5] everything to which *C* does and *A* to nothing to which *B* does—in the case of *BC*, then and in general of the second premiss it is necessary to come to immediates; for this premiss is affirmative. And clearly if the other term does not belong to something else that is prior, e.g. to *D*, this will have to belong to every *B*; and if again it does not belong to something else prior to *D*, that will have to belong to every *D*. [10] Hence since the way upwards comes to a stop, the way to *A* will come to a stop too, and there will be some first thing to which it does not belong.

Again, if *B* belongs to every *A* and to no *C*, *A* belongs to none of the *C*'s. Again, [15] if one has to prove this, clearly it will be proved either in the above fashion, or in this or the third. Now the first has been described, and the second will now be proved.

You might prove it in this way—e.g. that *D* belongs to every *B* and to no *C*—if it is necessary for something to belong to *B*. And again, if this is not to belong to *C*, something else belongs to *D* which does not belong to *C*. So since belonging to ever [20] higher terms comes to a stop, not belonging will come to a stop too.

The third way was: if *A* belongs to every *B* and *C* does not belong to it, *C* does not belong to everything to which *A* does. Again, this will be proved either in the ways described above or similarly. Well, if the former, it comes to a stop; and if the [25] latter, one will again assume that *B* belongs to *E*, to not all of which *C* belongs. And this again similarly. Since it is supposed that it comes to a stop in the downward direction too, it is clear that *C*'s not belonging will also come to a stop.

It is evident that even if it is proved not in one way but in all—sometimes from the first figure, sometimes from the second or third—that it will come to a stop even [30] so; for the ways are finite, and necessarily anything finite taken a finite number of times is finite.

So it is clear that it comes to a stop in the case of negation if it does in the case of belonging. That it comes to a stop in the latter case is evident if we consider it [35] generally, as follows.

22 · Now in the case of things predicated in what something is, it is clear; for if it is possible to define, or if what it is to be something is knowable, but one cannot go through indefinitely many things, it is necessary that the things predicated in what something is are finite.

We argue universally, as follows: one can say truly that the white thing is [83<sup>a</sup>1] walking, and that that large thing is a log, and again that the log is large and that the man is walking. Well, speaking in the latter and in the former ways are different. For when I say that the white thing is a log, then I say that that which is [5] accidentally white is a log; and not that the white thing is the underlying subject for the log; for it is not the case that, being white or just what is some white, it came to be a log, so that it is not a log except accidentally. But when I say that the log is white, I do not say that something else is white and that that is accidentally a log, as [10] when I say that the musical thing is white (for then I say that the man, who is accidentally musical, is white); but the log is the underlying subject which *did* come to be white without being something other than just what is a log or a particular log.

Well, if we must legislate, let speaking in the latter way be predicating, and in [15] the former way either no predicating at all, or else not predicating *simpliciter* but predicating accidentally. (What is predicated is like the white, and that of which it is predicated is like the log.) Thus let it be supposed that what is predicated is always predicated *simpliciter* of what it is predicated of, and not accidentally; for [20] this is the way in which demonstrations demonstrate. Hence when one thing is predicated of one, either it is predicated in what a thing is or it says that it has some quality or quantity or relation or is doing something or undergoing something or is at some place of time.

Again, the things signifying a substance signify of what they are predicated of [25] just what is that thing or just what is a particular sort of it; but the things which do not signify a substance but are said of some other underlying subject which is neither just what is that thing nor just what is a particular sort of it, are accidental, e.g. white of the man. For the man is neither just what is white nor just what is some [30] white—but presumably animal; for a man is just what is an animal. But the things that do not signify a substance must be predicated of some underlying subject, and there cannot be anything white which is not white through being something different. (For we can say goodbye to the forms; for they are nonny-noes, and if there are any they are nothing to the argument; for demonstrations are about things [35] of this type.)

Again, if it cannot be the case that this is a quality of that and the latter of the former—a quality of a quality—it is impossible for them to be counterpredicated of one another in this way—it is possible to say it truly, but it is not possible to counterpredicate truly. Now either it will be predicated as a substance, i.e. either [83<sup>b</sup>1] being the genus or the

difference of what is predicated—but it has been proved that these will not be infinitely many, either downwards or upwards (e.g. man is two-footed, that is animal, that is something else; nor animal of man, that of Callias, [5] and that of another thing in what it is); for one can define every substance of that kind, but one cannot go through infinitely many things in thought. Hence they are not infinitely many either upwards or downwards; for one cannot define that of which infinitely many things are predicated. Thus they will not be counterpredicated [10] of one another as genera; for a thing will itself be just what is some of itself.

But neither will any case of quality or the other kinds of predication be counterpredicated unless it is predicated accidentally; for all these are accidental and are predicated of substances.

But it is clear that they will not be infinitely many upwards either; for of each is predicated whatever signifies either a quality or a quantity or one of those things, [15] or what is in its substance; but these are finite, and the genera of predications are finite—for they are either quality or relation or doing or undergoing or place or time.

It is supposed that one thing is predicated of one thing, and that things which are not what something is are not predicated of themselves. For they are all [20] accidental (though some in themselves and some in another fashion) and we say that all of them are predicated of some underlying subject, and that what is accidental is not an underlying subject; for we posit nothing of this type which is not called what it is called through being something different, and itself belongs to other things.<sup>27</sup>

[25] Neither upwards, therefore, nor downwards will one thing be said to belong to one thing. For the things of which the accidentals are said are whatever is in the substance of each thing; and these are not infinitely many. And upwards there are both these and their accidentals, and neither are infinitely many. It is necessary, therefore, for there to be something of which something is predicated primitively, and something else of that; and for this to come to a stop, and for there to be [30] something which is no longer predicated of anything prior and of which nothing else prior is predicated.

Now this is one way of demonstration; but there is still another, if there is demonstration of that of which some prior things are predicated, and it is not possible either to be more happily related to the things of which there is demonstration than by knowing them or to know them without demonstration, and [35] if this is familiar through these and we neither know these nor are more happily related to them than by

knowing them, we shall not understand what is familiar through them either.

So if one can know something through demonstration—*simpliciter*, and not dependent on something, nor on a supposition—it is necessary for the predication in between to come to a stop. For if they do not come to a stop but there is always [84<sup>a</sup>1] something above what has been taken, there will be demonstration of everything; hence if it is not possible to go through infinitely many things, we shall not know through demonstration the things of which there is demonstration. So if we are not more happily related to them than by knowing them, we will be able to understand nothing through demonstration *simpliciter* but only on a supposition. [5]

Now generally, one might be convinced of what we said by this; but analytically, it is evident more concisely from the following facts that neither upwards nor downwards can the terms predicated be infinitely many in the demonstrative sciences with which our inquiry is concerned. [10]

For demonstration is of what belongs to the objects in themselves—in themselves in two ways: both what belongs in them in what they are, and the things which have what they themselves belong to belonging in what they are (e.g. odd to number—odd belongs to number and number itself inheres in its account; and again [15] plurality or divisibility inheres in the account of number). And it is not possible for either of these sorts of term to be infinitely many—either as odd of number (for then there would again be something else belonging to odd in which odd inhered; and if this is prime, number will inhere in what belongs to it; so if it is not possible [20] for infinitely many such things to belong in the one thing, they will not be infinitely many in the upward direction; but it is necessary that everything belongs to the primitive term, i.e. to number, and number to them, so that they will be convertible and will not exceed it). Nor yet can the terms inhering in what something is be infinitely many; for then it would not be possible to define. [25]

Hence if all the terms predicated are said in themselves, and there are not infinitely many, then the terms leading upward will come to a stop. Hence they will come to a stop in the downward direction too. And if this is so, the terms in between two terms will also always be finite.

And if this is the case, it is now clear too that of necessity there are principles of [30] demonstrations and there is not demonstration of everything (which, as we said at the beginning, some men assert). For if there are principles, neither is everything demonstrable, nor is it possible



to go on *ad infinitum*; for for either of these to be the case is nothing other than for there to be no immediate and indivisible proposition [35] but for all to be divisible. For it is by interpolating a term inside and not by taking an additional one that what is demonstrated is demonstrated; hence if it is possible for this to go on *ad infinitum*, it would be possible for there to be infinitely many middle terms in between two terms. But this is impossible if the predications come to a stop [84<sup>b</sup>1] upwards and downwards. And that they do come to a stop has been proved generally before and analytically now.

23 · Now that this has been proved, it is evident that if one and the same thing belongs to two things—e.g. *A* both to *C* and to *D*—which are not predicated [5] one of the other (either not at all or not in every case), that it will not always belong in virtue of something common. E.g. having angles equal to two right angles belongs to isosceles and to scalene in virtue of something common (for it belongs to them as figures of a certain sort and not as different things); but this is not always so.

[10] For let *B* be that in virtue of which *A* belongs to *C*, *D*. It is clear, then, that *B* too will belong to *C* and *D* in virtue of some other common feature, and that in virtue of another; so that infinitely many terms would fall between two terms. But that is impossible.

It is not necessary, then, that when one and the same thing belongs to several things it should always do so in virtue of something common, since there are [15] immediate propositions. Yet it is necessary for the terms to be in the same genus and dependent on the same atoms, if the common feature is to be something belonging in itself; for it turned out impossible that what is proved should cross from one genus to another.

It is evident too that when *A* belongs to *B*, then if there is some middle term you [20] can prove that *A* belongs to *B*, and the elements of this are<sup>28</sup> as many as the middle terms (for the immediate propositions are the elements, either all of them or the universal ones); but if there is no middle term, there is no longer a demonstration, but this is the path to the principles.

Similarly, too, if *A* does not belong to *B*, then if there is either a middle or a [25] prior term to which it does not belong, there is a demonstration; and if not, there is not, but it is a principle. And there are as many elements as terms; for the propositions containing these are principles of the demonstration. And just as there are some non-demonstrable principles to the effect that this is *this* and this belongs to

*this*, so too there are some to the effect that this is *not this* and this does *not* [30] belong to *this*; so that there will be principles some to the effect that something is, and others to the effect that something is not.

When you have to prove something, you should assume what is predicated primitively of *B*. Let it be *C*; and let *D* be predicated similarly of this. And if you always proceed in this way no proposition and nothing belonging outside *A* will ever [35] be assumed in the proof, but the middle term will always be thickened, until they become indivisible and single. It is single when it becomes immediate; and a single proposition *simpliciter* is an immediate one. And just as in other cases the principle is simple, though it is not the same everywhere—but in weight it is the ounce, in song the semitone, and in other cases other things—so in deduction it is the unit<sup>29</sup> [85<sup>a</sup>1] and in demonstration and understanding it is comprehension.

So, in deductions proving something to belong, nothing falls outside; but in deductions, in one case nothing falls outside the term which must belong—i.e. if *A* does not belong to *B* through *C* (if *C* belongs to every *B*, and *A* to no *C*), then if [5] again you have to prove that *A* belongs to no *C*, you should assume a middle term for *A* and *C*; and it will always proceed in this way.

If you have to prove that *D* does not belong to *E* by the fact that *C* belongs to every *D* and to no *E* it will never fall outside *E* (this is the term to which it must belong).

In the case of the third way, it will never pass outside either the term of which [10] it must be denied or that which must be denied of it.

**24** · Some demonstrations are universal, others particular, and some are affirmative, others negative; and it is disputed which are better. And similarly too [15] for those which are said to demonstrate and those which lead to the impossible. Now first let us inquire about universal and particular demonstrations; and when we have made this clear, let us speak about those which are said to prove and those which lead to the impossible

Now it might perhaps seem to some, inquiring as follows, that particular [20] demonstration is better: if a demonstration in virtue of which we understand better is a better demonstration (for this is the excellence of demonstration), and we understand a thing better when we know it in itself than when we know it in virtue of something else (e.g. we know musical Coriscus better when we know that Coriscus [25] is

musical than when we know that a man is musical; and similarly in the other cases too), and the universal demonstration shows that something else and not that the thing itself is in fact so and so (e.g. of the isosceles,<sup>30</sup> it shows not that the isosceles but that the triangle has two right angles), while the particular demonstration shows that the thing itself has in fact two right angles—well, if a demonstration of something in itself is better, and the particular rather than the universal is of that [30] type, then the particular demonstration will be better.

Again, if the universal is not a thing apart from the particulars, and demonstration instils an opinion that that in virtue of which it demonstrates is some thing, and that this belongs as a sort of natural object among the things there are (e.g. a triangle apart from the individual triangles, and a figure apart from the individual figures and a number apart from the individual numbers), and a [35] demonstration about something there is is better than one about something that is not, and one by which we will not be led into error is better than one by which we will be, and universal demonstration is of this type (for as they go on they prove as in the case of proportion, e.g. that whatever is of such a type—neither line nor number nor solid nor plane but something apart from these—will be proportional)—so, if [85<sup>b</sup>1] this is more universal and is less about something there is than the particular demonstration, and instils a false opinion, then the universal will be worse than the particular.

[5] Or, first, is the other argument any better fitted to the universal than to the particular case? For if two right angles belong not as isosceles but as triangle, one who knows that the isosceles has two right angles will know it less well as such than one who knows that a triangle has two right angles.

And in general, if it does not hold as triangle and yet someone proves it, this will not be a demonstration; and if it does, it is the man who knows a thing as it [10] belongs who knows it better. Thus if triangle extends further, and there is the same account and triangles are not so called in virtue of a homonymy, and two right angles belong to every triangle, it will not be that the triangle has two right angles as isosceles but that the isosceles has such angles as triangle. Hence one who knows universally knows it better as it belongs than one who knows it particularly. [15] Therefore the universal demonstration is better than the particular.

Again, if there is some single account and the universal is not a homonymy, it will be some thing no less than some of the particulars, but actually more so, inasmuch as what is imperishable is among the former and it is rather the particulars that are perishable. And again, there is no necessity to believe that this is [20] a thing apart from the particulars on the grounds that it makes one thing clear, any more than in the case of the other things which do not signify an individual but either quality or quantity or relation or doing. If, therefore, this is believed, it is not the demonstration but the audience which is responsible.

Again, if demonstration is a probative deduction of an explanation and the reason why, and the universal is more explanatory (for that to which something [25] belongs in itself, is itself explanatory for itself; and the universal is primitive: therefore the universal is explanatory); hence the universal demonstration is better; for it is more a demonstration of the explanation and the reason why it is the case.

Again, we seek the reason why up to this point, and it is then we think we know, when it is not the case that this either comes about or is because something else does; [30] for the last term is in this way an end and a limit. E.g. with what aim did he come? So as to get the money—and that so as to give back what he owed; and that so as not to be dishonest. And going on in this way, when it is no longer because of something else or with some other aim, we say it is because of this as an end that he came (and that it is and that it came about) and that then we best know why he came. Thus if [35] the same goes for all explanations

and reasons why, and in the case of explanations in terms of aim we know best in this way—in the other cases too, therefore, we then know best when this no longer belongs to it because it is something else. So when we are aware that the external angles are equal to four right angles because it is isosceles, it still remains to ask why the isosceles is so because it is a triangle, and [86<sup>a</sup>1] that because it is a rectilineal figure. And if this is no longer the case because it is something else, it is then we know best. And it is then too that it is universal; therefore the universal demonstration is better.

Again, the more particular a demonstration is, the more it falls into what is [5] indefinite, while the universal tends to the simple and the limit. And as indefinite, things are not understandable; but as finite they are understandable. Therefore they are more understandable as universal than as particular. Therefore universals are more demonstrable. And of more demonstrable things there is more of a demonstration; for correlatives vary in degree together. Therefore the universal demonstration is better, since it is more of a demonstration. [10]

Again, if a demonstration in virtue of which one knows this and something else is preferable to one in virtue of which one knows this alone; and one who has the universal demonstration knows the particular fact too, but the latter does not know the universal fact<sup>31</sup>—hence in this way too it will be preferable.

Again, as follows: to prove more universally is to prove through a middle term that is nearer to the principle. The immediate is nearest, and this is a principle. So if [15] a demonstration depending on a principle is more precise than one not depending on a principle, a demonstration more dependent on a principle is more precise than one less so; and the more universal demonstration is of such a type; therefore the universal will be superior. E.g. if you had to demonstrate *A* of *D*; the middle terms are *B*, *C*: well, *B* is higher, so that the demonstration through it is more [20] universal.

But some of the things we have said are general. It is most clear that universal demonstration is more important from the fact that grasping the prior of the propositions we have in a sense the posterior one too and we grasp it potentially. E.g. if someone knows that every triangle has two right angles, he knows in a sense of the [25] isosceles too that it has two right angles—potentially—even if he does not know of the isosceles that it is a triangle. But one who grasps the latter proposition does not know the universal in any sense, neither potentially nor actually.

And the universal proposition is comprehensible, while the particular

terminates in perceptions. [30]

25 · So much, then, for the view that universal demonstration is better than particular; that probative is better than negative is clear from what follows.

Let that demonstration be better which, other things being equal, depends on fewer postulates or suppositions or propositions. For if they are equally familiar, [35] knowing will come about more quickly in this way; and that is preferable.

The argument for the proposition that the one depending on fewer things is better is, put universally, this: if it is the case that the middle terms are equally familiar, and the prior terms are more familiar, let the one demonstration show that *A* belongs to *E* through middle terms *B*, *C*, *D*, and the other that *A* belongs to *E* through *F*, *G*. Thus that *A* belongs to *D* and that *A* belongs to *E* are similar. But that [86<sup>b</sup>1] *A* belongs to *D* is prior to and more familiar than the proposition that *A* belongs to *E*; for the latter is demonstrated through the former, and that through which a thing [5] is demonstrated is more convincing. Therefore the demonstration through the fewer items is better, other things being equal.

Now both are proved through three terms and two propositions, but the one assumes that something is the case and the other both that something is and that something is not the case; therefore it is through more items, so that it is worse.

[10] Again, since it has been proved that it is impossible for a deduction to come about when both propositions are negative, but that one must be so and the other to the effect that something belongs, in addition to that one must assume this: the affirmative propositions, as the demonstration increases, necessarily become more numerous, whereas it is impossible for the negatives to be more than one in any [15] deduction.

For let *A* belong to none of the *B*'s and *B* belong to every *C*. Well, if we must again increase both propositions, a middle term must be interpolated. Let it be *D* for *A B*, and *E* for *B C*. Well, it is evident that *E* is affirmative, and that *D* is affirmative [20] of *B* but lies as negative towards *A*. For *D* holds of every *B*, and *A* must belong to none of the *D*'s. So a single negative proposition, *A D*, comes about.

The same holds of the other deductions too. For the middle for the affirmative [25] terms is always affirmative both ways; but for the negative it is necessarily negative in one way, so that this comes to be the single such proposition and the others are affirmative.

Thus if that through which something is proved is more familiar and more convincing, and the negative demonstration is proved through the affirmative while the latter is not proved through the former, then, being prior and more familiar and more convincing, the affirmative will be better.

[30] Again, if the universal immediate proposition is a principle of deduction, and the universal proposition is affirmative in the probative demonstration and negative in the negative, and the affirmative is prior to and more familiar than the negative [35] (for the negation is familiar because of the affirmation, and the affirmation is prior, just as being the case is prior to not being the case)—hence the principle of the probative is better than that of the negative; and the one which uses better principles is better.

Again, it is more principle-like; for without the probative there is no negative.

[87<sup>a</sup>1] **26** · Since affirmative demonstration is better than negative, it is clear that it is also better than demonstration leading to the impossible. But we must know what is the difference between them.

Well, let  $A$  belong to no  $B$  and  $B$  to every  $C$ ; thus it is necessary for  $A$  to belong [5] to no  $C$ . Now if things are assumed in this way, the negative demonstration that  $A$  does not belong to  $C$  will be probative. The demonstration leading to the impossible goes thus: if we should have to prove that  $A$  does not belong to  $B$ , we must assume that it does belong and that  $B$  belongs to  $C$ , so that it results that  $A$  belongs to  $C$ . Let [10] it be familiar and agreed that this is impossible. Therefore it is not impossible for  $A$  to belong to  $B$ . So if  $B$  is agreed to belong to  $C$ , it is impossible for  $A$  to belong to  $B$ .

So the terms are similarly arranged, and the difference is a matter of which negative proposition is the more familiar—that  $A$  does not belong to  $B$  or that  $A$  [15] does not belong to  $C$ . Now when the conclusion (that it is not the case) is more familiar, demonstration to the impossible comes about; but when the proposition in the deduction is more familiar, we have demonstrative demonstration. By nature the proposition  $A B$  is prior to  $A C$ . For that on which the conclusion depends is prior to the conclusion; and that  $A$  does not belong to  $C$  is a conclusion, whereas that  $A$  does not belong to  $B$  is something on which the conclusion depends. For it is not the [20] case that if it happens that something is disproved, then this is a conclusion and those are what it depends on; but what a

deduction depends on is whatever is so related as to be related as whole to part or part to whole—and the propositions  $B \subset C$  and  $A \subset B$ <sup>32</sup> are not so related to one another.

So if the demonstration depending on what is more familiar and prior is [25] superior, and in both cases conviction depends on something's not being the case, but in the one on something prior and in the other on something posterior, then the negative demonstration will be better *simpliciter* than the one to the impossible; hence the affirmative, which is better than this, is clearly also better than the one to the impossible. [30]

27 · One science is more precise than another and prior to it both if it is at the same time of the fact and of the reason why and not of the fact separately from the science of the reason why; and if it is not said of an underlying subject and the other is said of an underlying subject (e.g. arithmetic and harmonics); and if it depends on fewer items and the other on an additional posit (e.g. arithmetic and geometry). (I mean by on an additional posit, e.g. a unit is a positionless [35] substance, and a point a substance having position—the latter depends on an additional posit.)

28 · A science is one if it is of one genus—of whatever things are composed from the primitives and are parts or attributes of these in themselves. One science is different from another if their principles depend neither on the same thing nor the ones on the others. There is evidence for this when one comes to the non-demonstrables; [87<sup>b</sup>1] for these must be in the same genus as the things demonstrated. And there is evidence for *this* when the things that are proved through them are in the same genus and of a kind.

29 · It is possible for there to be several demonstrations of the same thing [5] not only if one takes a non-continuous middle term from the same chain—e.g.  $C$  and  $D$  and  $F$  for  $A \subset B$ —but also if one takes a middle term from a different chain. E.g. let  $A$  be altering,  $D$  changing,  $B$  enjoying, and again  $G$  coming to rest. Now it is true to predicate both  $D$  of  $B$  and  $A$  of  $D$ ; for the man who is enjoying himself is changing, [10] and what is changing is altering. Again, it is true to predicate  $A$  of  $G$  and  $G$  of  $B$ ; for everyone who is enjoying himself is coming to rest, and one who is coming to rest is altering. Hence the deduction is through middle terms that are different and not from the same chain—yet not in such a way



that neither of the middle terms is said of the other; for it is necessary for them both to belong to some one thing. Inquire [15] in how many ways it is possible for a deduction of the same thing to come about through the *other* figures.

**30** · There is no understanding through demonstration of what holds by [20] chance. For what holds by chance is neither necessary nor for the most part, but what comes about apart from these; and demonstration is of one or other of these. For every deduction is either through necessary or through for the most part propositions; and if the propositions are necessary, the conclusion is necessary too; [25] and if for the most part, the conclusion too is such. Hence if what happens by chance is neither for the most part nor necessary, there will not be demonstration of it.

**31** · Nor can one understand through perception. For even if perception is of [30] what is such and such, and not of individuals, still one necessarily perceives an individual and at a place and at a time, and it is impossible to perceive what is universal and holds in every case; for that is not an individual not at a time; for then it would not be universal—for it is what is always and everywhere that we call universal.

So, since demonstrations are universal, and it is not possible to perceive these, [35] it is evident that it is not possible to understand through perception either; but it is clear that even if one could perceive of the triangle that it has its angles equal to two right angles, we would seek a demonstration and would not, as some say, understand it; for one necessarily perceives particulars, whereas understanding comes by becoming familiar with the universal.

That is also why if we were on the moon and saw the earth screening it we [88<sup>a</sup>1] would not know the explanation of the eclipse. For we would perceive that it is eclipsed and not why at all; for there turned out to be no perception of the universal. Nevertheless, if, from considering this often happening, we hunted the universal, we would have a demonstration; for from several particulars the universal is clear.

[5] The universal is valuable because it makes clear the explanation; hence universal demonstration is more valuable than perception and comprehension<sup>33</sup>—with regard to those things whose explanation is something different; but for the primitives there is a different account.

So it is evident that it is impossible by perceiving to understand

anything [10] demonstrable—unless someone calls this perceiving: having understanding through demonstration.

Yet some of our problems are referred to want of perception; for in some cases if we saw we should not seek—not on the grounds that we knew by seeing, but that we grasped the universal from seeing. E.g. if we saw the glass to be perforated and [15] the light coming through it, it would also be clear why it does, even if seeing<sup>34</sup> occurs separately for each piece of glass while comprehending grasps at one time that it is thus in every case.

**32** · It is impossible for all deductions to have the same principles. First, let us consider it in general terms.

Some deductions are true and some false. For even if it is possible to reduce a [20] truth from falsehoods, yet this only comes about once. E.g. if *A* is true of *C*, and the middle, *B*, is false (for *A* does not belong to *B* nor *B* to *C*); but if middle terms are assumed for these propositions they will be false, because every false conclusion [25] depends on falsehoods, while true conclusions depend on truths, and the truths and the falsehoods are different.

Next, not even falsehoods depend on the same things as one another; for there are falsehoods which are actually contrary to one another and cannot be the case together—e.g. that justice is injustice or cowardice, and that the man is a horse or a cow, and that what is equal is greater or less. [30]

From what we have laid down we argue as follows: not even all truths have the same principles. For the principles of many of them are different in genus and do not apply—e.g. units do not apply to points, for the former do not have the position while the latter do. But it is necessary for them to apply either as middle terms or from above or from below, or for some of the terms to be inside and some [35] outside.

Nor is it possible for there to be some of the common principles from which everything will be proved. (I call common e.g. that everything is affirmed or denied.) For the genera of the things there are are different, and some predicates [88<sup>b</sup>1] belong to quantities and some to qualities alone, with the help of which proofs are conducted through the common items.

Again, the principles are not much fewer than the conclusions; for the propositions are principles, and the propositions are formed either by taking an [5] additional term or by interpolating one.

Again, the conclusions are infinite, the terms finite.

Again, some principles are necessary and others possible.

Now if we inquire in this way, it is impossible for them to be the same and finite if the conclusions are infinite. If anyone means it in some other way, e.g. that [10] *these* are the principles of geometry, *these* of calculations, *these* of medicine, what else will he be saying other than that the sciences have principles? It is ridiculous to say they are the same because they are the same as themselves—for in this way everything comes to be the same.

Nor yet is the contention that anything is proved from everything the same as [15] seeking the same principles for everything; for that is too silly. For neither does this come about in the evident parts of mathematics, nor is it possible on analysis; for the immediate propositions are principles, and a different conclusion comes about if an additional immediate proposition is taken. And if someone were to say that it is the [20] *primitive* immediate propositions that are principles, then there is one in each genus.

If it is claimed neither that anything must be proved from all of them, nor that they are different in the sense of being different for each science, it remains to consider whether the principles of everything are of the same kind, but *this* depends on *these* and *this* on *these*. It is evident that this too is not possible; for it has been [25] proved that the principles of things different in genus are different in genus. For the principles are twofold, those from which and those about which; now while those from which are common, those about which are proper—e.g. number, magnitude.

[30] **33** · What is understandable, and understanding, differ from what is opinable, and opinion, because understanding is universal and through necessities, and what is necessary cannot be otherwise. But there are some things which are true and are the case, but which can also be otherwise. So it is clear that understanding is [35] not about these things; for then what can be otherwise could not be otherwise. But nor is comprehension concerned with them—for by comprehension I mean a principle of understanding—nor is non-demonstrative understanding (this is belief in an immediate proposition). But it is comprehension and understanding and [89<sup>a</sup>1] opinion and what is named from these that are true; hence it remains that opinion is about what is true or false but can also be otherwise. This is belief in a proposition which is immediate and

not necessary.

[5] And this agrees with the appearances; for opinion is unstable, and so too is the nature of the things in question. In addition, no one thinks that he opines when he thinks that it is impossible for it to be otherwise, but that he understands; but when he thinks that it is so but that nothing prevents it from being otherwise, then he [10] thinks he opines, supposing opinion to be about that sort of thing and understanding about what is necessary.

So how can one opine and understand the same thing? and why will not opinion be understanding if one posits that it is possible to opine everything that one knows? For the knower and the opiner will follow one another through the middle terms until they come to the immediates; so that since the former knows, the opiner too [15] knows. For just as one can opine the fact, so too one can opine the reason why; and that is the middle term.

Or if he believes what cannot be otherwise in the way in which he does the definitions through which the demonstrations come about, will he not opine but understand? While if he believes that they are true but not that *they* belong to them [20] in virtue of their substance and in virtue of their form, he will opine and not truly understand—both the fact and the reason why if he opines through the immediates, but if not through immediates, he will opine only the fact.

There is not opinion and understanding of the same thing in every sense; but just as there is in a way both false and true opinion of the same thing, so there is both [25] understanding and opinion of the same thing. For if there is true and false opinion of the same thing in the way some say, it results that one is committed to absurdities, and in particular to the absurdity that a man does not opine what he opines falsely. But since things are called the same in several ways, in a sense it is possible and in a [30] sense it is not. For to opine truly that the diagonal is commensurate is absurd; but because the diagonal about which the opinions are is the same, in this way they are of the same thing—but what it is to be each of them in respect of its account is not the same.

Similarly, there is both knowledge and opinion of the same thing. For the one is of animal in such a way that it cannot not be an animal, and the other in such a way that it can be—e.g. if the one is of just what is man, and the other of man but not of [35] just what is man. For it is the same because man is the same, but the manner is not the same.

It is also evident from this that it is not possible to opine and to

understand the same thing at the same time. For one would at the same time hold the belief that the same thing can be otherwise and cannot be otherwise, which is not possible. For in [89<sup>b</sup>1] different men it is possible for there to be each of these attitudes with regard to the same thing, as has been said; but in the same man it is not possible even in this way; for he will at the same time hold a belief, e.g. that a man is just what is an animal (for this is what it was for it not to be possible for something not to be an animal), and that man is not just what is an animal (for let that be what it is for it to be [5] possible).

As for how the rest should be distributed among thought and comprehension and understanding and skill and prudence and wisdom—that is rather the task partly of nature and partly of moral theory.

**34** · Acumen is a talent for hitting upon the middle term in an imperceptible [10] time; e.g. if someone sees that the moon always holds its bright side toward the sun and quickly grasps why this is—because it gets light from the sun; or he is aware that someone is talking to a rich man because he is borrowing from him; or why they are friends—because they are enemies of the same man. For seeing the extremes he [15] becomes familiar with all the explanatory middle terms.

The bright side's being toward the sun, *A*: getting light from the sun, *B*; the moon, *C*. Well, *B*, getting light from the sun, belongs to *C*, the moon; and *A*, the bright side's being toward that from which it gets light, to *B*; hence *A* belongs to *C*, through *B*. [20]

## BOOK II

1 · The things we seek are equal in number to those we understand. We seek four things: the fact, the reason why, if it is, what it is.

For when we seek whether it is this or this, putting it into a number (e.g. [25] whether the sun is eclipsed or not), we seek the fact. Evidence for this: on finding that it is eclipsed we stop; and if from the start we know that it is eclipsed, we do not seek whether it is. When we know the fact we seek the reason why (e.g. knowing that it is eclipsed and that the earth moves, we seek the reason why it is eclipsed or [30] why it moves).

Now while we seek these things in this way, we seek some things in another fashion—e.g. if a centaur or a god is or is not (I mean if one is or not *simpliciter* and not if one is white or not). And knowing that it is, we seek what it is (e.g. so what is a god? or what is a man?). [35]

2 · Now what we seek and what on finding we know are these and thus many. We seek, whenever we seek the fact or if it is *simpliciter*, whether there is or is not a middle term for it; and whenever we become aware of either the fact or if it [90<sup>a</sup>1] is—either partially or *simpliciter*—and again seek the reason why or what it is, then we seek what the middle term is. (I mean by the fact that it is partially and *simpliciter*—partially: Is the moon eclipsed? or is it increasing? (for in such cases we seek if it is something or is not something); *simpliciter*: if the moon or night is or [5] is not.) It results, therefore, that in all our searches we seek either if there is a middle term or what the middle term is.

For the middle term is the explanation, and in all cases that is sought. Is it eclipsed?—Is there some explanation or not? After that, aware that there is one, we [10] seek what this is. For the explanation of a substance being not this or that but *simpliciter*, or of its being not *simpliciter* but one of the things which belong to it in itself or accidentally—that is the middle term. I mean by *simpliciter* the underlying subject (e.g. moon or earth or sun or triangle) and by one of the things eclipse, equality, inequality, whether it is in the middle or not.

For in all these cases it is evident that what it is and why it is are the same. [15] What is an eclipse? Privation of light from the moon by the earth's screening. Why is there an eclipse? or Why is the moon eclipsed?

Because the light leaves it when the earth screens it. What is a harmony? An arithmetical ratio between high and [20] low. Why does the high harmonize with the low? Because an arithmetical ratio holds between the high and the low. Can the high and the low harmonize?—Is there an arithmetical ratio between them? Assuming that there is, what then is the ratio?

That the search is for the middle term is made clear by the cases in which the [25] middle is perceptible. For if we have not perceived it, we seek, e.g. for the eclipse, if there is one or not. But if we were on the moon we would seek neither if it comes about nor why, but it would be clear at the same time. For from perceiving, it would come about that we knew the universal too. For perception tells us that it is now [30] screening it (for it is clear that it is now eclipsed); and from this the universal would come about.

So, as we say, to know what it is is the same as to know why it is—and that either *simpliciter* and not one of the things that belong to it, or one of the things that belong to it, e.g. that it has two right angles, or that it is greater or less.

[35] **3** · Now, that everything we seek is a search for a middle term is clear; let us now say how one proves what a thing is, and what is the fashion of the reduction, [90<sup>b</sup>1] and what definition is and of what, first going through the puzzles about them. Let the start of what we are about to say be whatever is most appropriate to the neighbouring arguments.

A man might puzzle over whether one can know the same thing in the same respect by definition and by demonstration, or whether that is impossible.

For definition seems to be of what a thing is, and what a thing is in every case [5] universal and affirmative, but deductions are some of them negative and some not universal—e.g. those in the second figure are all negative and those in the third not universal.

Next, there is not definition even of all the affirmatives in the first figure—e.g. that every triangle has angles equal to two right angles. The argument for this is that to understand what is demonstrable is to have a demonstration; so that since [10] there is demonstration of such things, clearly there will not also be definition of them—for someone might understand them in virtue of the definition without having the demonstration; for nothing prevents him from not having them together.

An induction, too, is sufficiently convincing; for we have never yet

become aware of anything by giving a definition—neither of anything belonging in itself nor [15] of any accidental.

Again, if definition is becoming familiar with some substance, it is evident that *such* things are not substances.

So it is clear that there is not definition of everything of which there is demonstration.

Well then, is there demonstration of everything of which there is definition, or not?

Well, one argument is the same in this case too. For of one thing, as one, there [20] is one mode of understanding. Hence, if to understand what is demonstrable is to have a demonstration, something impossible will result; for anyone who has the definition without the demonstration will understand.

Again, the principles of demonstrations are definitions, and it has been proved [25] earlier that there will not be demonstrations of these—either the principles will be demonstrable and there will be principles of the principles, and this will go on *ad infinitum*, or the primitives will be non-demonstrable definitions.

But if the objects of definition and demonstration are not all the same, are some of them the same? or is this impossible? For there is no demonstration of that of which there is definition. For definition is of what a thing is and of substance; but [30] all demonstrations evidently suppose and assume what a thing is—e.g. mathematical demonstrations assume what a unit is and what odd, and the others similarly.

Again, every demonstration proves something of something, i.e. that it is or is not; but in a definition one thing is not predicated of another—e.g. neither animal of [35] two-footed nor this of animal, nor indeed figure of plane (for plane is not figure nor is figure plane).

Again, proving what a thing is and that it is are different. So the definition makes clear what it is, and the demonstration that this is or is not true of that. And [91<sup>a</sup>1] of different things there are different demonstrations—unless they are related as a part to the whole (I mean by this that the isosceles has been proved to have two right angles if every triangle has been proved to be so; for one is a part and the other a whole). But these things—that it is and what it is—are not related to one another in [5] this way; for neither is part of the other.

It is evident, therefore, that neither is there demonstration of everything of which there is definition, nor is there definition of everything of which there is demonstration, nor in general is it possible to



have both of the same thing. Hence it [10] is clear that definition and demonstration are neither identical nor the one included in the other; for then their underlying subjects would be similarly related.

4 · Now so much for these puzzles; but is there deduction and demonstration of what a thing is, or is there not, as the argument just now supposed?

For deduction proves something of something through the middle term. But [15] what a thing is both is proper to it and is predicated in what it is. And these necessarily convert; for if *A* is proper to *C* it is clear that it is also proper to *B* and this to *C*; so that all are proper to one another. And if *A* belongs to every *B* in what it [20] is, and *B* is said universally of every *C* in what it is, necessarily *A* is said of *C* in what it is. But if you do not assume them in this double way, it will not be necessary for *A* to be predicated of *C* in what it is (if *A* holds of *B* in what it is, but of what *B* is said of *B* does not hold in what it is). But both these will contain what it is; therefore *B* [25] too will hold of *C* in what it is.

Thus if both contain what a thing is and what it is to be it, what it is to be it will be prior in the case of the middle term. And in general if one can prove what a man is, let *C* be man, and *A* what man is—whether two-footed animal or something else. If, then, it is deduced, it is necessary for *A* to be predicated of every *B*, and there will [30] be an intermediate account other than this,<sup>35</sup> so that this too will be what man is. So you assume what you have to prove; for *B* is what man is.

We must inquire in the case of two propositions and of what is primitive and immediate; for there what we are saying becomes especially evident.

[35] Now those who prove through conversion what soul is, or what man is, or anything else that there is, postulate the point at issue—e.g. if someone were to claim that soul is what is explanatory of its own being alive, and that this is a number that moves itself; for it is necessary to postulate that soul is just what is a [91<sup>b</sup>1] number that moves itself, in the sense of its being the same thing.

For it is not the case that if *A* follows *B* and this *C*, *A* will be what it is to be *C*, but it is true<sup>36</sup> to say only *A* will be *C*—even if *A* is just what is some *B* and is [5] predicated of every *B*. For what it is to be an animal is predicated of what it is to be a man (for it is true that every case of what it is to be a man is what it is to be an animal, just as every man is an animal), but not in the sense of their being one thing.

If, then, you do not assume in this way, you will not deduce that *A* is what it is to be *C* and its substance; and if you do assume in this way, you will already have [10] assumed what is what it is to be *C*, viz. *B*. Hence it has not been demonstrated; for you have assumed the point of issue.

5 · But neither does the method of division deduce, as we said in our analysis of the figures.<sup>37</sup> For it nowhere becomes necessary for the object to be *that* if *these* are the case—just as someone who is giving an induction does not demonstrate. For [15] one must not ask the conclusion, nor must it be the case by being granted; but it is necessary for it to be the case if *those* are the case, even if the answerer denies it.

Is man an animal or inanimate? If<sup>38</sup> he assumed animal, he has not deduced it. Again, every animal is either terrestrial or aquatic: he assumed terrestrial. And that man is the whole—a terrestrial animal—is not necessary from what he has said, but [20] he assumes this too. It makes no difference whether he does this in many steps or in few; for it is the same. (Indeed those who proceed in this way actually make non-deductive use even of what can be deduced.) For what prevents all this from being true of man yet not making clear what a man is or what it is to be a man? [25] Again, what prevents you from positing something additional, or from abstracting something, or from passing over something in its substance?

Now these points are ignored; but it is possible to solve them if one assumes everything in what the thing is, and makes the division consecutive by postulating what is primitive, and leaves nothing out. [This is necessary if everything falls into [30] the division and nothing is omitted; and this is necessary, for it must already be atomic.]<sup>39</sup>

But nevertheless there is no deduction in it; but it makes us familiar with what the thing is, if at all, in some other fashion. And this is nothing absurd; for neither, presumably, does someone who gives an induction demonstrate, but he nevertheless makes something clear. And someone who states the definition as a result of the [35] division does not state a deduction. For just as in the case of conclusions without middle terms if someone says that if these are the case it is necessary that *this* is the case, it is possible to ask why; so too this is possible in the case of divisional definitions. What is man? An animal, mortal, footed, two-footed, wingless. Why (at [92<sup>a</sup>1] each additional posit)? For he will say, and prove by the division as he thinks, that everything is either mortal or immortal. But a whole argument of this sort is not a definition, so that

even if it were demonstrated by the division, that does not make *the definition* a deduction. [5]

6 · But can one actually demonstrate what a thing is in respect of substance, but do so on a supposition, by assuming that what it is to be something is the property composed from the things in what it is, and that *these* alone are in what it is, and that the whole is proper to it? For this is what it is to be that thing.

Or do you again assume what it is to be the thing in this case too? For it is [10] necessary to prove it through the middle term.

Again, just as in a deduction you do not assume what being deduced is (for the proposition on which the deduction depends is always whole or part), so too what it is to be something must not be in the deduction, but this must be separate from what is laid down. And if anyone disputes whether something has been deduced or not, we [15] meet him by saying that “that is what a deduction is”; and if anyone says that what it is to be it has not been deduced we can say that “Yes it has; for that is what we supposed what it is to be something is.” Hence it is necessary for something to have been deduced *without* assuming what deduction is or what it is to be something.

[20] And even if you prove it from a supposition—e.g. if being bad is being divisible, and for things which have a contrary being their contrary is being contrary to what they are,<sup>40</sup> and the good is contrary to the bad, and the indivisible to the divisible—therefore being good is being indivisible.

For here too you prove by assuming what it is to be something, and you assume [25] it in order to prove what it is to be it.—Yet something different.—Granted; for in demonstrations too one assumes that this is true of this—but not itself, and not something that has the same account and converts.

And in both cases—if you prove in virtue of a division and if you produce a deduction in this way—there is the same puzzle: why will man be a two-footed [30] terrestrial animal and not animal and terrestrial? For from the assumption there is no necessity for what is predicated to become a unity, but it might be as if the same man were musical and literate.

7 · Well now, how will a definer prove a thing’s substance or what it

is?

[35] For neither, as in demonstration, will he make it clear from what is agreed to be the case because necessarily if these are the case something else is (for this is demonstration); nor, as in induction, will he show through the particulars, which are clear, that everything is thus since nothing is otherwise (for in induction you do not [92<sup>b</sup>1] prove what a thing is, but that either it is or it is not).

Now what other way is left? For you will hardly prove it by perception or by pointing with your finger.

Again, how will you prove what a thing is? For it is necessary for anyone who [5] knows what a man or anything else is to know too *that* it is (for of that which is not, no one knows what it is—you may know what the account or the name signifies when I say goatstag, but it is impossible to know what a goatstag is). But if you are to prove what it is and that it is, how will you prove them by the same argument? [10] For both the definition and the demonstration make one thing clear; but what a man is and that a man is are different.

Next, we say it is necessary that everything that a thing is should be proved through demonstration, unless it is its substance. But being is not the substance of anything; for what is is not a genus. Therefore there will be a demonstration that it [15] is. And that is what the sciences as a matter of fact do; for the geometer assumes what triangle signifies and proves that it is. So when you define what it is, what will you prove? Triangle?<sup>41</sup> Then you will know by definition what it is, but you will not know if it is. But that is impossible.

It is evident too from the present fashions of definition that definers do not [20] prove that a thing is. For if it is in fact what is<sup>42</sup> equidistant from the middle, why should what has been defined be? and why is this a circle? For one might say that it was a definition of mountain-copper. For definitions do not in addition make clear either that what is said is possible, or that it is that of which they say they are definitions, but it is always possible to say “Why?” [25]

If, therefore, the definer proves either what a thing is or what its name signifies, then if a definition has nothing at all to do with what a thing is, it will be an account signifying the same as a name. But that is absurd.

For, first, there would be definitions even of non-substances, and of things that are not—for one can signify even things that are not.

Again, all accounts would be definitions; for one could posit a name

for any [30] account whatever, so that we would all talk definitions and the *Iliad* would be a definition.

Again, no demonstration would demonstrate that this name makes *this* clear; nor then do definitions make this clear in addition.

From this, then, it is evident that definition and deduction are not the same, [35] and that deduction and definition are not of the same thing; and in addition, that definition neither demonstrates nor proves anything, and that you can become aware of what a thing is neither by definition nor by demonstration.

8 · We must inquire again which of these points is correctly argued and [93<sup>a</sup>1] which not correctly; and what a definition is; and whether there is in some way demonstration and definition of what a thing is, or in no way at all.

Since, as we said, to know what something is and to know the explanation of the fact that it is are the same—the argument for this is that there is some [5] explanation, and this is either the same thing or something else, and if it is something else it is either demonstrable or non-demonstrable—if, then, it is something else and it is possible to demonstrate it, it is necessary for the explanation to be a middle term and to be proved in the first figure; for what is being proved is both universal and affirmative.

Well, one way would be the one just examined—proving what a thing is [10] through another definition. For in the case of what a thing is, it is necessary for the middle term to state what the thing is (and in the case of what is proper it must be proper). Hence you will prove the one but you will not prove the other instance of what it is to be the same object. Now that this way will not be a demonstration was said earlier (but it is a general deduction of what the thing is). [15]

But let us say in what way a demonstration is possible, speaking again from the beginning. Just as we seek the reason why when we grasp the fact—sometimes they actually become clear together, but it is not possible to become familiar with the reason why *before* the fact—it is clear that similarly we cannot grasp what it is to be something without grasping the fact that it is; for it is impossible to know what a [20] thing is if we are ignorant of whether it is. But as to whether it is, sometimes we grasp this accidentally, and sometimes when grasping something of the object itself—e.g. of thunder, that it is a sort of noise of the clouds; and of eclipse, that it is a sort of privation of light; and of man, that he is

a sort of animal; and of soul, that it is something moving itself.

[25] Now in cases in which we know accidentally that a thing is, necessarily we have no hold on what it is; for we do not even know that it is, and to seek what it is without grasping that it is, is to seek nothing. But in the cases in which we grasp something, it is easier. Hence in so far as we grasp that it is, to that extent we also have some hold on what it is.

So in cases in which we grasp something of what the thing is, let it be first like [30] this:—eclipse *A*, moon *C*, screening by the earth *B*. So to ask whether it is eclipsed or not is to seek whether *B* is or not. And this is no different from seeking whether there is an account of it; and if this is, we say that that is too. (Or: of which of the contradictory pair does the account hold—of its having two right angles or of its not having them?)

[35] When we discover it, we know at the same time the fact and the reason why, if it is through immediates; if not, we know the fact but not the reason why. Moon, *C*; eclipse, *A*; not being able to produce a shadow during full moon though there is nothing evident between us, *B*. Then if *B*—not being able to produce a shadow [93<sup>b</sup>1] though there is nothing evident between us—belongs to *C*, and *A*—being eclipsed—to this, then it is clear *that* it is eclipsed but not yet *why*; and we know *that* an eclipse is but we do not know *what* it is.

When it is clear that *A* belongs to *C*, then to seek why it belongs is to seek what [5] *B* is—whether screening or rotation of the moon or extinction. And this is the account of the one extreme, i.e. in this case of *A*. For an eclipse is a screening by the earth.

What is thunder? Extinction of fire in cloud. Why does it thunder? Because the fire in the cloud is extinguished. Cloud *C*, thunder *A*, extinction of fire *B*. Thus *B* [10] belongs to *C*, the cloud (for the fire is extinguished in it); and *A*, noise, to this; and *B* is indeed an account of *A*, the first extreme. And if again there is another middle term for this, it will be from among the remaining accounts.

[15] We have said, then, how what a thing is grasped and becomes familiar, hence no deduction and no demonstration of what a thing is comes about—yet it is clear through deduction and through demonstration. Hence without a demonstration you cannot become aware of what a thing is (in cases where the explanation is something else), yet there is no demonstration of it (as we said when we went [20] through the puzzles).

others there is not. Hence it is clear that in some cases what a thing is is immediate and a principle; and here one must suppose, or make apparent in some other way, both [25] that they are and what they are (which the arithmetician does; for he supposes both what the unit is and that it is); but in those cases which have a middle term and for which something else is explanatory of their substance, one can, as we said, make them clear through a demonstration, but not by demonstrating what they are.

10 · Since a definition is said to be an account of what a thing is, it is evident [30] that one type will be an account of what the name, or a different name-like account, signifies—e.g. what triangle signifies. And when we grasp that this is, we seek why it is; but it is difficult to grasp in this way why a thing is if we do not know that it is. The explanation of the difficulty has been stated already—that we do not even know whether it is or not, except accidentally. (An account is a unity in two [35] ways—either by connection, like the *Iliad*, or by making one thing clear of one thing non-accidentally.)

Thus one definition of definition is the one stated; another definition is an account which makes clear why a thing is. Hence the former type of definition signifies but does not prove, whereas the latter evidently will be a sort of [94<sup>a</sup>1] demonstration of what a thing is, differing in position from the demonstration. For there is a difference between saying why it thunders and what thunder is; for in the one case you will say: Because the fire is extinguished in the clouds. What is thunder?—A noise of fire being extinguished in the clouds. Hence the same account [5] is put in a different way, and in *this* way it is a continuous demonstration, in *this* way a definition.

Again, a definition of thunder is noise in the clouds; and this is a conclusion of the demonstration of what it is.

The definition of immediates is an undemonstrable positing of what they are. [10]

One definition, therefore, is an undemonstrable account of what a thing is; one is a deduction of what it is, differing in aspect from the demonstration; a third is a conclusion of the demonstration of what it is.

So it is evident from what has been said, both in what way there is a demonstration of what a thing is, and in what way there is not; and in what cases [15] there is and in what cases there is not; and again in how many ways something is called a definition, and in what way it proves what a thing is and in what way it does not, and in what cases it does and

in what cases it does not; and again how it is related to demonstration and in what way it is possible for them to be of the same thing and in what way it is not possible.

**11** · Since we think we understand when we know the explanation, and there [20] are four types of explanation (one, what it is to be a thing; one, that if certain things hold it is necessary that this does; another, what initiated the change; and fourth, the aim), all these are proved through the middle term.

The case in which if something holds it is necessary that this does, does not occur if one proposition is assumed, but only if at least two are; and this occurs when [25] they have one middle term. So when this one thing is assumed it is necessary for the conclusion to hold. It is clear too as follows: Why is the angle in the semicircle right? It is right if *what* holds? Well, let right be *A*; half of two rights *B*; the angle in the semicircle *C*. Thus *B* is the explanation of why *A*, right, belongs to *C*, the angle in [30] the semicircle. For this is equal to *A* and *C* to *B*; for it is half of two rights. So if *B*, half of two rights, holds, then *A* belongs to *C* (that is, the angle in the semicircle is right). And what it is to be it is the same as this, since this is what its account signifies.

And the middle term has also been proved to be explanatory of what it is to be [35] something.<sup>43</sup>

And why did the Persian war come upon the Athenians? What is the explanation of the Athenians' being warred upon? Because they attacked Sardis [94<sup>b</sup>1] with the Eretrians; for that initiated the change. War, *A*; being the first to attack, *B*; Athenians, *C*. Thus *B* belongs to *C* (being the first to attack to the Athenians), and *A* to *B* (for men make war on those who have first done them wrong). Therefore *A* [5] belongs to *B* (being warred upon to those who first began), and this—*B*—to the Athenians (for they first began). Therefore here too the explanation, what initiated the change, is a middle term.

In cases in which the aim is explanatory—e.g. why does he walk about? In order to be healthy. Why is there a house? In order that his belongings may be [10] preserved—in the one case with the aim of being healthy, in the other with the aim of their being preserved. (Why must he walk about after dinner? and With what aim must he? do not differ.) Walk after dinner, *C*; the foodstuffs' not remaining on the surface, *B*; being healthy, *A*. Well, let there belong to walking about after [15] dinner, making the foodstuffs not to remain on the surface at the mouth



of the stomach; and let this be healthy. For *B*, the foodstuffs' not remaining on the surface, seems to belong to walking about, *C*; and *A*, healthy, to this. So what is explanatory—the aim—for *C* of *A*'s belonging to it?—*B*, their not remaining on the [20] surface. And this is as it were an account of it; for *A* will be set out in this way. Why is *B* explanatory for *C*? Because this, being in such a state, is what being healthy is. (One must transpose the accounts, and in this way everything will be more evident.)

Here the events are the other way about from those in the case of explanations [25] in respect of change; for there the middle term must come about first, but here *C*, the last term, comes about first, and the final term to come about is the aim.

It is possible for the same thing to be the case both with some aim and from necessity—e.g. the light through the lantern; for the finer body passes through the [30] larger pores both from necessity (if light comes about by passing through), and with some aim (in order that we shan't stumble).

Now if it is possible for something to be the case in this way, is it also possible for something to come about thus? E.g. if it thunders: when the fire is extinguished, it is necessary for it to sizzle and make a noise, and also (if things are as the Pythagoreans say) it has the aim of threatening those in Hell in order to make them afraid.

[35] There are very many things of this sort, especially among things which are constituted by nature or are being so constituted; for one nature makes them with some aim and another from necessity. (Necessity is twofold: one, in accordance with [95<sup>a</sup>1] nature and impulse; the other, by force and<sup>44</sup> contrary to impulse—e.g. a stone travels both upwards and downwards from necessity, but not because of the same necessity.) Among the products of thought, some never occur spontaneously—e.g. a [5] house or a statute—nor from necessity either, but with some aim; but others occur by chance too—e.g. health and preservation. But it is especially among things which can be both thus and otherwise, when their coming about, not being by chance, is such that the end is good, that things come about with some aim, and then either by nature or by skill, but by change nothing comes about with any aim.

12 · The same thing is explanatory for what is coming about and what has [10] come about and what will be as for what is the case (for the middle term is explanatory)—except that for what is the case, it is the

case; for what is coming about, it is coming about; for what has come about, it has come about; and for what will be, it will be.

E.g. why has an eclipse come about? Because the earth has come to be in the middle. And it *is* coming about because it *is* coming to be there; and it will be because it will be in the middle; and it is because it is. [15]

What is ice? Well, assume that it is solidified water. Water, C; solidified, A; the explanatory middle term *B*—utter lack of heat. Thus *B* belongs to C, and being solidified, A, to this. And ice is coming about if *B* is coming about; and it has come about if it has come about; and it will be if it will be. [20]

Now what is explanatory in this way and what is explanatory of come about together when they come about, and are the case together when they are; and similarly for having come about and going to be. But what of things that do not go together—can it be that in continuous time, as it seems to us, one should be [25] explanatory of another? something else that has come about of the fact that this has come about, and something else that will be of the fact that this will be, and of the fact that this is coming about something that came to be before?

Well, the deduction proceeds from what has come about later (but the principle of these things is actually what has come about—and similarly in the case of what is coming about), and it does not proceed from what is earlier (e.g. since this [30] has come about, that this has come about later). And similarly for what will be the case. For whether the time is indeterminate or determined it will not be the case that since it is true to say that this has come about it is true to say that this, the later thing, has come about. For in between it will be false to say this, when the one has already come about. And the same account also goes for what will be the case. [35]

Neither can one deduce that since this has come about this will be. For the middle term must be coeval—something that came about for what came about, something that will be for what will be, something that is coming about for what is coming about, something that is for what is; but it is not possible for anything to be coeval with “it has come about” and “it will be”.

Again, the time in between can be neither determinate or determined; for it [95<sup>b</sup>1] will be false to say it in between.

We must inquire what it is that holds things together so that after what *has* come about there are objects that *are* coming about. Or is it clear that what is coming about is *not* next to what has come about? For

neither is what came about next to what came about; for they are limits and atomic. So just as points are not [5] next to one another, neither are things that came about; for both are indivisible. Thus neither is what is coming about next to what has come about, for the same reason; for what is coming about is divisible, but what has come about is indivisible. So just as a line is related to a point, in the same way what is coming about is related [10] to what has come about; for infinitely many things that have come about inhere in what is coming about.

But we must speak more clearly about this in our general account of change.

Now as to the character of the explanatory middle term when events occur [15] consecutively, let this much be assumed. For here too it is necessary for the middle and the first term to be immediate.

E.g. *A* has come about since *C* has come about (*C* has come about later, *A* before; but *C* is the principle since it is nearer to the present, which is the principle of time); and *C* has come about if *D* has come about. Thus if *D* has come about it is [20] necessary that *A* has come about; and *C* is the explanation—for if *D* came about it is necessary that *C* has come about, and if *C* has come about it is necessary that *A* has come about earlier.

If we take things in this way, will the middle term come to a stop anywhere at an immediate, or will there always be something falling in between because of the infinite nature of the past? For what has come about is not next to what has come about, as has been said. But nevertheless it is necessary to *begin* from something [25] that is immediate and first from the present.

The same goes too for “it will be”. For if it is true to say that *D* will be, then necessarily it was earlier true to say that *A* will be. And *C* is explanatory of this; for if *D* will be, *C* will be earlier; and if *C* will be, *A* will be earlier. And similarly the [30] division is infinite in these cases too; for things that will be are not next to one another. But in these cases too an immediate principle must be got.

And it is like this in actual cases—if a house has come about it is necessary for stones to have been cut and to have come about. Why is this? Because it is necessary for a foundation to have come about if a house has come about; and if a foundation [35] has come about, it is necessary for stones to have come about earlier.

Again, if there is going to be a house, in the same way there will be stones earlier. It is proved similarly through the middle term; for there

will be a foundation earlier.

Since we see that among the things that come about there is a sort of circular coming about, it is possible for this to be the case if the middle term and the extremes follow one another; for in these cases there is conversion (this has been [96<sup>a</sup>1] proved in our first chapters<sup>45</sup> because the conclusions convert; and this is what being circular is.

In actual cases it appears as follows: if the earth is soaked, necessarily steam came about; and if that came about, cloud; and if that came about, water: and if [5] that came about, it is necessary for the earth to be soaked. But this was what we started from; so that it has come round in a circle—for if any whatever of them is the case, another is; and if that, another; and if that, the first.

Some things come about universally (for always and in every case either it holds or it comes about in this way), others not always but for the most part—e.g. not every male man has hair on his chin, but for the most part they do. Well, in such [10] cases it is necessary for the middle term also to hold for the most part. For if *A* is predicated universally of *B* and this universally of *C*, it is necessary for *A* to be predicated of *C* always and in every case; for that is what the universal is—what holds in every case and always. But it was supposed to hold for the most part. [15] Therefore it is necessary for the middle term, *B*, also to hold for the most part. There will be immediate principles, then, also in the case of what is for the most part, which hold or come about in this way for the most part.

**13** · Now we have already said how what a thing is is set out in the terms, [20] and in what way there is or is not demonstration or definition of it; let us now say how one should hunt out what is predicated in what a thing is.

Well, of the things which belong always to something, some extend further—yet not outside its genus. (I say they belong further if they belong to the thing [25] universally but also belong to something else.) E.g. there is something which belongs to every triplet but also to non-triplets—as being belongs to the triplet but also to non-numbers, but odd both belongs to every triplet and belongs further (for [30] it also belongs to the quintuplet), but not outside its genus; for the quintuplet is a number, and nothing outside number is odd.

Well, such things must be taken up to the first point at which just so many are taken that each will belong further but all of them together will not belong further; for necessarily this will be the substance of the object.

E.g. number belongs to every triplet, and so do odd, prime (in both [35] ways—both as not being measured by number and as not being compounded from numbers). This, then, is precisely what a triplet is: a number that is odd, prime, and prime in *this* way. For each of these belongs in some cases to all the odds as well and in the last case to pairs as well—but all of them together belong to nothing other than the [96<sup>b1</sup>] triplet.

Since we have made clear above<sup>46</sup> that what is predicated in what a thing is is necessary<sup>47</sup> (and what is universal is necessary), and in the case of the triplet (and of anything else for which we take terms in this way) what is taken is in what it is, in this way a triplet will be these things from necessity. [5]

And that they constitute its substance is clear from this: necessarily, if this is not what being a triplet is, it is some sort of genus, either named or nameless. It will, then, belong further than to the triplet—for let it be supposed that a genus is such as potentially to belong further. Then if it belongs to nothing other than the atomic [10] triplets, this will be what being a triplet is—for let this too be supposed, that the substance of a thing is the last such predication to hold of the atoms. Hence in the case of anything else proved in this way, the same will go for what being it is.

When you are dealing with some whole, you should divide the genus into what [15] is atomic in species—the primitives—(e.g. number into triplet and pair); then in this way attempt to get definitions of these (e.g. of straight line and circle and right angle); and after that, grasping what the genus is (e.g. whether it is a quantity or a [20] quality), consider the proper affections through the first common items.

For what holds for what is compounded from the atoms will be clear from the definitions, because definitions and what is simple are principles of everything, and what holds belongs in themselves to the simples alone, and to the other things in virtue of them.

[25] Divisions made according to the differentiae are useful for this sort of pursuit: while the sense in which they prove has been discussed earlier,<sup>48</sup> they will be useful for deducing what a thing is only as follows.

Yet they might seem to be of no use, but to assume everything straight off—just as if one were to assume it from the beginning without the division. But it [30] makes a difference which of the predicates are predicated first and which later—e.g. to say *animal tame two-footed* or *two-footed animal tame*. For if everything depends on two things and *animal tame* is a single thing, and again man (or whatever the single thing

in question may be) depends on this and the [35] differentia, then it is necessary to postulate by dividing.

Again, only in this way is it possible to ensure that you leave nothing out in what the thing is. For when the first genus has been taken, if you take one of the lower divisions not everything will fall into it—e.g. not every animal is either whole-winged or split-winged, but every *winged* animal (for it is *this* of which it is a [97<sup>a</sup>1] differentia). The first differentia of animal is that into which every animal falls; and similarly of each of the others, both the genera outside it and those under it—e.g. the first differentia of bird is that into which every bird falls, and of fish, that into which every fish.

[5] Now if you proceed in this way you can know that nothing has been left out; but in any other way you will of necessity both leave something out and not know it.

There is no need for one who is defining and dividing to know everything there is. Yet some say that it is impossible to know a thing's differences from something without knowing that thing; but that without the differences one cannot know that [10] thing—for it is the same as that from which it does not differ and different from that from which it does differ.

Now, first, this is false; for a thing is not different in virtue of every difference; for many differences belong to things that are the same species—though not in respect of their substance, nor in themselves.

Next, when you assume the opposites and the differentia and that everything [15] falls here or here, and assume that what you are seeking is in one of them, and are aware of this, it makes no difference whether you know or do not know the other things of which the differentiae are predicated. For it is evident that if, proceeding in this way, you come to things of which there is no longer a differentia, you will [20] have the account of its substance. (And that everything falls into the division—if they are opposites which have nothing between them—is not a postulate; for it is necessary for everything to be in one of them, if it is a differentia of that thing.)

To establish a definition through divisions, one must aim for three things—grasping what is predicated in what the thing is, ordering these as first or second, [25] and ensuring that these are all there are.

The first one of these is achieved through being able to establish conclusions through the genus, just as in the case of accidentals one can deduce that they belong.<sup>49</sup>

And ordering them as one should will be achieved if you take the first term; and this will be achieved by taking the one which follows all the others but is not followed by them all (for of necessity there will be some such term). And when this [30] is taken the same now goes for the lower terms; for second will be that which is first of the others, and third that which is first of the next; for if the upmost one is abstracted, the next will be first of the others. And similarly in the other cases too.

And that these are all there are is evident; for you assume of the first term in [35] the division that every animal is either this or this, and that this belongs to it, and again you take the differentia of this whole, and you assume that there is no further differentia of the final whole—or that straightaway after the final differentia this no longer differs in species from the complex. For it is clear both that nothing extra has been posited (for all of these terms have been taken in what the thing is) and [97<sup>b</sup>1] that nothing is missing (for it would be either a genus or a differentia: now both the first term, and this taken together with the differentiae, constitute the genus; and the differentiae are all grasped—for there is no later one left; for then the final term [5] would differ in species, but it has been said not to differ).

We should look at what are similar and undifferentiated, and seek, first, what they all have that is the same; next, we should do this again for other things which are of the same genus as the first set and of the same species as one another but of a [10] different species from those. And when we have grasped what all these have that is the same, and similarly for the others, then we must again inquire if what we have grasped have anything that is the same—until we come to a single account; for this will be the definition of the object. And if we come not to one but to two or more accounts, it is clear that what we are seeking is not a single thing but several. [15]

I mean, e.g., if we were to seek what pride is we should inquire, in the case of some proud men we know, what one thing they all have as such. E.g. if Alcibiades is proud, and Achilles and Ajax, what one thing do they all have? Intolerance of insults; for one made war, one waxed wroth, and the other killed himself. Again in [20] the case of others, e.g. Lysander and Socrates. Well, if here it is being indifferent to good and bad fortune, I take these two things and inquire what both indifference to fortune and not brooking dishonour have that is the same. And if there is nothing, then there will be two sorts of pride.

Every definition is always universal; for the doctor does not say what is healthy [25] in the case of some individual eye, but either in the case

of every eye, or determining some species of eye.

And it is easier to define the particular than the universal—that is why one should cross from the particulars to the universals. For homonymies escape notice in [30] what is universal more than in what is undifferentiated.

Just as in demonstrations a *deduction* must have been made, so in definitions there must be clarity. And this will be achieved if, through the stated<sup>50</sup> particulars, one can define separately for each genus (e.g. if one defines similarity not for every [35] case but for colour and for shape, and sharpness for sound), and can then proceed in this way to what is common, taking care not to fall into homonymy.

And if one should not argue in metaphors, it is clear too that one should not define either by metaphors or what is said in metaphors; for then one will necessarily argue in metaphors.

[98<sup>a</sup>1] **14** · In order to grasp problems, one should excerpt both the anatomies and the divisions; and in this way, laying down the genus common to all the subject-matter, one should excerpt (if e.g. animals are under consideration) whatever [5] belongs to every animal; and having got this, again excerpt whatever follows every case of the first of the remaining terms (e.g. if it is bird, whatever follows every bird), and always excerpt in this way whatever follows the nearest term. For it is clear that we shall now be in a position to state the reason why what follows the items under the common genus belongs to them—e.g. why it belongs to man or to [10] horse. Let *A* be animal, *B* what follows every animal, and *C*, *D*, *E* individual animals. Well, it is clear why *B* belongs to *D*; for it does so because of *A*. Similarly in the other cases too. and the same account will always hold for the others.<sup>51</sup>

Now at present we argue in terms of the common names that have been handed down; but we must not only inquire in these cases, but also if anything else [15] has been seen to belong in common, we must extract that and then inquire what it follows and what follows it—e.g. having a manyplies and not having upper incisors follow having horns; again, we should inquire what having horns follows. For it is clear why what we have mentioned will belong to them; for it will belong because they have horns.

[20] Again, another way is excerpting in virtue of analogy; for you cannot get one identical thing which pounce and spine and bone should be called; but there will be things that follow them too, as though there



were some single nature of this sort.

**15** · Problems are the same in some cases through having the same middle [25] term, e.g. because they are all cases of reciprocity. And of these some are the same in genus—those which have differences through holding of different things or in different ways: e.g. Why does it echo? or Why is it mirrored? and Why is there a rainbow?—for all these are the same problem in genus (for they are all cases of reflection), but different in species.

[30] Other problems differ in that the middle term of the one is under the other middle term; e.g. Why does the Nile flow more at the end of the month? Because the end of the month is more stormy. And why is the end more stormy? Because the moon is waning. For these are related in this way to one another.

**16** · About explanations and what they are explanatory of, one might puzzle [35] whether when the explanandum belongs to something the explanation belongs too. E.g. if it sheds its leaves or if it suffers eclipse, will the explanation of the eclipse or the shedding also hold—if this is, e.g. having broad leaves, and (for the eclipse) the [98<sup>b</sup>1] earth's being in the middle? For if they do not hold, something else will be explanatory of them. And if the explanation belongs to it, does the explanandum also belong at the same time? e.g. if the earth is in the middle, it suffers eclipse; or if it is broad-leaved, it sheds its leaves.

If this is so, they will hold at the same time and will be proved through one [5] another. For let shedding leaves be *A*, broad-leaved *B*, vine *C*. Well, if *A* belongs to *B* (for everything broad-leaved sheds its leaves) and *B* belongs to *C* (for every vine is broad-leaved), then *A* belongs to *C* and every vine sheds its leaves. *B*, the middle [10] term, is explanatory. But one can also demonstrate that the vine is broad-leaved through the fact that it sheds its leaves. For let *D* be broad-leaved, *E* shedding leaves, *F* vine. Well, *E* belongs to *F* (for every vine sheds its leaves) and *D* to *E* (for everything that sheds its leaves is broad-leaved); therefore vine is broad-leaved. [15] Shedding its leaves is explanatory.

But if it is not possible for things to be explanatory of one another (for the explanation is prior to what it is explanatory of), and the earth's being in the middle is explanatory of the eclipse, but the eclipse is not explanatory of the earth's being in the middle—so if the demonstration

through the explanation gives the reason *why*, and the one not through the explanation gives the fact, you know *that* it is in the [20] middle but not *why*. And that the eclipse is not explanatory of its being in the middle but the latter of the eclipse is evident; for its being in the middle belongs in the account of the eclipse; so that it is clear that the latter becomes familiar through the former and not the former through the latter.

Or is it possible for there to be several explanations of one thing? For if the [25] same thing can be predicated of several things primitively—let *A* belong to *B* primitively and to another term, *C*, primitively; and these to *D*, *E*. Therefore *A* will belong to *D*, *E*; and *B* is explanatory for *D*, and *C* for *E*. Hence when the explanation belongs, it is necessary for the object to belong; but when the object belongs it is not [30] necessary for everything which is explanatory to belong—something, yet not everything, explanatory must belong.

Or if problems are always universal, must the explanation be some whole and what it is explanatory of universal? E.g. shedding leaves is determined to some whole, even if that has species, and it belongs to *these* universally (either plants or plants of such and such a sort); hence in these cases the middle term and what it is [35] explanatory of must be equal and convert. E.g. why do trees shed their leaves? Well, if it is because of solidification of their moisture, then if a tree sheds its leaves solidification must belong to it, and if solidification belongs—not to anything whatever but to a tree—it must shed its leaves.

[99<sup>a</sup>1] **17** · Is it possible for there not to be the same explanation of the same thing for every case, but a different one? or not? Perhaps if it has been demonstrated in itself and not in virtue of a sign or accidentally it is not possible (for the middle term is the account of the extreme), but if it has not been demonstrated in this way, it is [5] possible? One can inquire accidentally both about what it is explanatory of and about what it is explanatory for—but these do not seem to be problems. Otherwise, the middle term will have a similar character—if they are homonymous, the middle will be homonymous; if they are in a genus, it will have a similar character.

E.g. why do proportionals alternate? For the explanation in the cases of lines [10] and of numbers is different—and the same: as lines it is different, as having such and such an increase it is the same. And so in all cases.

The explanation of a colour's being similar to a colour and a figure to

a figure is different in the different cases. For what is similar is homonymous in these cases; for here it is presumably having proportionate sides and equal angles, but in the [15] case of colours it is that perception of them is single, or something else of that sort.

And things which are the same by analogy will have their middle term the same by analogy too.

The explanation and what it is explanatory of and what it is explanatory for are interrelated like this: taking them severally, what it is explanatory of extends further (e.g. having external angles equal to four right angles extends further than [20] either triangle or quadrangle), but for all of them together it extends equally (for they comprise everything that has external angles equal to four right angles); and similarly for the middle term. (But the middle term is an account of the first extreme: that is why all the sciences come about through definition.)

E.g. shedding leaves follows together with the vine and exceeds it; and with the fig, and exceeds it—but not all of them, but it is equal.

[25] Thus if you were to take the primitive middle term, it is an account of shedding leaves. For there will be a middle term in the other direction (that all are *such and such*); and then a middle for this (that the sap solidifies or something else of that sort). What is shedding leaves? The solidifying of the sap at the connection of the seed.

[30] Schematically it will come out as follows for anyone seeking the interrelation between the explanation and what it is explanatory of: Let *A* belong to every *B*, and *B* to each of the *D*'s, and further. Thus *B* will hold universally of the *D*'s (for I call universal that with which they do not convert, and primitive universal that with [35] which severally they do not convert but taken all together they do convert and extend alongside). Thus *B* is explanatory of *A* for the *D*'s. Therefore *A* must extend alongside further than *B*; for if it does not, why will this be explanatory rather than that?

Well, if *A* belongs to all the *E*'s, all of them together will be some one thing different from *B*. For if not, how will one be able to say that *A* belongs to everything [99<sup>b</sup>1] to which *E* belongs but *E* does not belong to everything to which *A* belongs? For why will there not be some explanation, as of its belonging to all the *D*'s? (But *will* the *DE*'s be some one thing? We must inquire into this; let it be *C*.)

Thus it is possible for there to be several explanations of the same thing, but not for things of the same species—e.g. the explanation of longevity for quadrupeds [5] is their not having bile, but for birds their

being dry or something else.

18 · If they do not come at once to what is atomic and there is not only one middle term but several, the explanations too are several. But which of the middle terms is explanatory for the particulars—that which is primitive in the direction of the universal or that which is primitive in the direction of the particular? Well, it is [10] clear that it is the one nearest to what it is explanatory for. For this explains why the primitive term belongs under the universal—i.e. *C* is explanatory for *D* of *B*'s belonging to it. So for *D* *C* is explanatory of *A*, and for *C* *B*, and for this itself.

19 · Now as for deduction and demonstration, it is evident both what each is [15] and how it comes about—and at the same time this goes for demonstrative understanding too (for that is the same thing). But as for the principles—how they become familiar and what is the state that becomes familiar with them—that will be clear from what follows, when we have first set down the puzzles.

Now, we have said earlier that it is not possible to understand through [20] demonstration if we are not aware of the primitive, immediate, principles. But as to knowledge of the immediates, one might puzzle both whether it is the same or not the same—whether there is understanding of each, or rather understanding of the one and some other kind of thing of the other—and also whether the states are not present in us but come about in us, or whether they are present in us but escape [25] notice.

Well, if we have them, it is absurd; for it results that we have pieces of knowledge more precise than demonstration and yet this escapes notice. But if we get them without having them earlier, how might we become familiar with them and learn them from no pre-existing knowledge? For that is impossible, as we said in the case of demonstration too. It is evidently impossible, then, both for us to have [30] them and for them to come about in us when we are ignorant and have no such state at all. Necessarily, therefore, we have some capacity, but do not have one of a type which will be more valuable than these in respect of precision.

And *this* evidently belongs to all animals; for they have a connate discriminatory [35] capacity, which is called perception. And if

perception is present in them, in some animals retention of the percept comes about, but in others it does not come about. Now for those in which it does not come about, there is no knowledge outside perceiving (either none at all, or none with regard to that of which there is no retention); but for some<sup>52</sup> perceivers, it is possible to grasp it in their minds. And when many such things come about, then a difference comes about, so that some [100<sup>a</sup>1] come to have an account from the retention of such things, and others do not.

So from perception there comes memory, as we call it, and from memory (when it occurs often in connection with the same thing), experience; for memories [5] that are many in number from a single experience. And from experience, or from the whole universal that has come to rest in the soul (the one apart from the many, whatever is one and the same in all those things), there comes a principle of skill and of understanding—of skill if it deals with how things come about, of understanding if it deals with what is the case.

[10] Thus the states neither belong in us in a determinate form, nor come about from other states that are more cognitive; but they come about from perception—as in a battle when a rout occurs, if one man makes a stand another does and then another, until a position of strength<sup>53</sup> is reached. And the soul is such as to be capable of undergoing this.

[15] What we have just said but not said clearly, let us say again: when one of the undifferentiated things makes a stand, there is a primitive universal in the mind (for though one perceives the particular, perception is of the universal—e.g. of man but [100<sup>b</sup>1] not of Callias the man); again a stand is made in these, until what has no parts and is universal stands—e.g. *such and such* an animal stands, until animal does, and in this a stand is made in the same way. Thus it is clear that it is necessary for us to become familiar with the primitives by induction; for perception too<sup>54</sup> instils the [5] universal in this way.

Since of the intellectual states by which we grasp truth some are always true and some admit falsehood (e.g. opinion and reasoning—whereas understanding and comprehension are always true), and no kind other than comprehension is more precise than understanding, and the principles of demonstrations are more familiar, [10] and all understanding involves an account—there will not be understanding of the principles; and since it is not possible for anything to be truer than understanding, except comprehension, there will be comprehension of the principles—both if we inquire from these facts and because

demonstration is not a principle of demonstration so that understanding is not a principle of understanding either—so if we have [15] no other true kind apart from understanding, comprehension will be the principle of understanding. And the principle will be of the principle, and understanding as a whole will be similarly related to the whole object.

<sup>1</sup>See Plato, *Meno* 80D.

<sup>2</sup>Reading ἀντιφάσεως for the MSS ἀποφάνσεως.

<sup>3</sup>Reading ὅ τι for ὅτι.

<sup>4</sup>I excise this sentence.

<sup>5</sup>Reading ἄλλως for ὅλως.

<sup>6</sup>*Prior Analytics* I 25, 41<sup>b</sup>36–42<sup>a</sup>40.

<sup>7</sup>*Prior Analytics* 11 5–7.

<sup>8</sup>Reading λευκόν with most MSS., for Ross's τὸ λευκὸν ἢ λευκόνά.

<sup>9</sup>Reading καθόλου τρίγωνον with most MSS., for Ross's καθ' ὅλου τριγώνου.

<sup>10</sup>Retaining ἀναγκαῖον with the MSS., for Ross's ἀναγκαίου.

<sup>11</sup>Reading ἢ μή, with most MSS., for Ross's ἢμῖν.

<sup>12</sup>See esp. 78<sup>b</sup>34–79<sup>a</sup>16.

<sup>13</sup>Reading ὅτε μὲν ἔσται ὅτε δ'οὐκ ἔσται τὰ ἐφ' ὧν.

<sup>14</sup>Omitting ἢ.

<sup>15</sup>Reading λέγονται with the MSS., for Ross's λέγεται.

<sup>16</sup>Omitting πᾶν.

<sup>17</sup>Retaining γάρ.

<sup>18</sup>*Prior Analytics* II 15.

<sup>19</sup>Reading ὧν ἢ δείκνυται ... ἢ ἐκ τῶν ... for ὧν δείκνυται ... ἢ ἅ ἐκ τῶν ...

<sup>20</sup>The reference may be to Antiphanes' comedy: see *Poetics* 1457<sup>b</sup>21.

<sup>21</sup>Retaining ΑΓ.

<sup>22</sup>Retaining ΑΓ.

<sup>23</sup>Retaining ΓΑ.

<sup>24</sup>Ross excises this sentence.

<sup>25</sup>Retaining λευκόν.

<sup>26</sup>Reading εἴ τ' ... ἐπ' ... for εἴτ' ... εἴτ' ...

<sup>27</sup>Reading ἀλλ' αὐτὸ ἄλλοις for ἀλλ' αὐτὸ ἄλλου καὶ τοῦτο καθ' ἑτέρου.

<sup>28</sup>Omitting ταῦτα καί.

<sup>29</sup>Omitting πρότασις ἄμεσος.

<sup>30</sup>Omitting ὅτι.

<sup>31</sup>Reading τό for τήν.

<sup>32</sup>Reading ΒΓ καὶ ΑΒ.

<sup>33</sup>'Comprehension' here translates νόησις; later it is also used to translate νοῦς.

<sup>34</sup>Reading καὶ εἰ τό for καίει τῷ.

<sup>35</sup>Reading τούτου with the MSS., for Ross's τοῦτο.

<sup>36</sup>Reading ἀληθὲς ἦν for ἀληθές.

<sup>37</sup>See *Prior Analytics* I 31.

<sup>38</sup>Reading εἴτ' for εἴτ'.

<sup>39</sup>The text of the bracketed passage is intelligible as it stands, but it does not fit the context.

<sup>40</sup>Reading τῷ δ' ἐναντίῳ τὸ τῷ ἐναντίῳ with the MSS., for Ross's τὸ δ' ἐναντίῳ τὸ τῷ ἐναντίῳ ἐναντίῳ.

<sup>41</sup>Reading τί ἐστίν; ἢ ... for Ross's ἢ τί ἔστι ....

<sup>42</sup>Reading τό for τι.

<sup>43</sup>Reading τοῦ τί ἦν εἶναι for τὸ τί ἦν εἶναι, and omitting Ross's ὄν.

<sup>44</sup>Reading καί for ἢ.

<sup>45</sup>See I 3, 73<sup>a</sup>6–20.

<sup>46</sup>See I 4.

<sup>47</sup>Reading ἀναγκαῖα, with the MSS., for Ross's καθόλου.

<sup>48</sup>See [Chapter 5](#).



<sup>49</sup>Aristotle alludes to the methods of the *Topics*: on genera see esp. *Topics* IV.

<sup>50</sup>Reading εἰρημένων with the MSS. for Ross's εἰλημμένων.

<sup>51</sup>Reading ἄλλων for κάτω.

<sup>52</sup>Reading ἐνιοῖς δ' ἐστὶν αἰσθανομένοις for ἐν οἷς δ' ἔνεστιν αἰσθομένοις.

<sup>53</sup>Reading ἀλκὴν for ἀρχήν.

<sup>54</sup>Reading καὶ for ἢ.

# TOPICS\*\*

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## BOOK I [100<sup>a</sup>20]

1 · Our treatise proposes to find a line of inquiry whereby we shall be able to reason from reputable opinions about any subject presented to us, and also shall ourselves, when putting forward an argument, avoid saying anything contrary to it. First, then, we must say what deduction is, and what its varieties are, in order to grasp dialectical deduction; for this is the object of our search in the treatise before us.

Now a deduction is an argument in which, certain things being laid down, [25] something other than these necessarily comes about through them. It is a demonstration, when the premisses from which the deduction starts are true and primitive, or are such that our knowledge of them has originally come through premisses which are primitive and true; and it is a dialectical deduction, if it reasons from reputable opinions. Things are true and primitive which are convincing on the [30] strength not of anything else but of themselves; for in regard to the first principles of science it is improper to ask any further for the why and wherefore of them; each of the first principles should command belief in and by itself. On the other hand, those [100<sup>b</sup>20] opinions are reputable which are accepted by everyone or by the majority or by the wise—i.e. by all, or by the majority, or by the most notable and reputable of them. Again, a deduction is contentious if it starts from opinions that seem to be reputable, but are not really such, or again if it merely seems to reason from opinions that are or seem to be reputable. For not every opinion that seems to be [25] reputable actually is reputable. For none of the opinions which we call reputable show their character entirely on the surface, as happens in the case of the principles of contentious arguments; for the nature of the falsity in these is obvious immediately, and for the most part even to persons with little power of comprehension. So then, of the

contentious deductions mentioned, the former really deserves to [101<sup>a</sup>1] be called deduction, but the other should be called contentious deduction, but not deduction, since it appears to deduce, but does not really do so.

Further, besides all the deductions we have mentioned there are the fallacies [5] that start from the premisses peculiar to the special sciences, as happens (for example) in the case of geometry and its sister sciences. For this form of reasoning appears to differ from the deductions mentioned above; the man who draws a false [10] figure reasons from things that are neither true and primitive, nor yet reputable. For he does not fall within the definition: he does not assume opinions that are received either by everyone or by the majority or by the wise—that is to say, by all, or by most, or by the most reputable of them—but he conducts his deduction upon assumptions which, though appropriate to the science in question, are not true; for [15] he effects his fallacy either by describing the semicircles wrongly or by drawing certain lines in a way in which they should not be drawn.

The foregoing must stand for an outline survey of the species of deduction. In general, in regard both to all that we have already discussed and to those which we [20] shall discuss later, we may remark that that amount of distinction between them may serve, because it is not our purpose to give a precise definition of any of them; we merely want to describe them in outline: we consider it quite enough from the point of view of the line of inquiry before us to be able to recognize each of them in some sort of way.

[25] **2** · Next in order after the foregoing, we must say for how many and for what purposes the treatise is useful. They are three—intellectual training, casual encounters, and the philosophical sciences. That it is useful as a training is obvious on the face of it. The possession of a plan of inquiry will enable us more easily to [30] argue about the subject proposed. For purposes of casual encounters, it is useful because when we have counted up the opinions held by most people, we shall meet them on the ground not of other people's convictions but of their own, shifting the ground of any argument that they appear to us to state unsoundly. For the study of [35] the philosophical sciences it is useful, because the ability to puzzle on both sides of a subject will make us detect more easily the truth and error about the several points that arise. It has a further use in relation to the principles used in the several sciences. For it is impossible to discuss them at all from the principles proper to the

particular science in hand, seeing that the principles are primitive in relation to [101<sup>b</sup>1] everything else: it is through reputable opinions about them that these have to be discussed, and this task belongs properly, or most appropriately, to dialectic; for dialectic is a process of criticism wherein lies the path to the principles of all inquiries.

[5] 3 · We shall be in perfect possession of the way to proceed when we are in a position like that which we occupy in regard to rhetoric and medicine and faculties of that kind; [this means the doing of that which we choose with the materials that are available.]<sup>1</sup> for it is not every method that the rhetorician will employ to persuade, or the doctor to heal: still, if he omits none of the available means, we [10] shall say that his grasp of the science is adequate.

4 · First, then, we must see of what parts our inquiry consists. Now if we were to grasp with reference to how many, and what kind of, things arguments take place, and with what materials they start, and how we are to become well supplied with these, we should have sufficiently won our goal. Now the materials with which arguments start are equal in number, and are identical, with the subjects on which deductions take place. For arguments start with propositions, while the subjects on [15] which deductions take place are problems. Now every proposition and every problem indicates either a genus or a property or an accident—for the differentia too, being generic, should be ranked together with the genus. Since, however, of what is proper to anything part signifies its essence, while part does not, let us divide [20] the proper into both the aforesaid parts, and call that part which indicates the essence a definition, while of the remainder let us adopt the terminology which is generally current about these things, and speak of it as a property. What we have said, then, makes it clear that according to our present division, the elements turn out to be four, all told, namely either property or definition or genus or accident. Do [25] not let any one suppose us to mean that each of these enunciated by itself constitutes a proposition or problem, but only that it is from these that both problems and propositions are formed. The difference between a problem and a proposition is a difference in the turn of the phrase. For if it be put in this way, ‘Is two-footed terrestrial animal the definition of man?’ or ‘Is animal the genus of man?’ the result [30] is a proposition; but if thus, ‘Is two-footed terrestrial animal the definition of man or not?’ and ‘Is animal the genus of man or not?’ the result is a

problem. Similarly too in other cases. Naturally, then, problems and propositions are equal in number; for out of every proposition you will make a problem if you change the turn of phrase.

5 · We must now say what are definition, property, genus, and accident. A definition is a phrase signifying a thing's essence. It is rendered in the form either of a phrase in lieu of a name, or of a phrase in lieu of another phrase; for it is [102<sup>a</sup>1] sometimes possible to define the meaning of a phrase as well. People whose rendering consists of a term only, try it as they may, clearly do not render the definition of the thing in question, because a definition is always a phrase of a [5] certain kind. One may, however, call definitory such a remark as that the beautiful is the becoming, and likewise also of the question, 'Are perception and knowledge the same or different?'—for argument about definitions is mostly concerned with questions of sameness and difference. In a word we may call definitory everything that falls under the same branch of inquiry as definitions; and that all the [10] above-mentioned examples are of this character is clear on the face of them. For if we are able to argue that two things are the same or are different, we shall be well supplied by the same turn of argument with lines of attack upon their definitions as well; for when we have shown that they are not the same we shall have demolished the definition. But the converse of this last statement does not hold; for to show that they are the same is not enough to establish a definition. To show, however, that [15] they are not the same is enough of itself to overthrow it.

A property is something which does not indicate the essence of a thing, but yet belongs to that thing alone, and is predicated convertibly of it. Thus it is a property [20] of man to be capable of learning grammar; for if he is a man, then he is capable of learning grammar, and if he is capable of learning grammar, he is a man. For no one calls anything a property which may possibly belong to something else, e.g. sleep in the case of man, even though at a certain time it may happen to belong to him alone. [25] That is to say, if any such thing were actually to be called a property, it will be called not a property absolutely, but a temporary or a relative property; for being on the right hand side is a temporary property, while two-footed is a relative property; e.g. it is a property of man relatively to a horse and a dog. That nothing which may belong to anything else is a convertible predicate is clear; for it does not necessarily [30] follow that if something is asleep it is a man.

A genus is what is predicated in what a thing is of a number of things exhibiting differences in kind. We should treat as predicates in what a thing is all such things as it would be appropriate to mention in reply to the question, 'What is the object in question?'; as, for example, in the case of man, if asked that question, it [35] is appropriate to say 'He is an animal'. The question, 'Is one thing in the same genus as another or in a different one?' is also a generic question; for a question of that kind as well falls under the same branch of inquiry as the genus; for having argued that animal is the genus of man, and likewise also of ox, we shall have argued that [102<sup>b</sup>1] they are in the same genus; whereas if we show that it is the genus of the one but not of the other, we shall have argued that these things are not in the same genus.

An accident is something which, though it is none of the foregoing—i.e. [5] neither a definition nor a property nor a genus—yet belongs to the thing; and something which may either belong or not belong to any one and the self-same thing, as (e.g.) being seated may belong or not belong to some self-same thing. Likewise also whiteness; for there is nothing to prevent the same thing being at one [10] time white and at another not white. Of the definitions of accident the second is the better; for in the case of the first, any one is bound, if he is to understand it, to know already what definition and genus and property are, whereas the second is sufficient of itself to tell us the essential nature of the thing in question. To accident are to be [15] attached also all comparisons of things together, when expressed in language that is derived in any kind of way from accident; such as, for example, the question, 'Is the honourable or the expedient preferable?' and 'Is the life of virtue or the life of self-indulgence the pleasanter?', and any other problem which may happen to be phrased in terms like these. For in all such cases the question is 'of which of the two [20] is the predicate more properly an accident?' It is clear on the face of it that there is nothing to prevent an accident from becoming a temporary or a relative property. Thus being seated is an accident, but will be a temporary property, whenever a man is the only person sitting, while if he is not the only one sitting, it is still a property relatively to those who are not sitting. So then, there is nothing to prevent an [25] accident from becoming both a relative and a temporary property; but a property absolutely it will never be.

6 · We must not fail to observe that everything applicable to property and genus and accident will be applicable to definition as well. For when

we have shown that the content of the definition fails to belong to the subject alone, as we do in the case of a property, or that the genus rendered in the definition is not the true genus, [30] or that any of the things mentioned in the phrase used does not belong, as would be remarked in the case of an accident, we shall have demolished the definition; so that, in the sense previously described, all the points we have enumerated might in a way be called definitory. But we must not on this account expect to find a single line [35] of inquiry which will apply universally to them all; for this is not an easy thing to find, and, even were one found, it would be very obscure indeed, and of little service for the treatise before us. Rather, a special plan of inquiry must be laid down for each of the classes we have distinguished, and then, starting from what is appropriate in each case, it will be easier to make our way right through the task [103<sup>a</sup>1] before us. So then, as was said before, we must outline a division of our subject, and other questions we must relegate each to the particular branch to which it most naturally belongs, speaking of them as definitory and generic questions. The questions I mean have practically been already assigned to their several branches. [5]

7 · First of all we must determine the number of ways we talk of sameness. Sameness would be generally regarded as falling, roughly speaking, into three divisions. We generally apply the term numerically or specifically or generically—numerically in cases where there is more than one name but only one thing, e.g. doublet and cloak; specifically, where there is more than one thing, but they present [10] no differences in respect of their species, as one man and another, or one horse and another; for things like this that fall under the same species are said to be specifically the same. Similarly, too, those things are called generically the same which fall under the same genus, such as a horse and a man. It might appear that the sense in which water from the same spring is called the same water is somehow [15] different and unlike the senses mentioned above; but really such a case as this ought to be ranked in the same class with the things that in one way or another are called the same in view of unity of species. For all such things seem to be of one family and to resemble one another. For the reason why all water is said to be specifically the same as all other water is because of a certain likeness it bears to it, and the only [20] difference in the case of water drawn from the same spring is this, that the likeness is more emphatic: that is why we do not distinguish it from the things that in one way or another are called the same in view of unity of species. It seems that things numerically one

are called the same by everyone with the greatest degree of agreement. But this too is apt to be rendered in more than one sense; its most literal [25] and primary use is found whenever the sameness is rendered by a name or definition, as when a cloak is said to be the same as a doublet, or a two-footed terrestrial animal is said to be the same as a man; a second sense is when it is rendered by a property, as when what can acquire knowledge is called the same as a man, and what naturally travels upward the same as fire; while a third use is found when it is rendered in reference to some accident, as when the creature who is [30] sitting, or who is musical, is called the same as Socrates. For all these are meant to signify numerical unity. That what I have just said is true may be best seen where one form of appellation is substituted for another. For often when we give the order to call one of the people who are sitting down, indicating him by name, we change [35] our description, whenever the person to whom we give the order happens not to understand us; he will, we think, understand better from some accidental feature; so we bid him call to us the man who is sitting or who is conversing—clearly supposing ourselves to be indicating the same object by its name and by its accident.

[103<sup>b</sup>1] 8 · Of sameness then, as has been said, three types are to be distinguished. Now one way to confirm that the elements mentioned above are those out of which and through which and to which arguments proceed, is by induction; for if any one were to survey propositions and problems one by one, it would be seen that each was [5] formed either from the definition of something or from its property or from its genus or from its accident. Another way to confirm it is through deduction. For every predicate of a subject must of necessity be either convertible with its subject or not: and if it is convertible, it would be its definition or property, for if it signifies [10] the essence, it is the definition; if not, it is a property—for this was what a property is, viz. what is predicated convertibly, but does not signify the essence. If, on the other hand, it is not predicated convertibly of the thing, it either is or is not one of the terms contained in the definition of the subject; and if it is one of those terms, then it will be the genus or the differentia, inasmuch as the definition consists of [15] genus and differentiae; whereas, if it is not one of those terms, clearly it would be an accident, for accident was said to be what belongs to a subject without being either its definition or its genus or a property.



[20] 9 · Next, then, we must distinguish between the categories of predication in which the four above-mentioned are found. These are ten in number: What a thing is, Quantity, Quality, Relation, Place, Time, Position, State, Activity, Passivity. For the accident and genus and property and definition of anything will always be in one [25] of these predications; for all the propositions found through these signify either what something is or its quality or quantity or some one of the other types of predicate. It is clear, too, on the face of it that the man who signifies what something is signifies sometimes a substance, sometimes a quality, sometimes some one of the other types of predicate. For when a man is set before him and he says [30] that what is set there is a man or an animal, he states what it is and signifies a substance; but when a white colour is set before him and he says that what is set there is white or is a colour, he states what it is and signifies a quality. Likewise, also, if a magnitude of a cubit be set before him and he says that what is set there is a cubit or a magnitude, he will be describing what it is and signifying a quantity. [35] Likewise, also, in the other cases; for each of these kinds of predicate, if either it be asserted of itself, or its genus be asserted of it, signifies what something is; if, on the other hand, one kind of predicate is asserted of another kind, it does not signify what something is, but a quantity or a quality or one of the other kinds of predicate. Such, then, and so many, are the subjects on which arguments take place, and the materials with which they start. How we are to acquire them, and by what means [104<sup>a</sup>1] we are to become well supplied with them, falls next to be told.

10 · First, then, a definition must be given of a dialectical proposition and a dialectical problem. For it is not every proposition nor yet every problem that is to [5] be set down as dialectical; for no one in his senses would make a proposition of what no one holds, nor yet make a problem of what is obvious to everybody; for the latter admits of no doubt, while to the former no one would assent.

Now a dialectical proposition consists in asking something that is reputable to all men or to most men or to the wise, i.e. either to all, or to most, or to the most [10] notable of these, provided it is not paradoxical; for a man would probably assent to the view of the wise, if it be not contrary to the opinions of most men. Dialectical propositions also include views which are like those which are reputable; also propositions which contradict the contraries of opinions that are taken to be reputable,

and also all opinions that are in accordance with the recognized arts. [15] Thus, supposing it to be reputable that the knowledge of contraries is the same, it might probably pass for reputable also that the perception of contraries is the same; also, supposing it to be a reputable opinion that there is but one single science of grammar, it might pass for a reputable opinion that there is but one science of flute-playing as well—and if more than one science of grammar, more than one science of flute-playing as well; for all these seem to be alike and akin. Likewise, [20] also, propositions contradicting the contraries of reputable opinions will pass as reputable; for if it is a reputable opinion that one ought to do good to one's friends, it will also be a reputable opinion that one ought not to do them harm. Here, that one ought to do harm to one's friends is the contrary, and that one ought not to do them harm is the contradictory of that contrary. Likewise also, if one ought to do good to [25] one's friends, one ought not to do good to one's enemies: this too is the contradictory of the contrary—the contrary being that one ought to do good to one's enemies. Likewise, also, in other cases. Also, on comparison, it will look like a reputable opinion that the contrary predicate belongs to the contrary subject: e.g. if one ought to do good to one's friends, one ought also to do evil to one's enemies. (It might appear as if doing good to one's friends were a contrary to doing evil to one's [30] enemies; but whether this actually is or is not so in reality will be stated in the course of the discussion of contraries.)<sup>2</sup> Clearly also, all opinions that are in accordance with the arts are dialectical propositions; for people are likely to assent to the views held by those who have made a study of these things, e.g. on a question of medicine [35] they will agree with the doctor, and on a question of geometry with the geometrician; and likewise also in other cases.

**11** · A dialectical problem is a subject of inquiry that contributes either to [104<sup>b</sup>1] choice and avoidance, or to truth and knowledge, and does that either by itself, or as a help to the solution of some other such problem. It must, moreover, be something on which either people hold no opinion either way, or most people hold a contrary [5] opinion to the wise, or the wise to most people, or each of them among themselves. For some problems it is useful to know only with a view to choice or avoidance, e.g. whether pleasure is to be chosen or not, while some it is useful to know merely with a view to knowledge, e.g. whether the universe is eternal or not; others, again, are not useful in themselves for either of these purposes, but yet help us in regard to some [10] such

problems; for there are many things which we do not wish to know in themselves, but for the sake of other things, in order that through them we may come to know something else. Problems also include questions in regard to which deductions conflict (the difficulty then being whether so-and-so is so or not, there being convincing arguments for both views); others also in regard to which we have [15] no argument because they are so vast, and we find it difficult to give our reasons, e.g. the question whether the universe is eternal or no; for into questions of that kind too it is possible to inquire.

Problems, then, and propositions are to be defined as aforesaid. A thesis is a [20] paradoxical belief of some eminent philosopher; e.g. the view that contradiction is impossible, as Antisthenes said; or the view of Heraclitus that all things are in motion; or that what exists is one, as Melissus says; for to take notice when any ordinary person expresses views contrary to men's usual opinions would be silly. Or it may be a view contrary to men's usual opinions about which we have an argument, e.g. the view maintained by the sophists that what is need not in every [25] case either have come to be or be eternal; for a musician who is a grammarian is so without ever having come to be so, or being so eternally. For even if some do not accept this view, a man might do so on the ground that it has an argument in its favour.

Now a thesis also is a problem, though a problem is not always a thesis, [30] inasmuch as some problems are such that we have no opinion about them either way. That a thesis is a problem, is clear; for it follows of necessity from what has been said that either the mass of men disagree with the wise about the thesis, or that the one or the other class disagree among themselves, seeing that the thesis is a [35] paradoxical belief. Practically all dialectical problems indeed are now called theses. But it should make no difference whichever description is used; for our object in thus distinguishing them has not been to create a terminology, but to recognize [105<sup>a</sup>1] what differences actually exist between them.

Not every problem, nor every thesis, should be examined, but only one which might puzzle one of those who need argument, not punishment or perception. For [5] people who are puzzled to know whether one ought to honour the gods and love one's parents or not need punishment, while those who are puzzled to know whether snow is white or not need perception. The subjects should not border too closely upon the sphere of demonstration, nor yet be too far removed from it; for the former cases admit of no doubt, while the latter involve difficulties too great for the art of the trainer.

[10] **12** · Having made these distinctions, we must distinguish how many species there are of dialectical arguments. There are induction and deduction. Now what deduction is has been said before; induction is a passage from particulars to universals, e.g. the argument that supposing the skilled pilot is the most effective, and likewise the skilled charioteer, then in general the skilled man is the best at his [15] particular task. Induction is more convincing and clear: it is more readily learnt by the use of the senses, and is applicable generally to the mass of men; but deduction is more forcible and more effective against contradictory people.

**13** · The classes, then, of things about which, and of things out of which, [20] arguments are constructed, are to be distinguished in the way we have said before. The instruments whereby we are to become well supplied with deductions are four: one, the securing of propositions; second, the power to distinguish in how many ways an expression is used; third, the discovery of the differences of things; fourth, the investigation of likeness. The last three, as well, are in a certain sense propositions; [25] for it is possible to make a proposition corresponding to each of them, e.g. that the desirable is either the honourable or the pleasant or the expedient; and that sensation differs from knowledge in that the latter may be recovered again after it has been lost, while the former cannot; and that the relation of the healthy to health [30] is like that of the vigorous to vigour. The first proposition depends upon the use of one term in several ways, the second upon the differences of things, the third upon their likenesses.

**14** · Propositions should be selected in as many ways as we drew distinctions in regard to the proposition: thus one may choose the opinions held by all or by most [35] men or by the wise, i.e. by all, or most, or the most notable of them—if they are not contrary to those that seem to be generally held; and, again, all opinions that are in accordance with the arts. We must make propositions also of the contradictories of [105<sup>b</sup>1] opinions contrary to those that seem to be generally held, as was laid down before. It is useful also to make them by selecting not only those opinions that actually are reputable, but also those that are like these, e.g. that the perception of contraries is the same—the knowledge of them being so—and that we see by admission of [5] something into

ourselves, not by an emission; for so it is, too, in the case of the other senses; for in hearing we admit something into ourselves; we do not emit; and we taste in the same way. Likewise also in the other cases. Moreover, all statements [10] that seem to be true in all or in most cases, should be taken as a principle or accepted thesis; for they are posited by those who do not also see what exception there may be. We should select also from the written handbooks of argument, and should draw up sketch-lists of them upon each several kind of subject, putting them down under separate headings, e.g. 'On Good', or 'On Life'—and that 'On Good' should deal with every form of good, beginning with the essence. In the margin, too, one should [15] indicate also the opinions of individual thinkers, e.g. that Empedocles said that the elements of bodies were four; for any one might assent to the saying of some reputable authority.

Of propositions and problems there are—to comprehend the matter in outline—three divisions; for some are ethical propositions, some are on natural [20] science, while some are logical. Propositions such as the following are ethical, e.g. 'Ought one rather to obey one's parents or the laws, if they disagree?'; such as this are logical, e.g. 'Is the knowledge of opposites the same or not?'; while such as this [25] are on natural science, e.g. 'Is the universe eternal or not?' Likewise also with problems. The nature of each of the aforesaid kinds of proposition is not easily rendered in a definition, but we have to try to recognize each of them by means of the familiarity attained through induction, examining them in the light of the illustrations given above.

[30] For purposes of philosophy we must treat of these things according to their truth, but for dialectic only with an eye to opinion.

All propositions should be taken in their most universal form; then, the one should be made into many. E.g. 'The knowledge of opposites is the same'; next, 'The knowledge of contraries is the same', and 'of relative terms'. In the same way these [35] should again be divided, as long as division is possible, e.g. the knowledge of good and evil, of white and black, of cold and hot. Likewise also in other cases.

[106<sup>a</sup>1] **15** · On the subject of propositions, the above remarks are enough. As regards the number of ways in which a term is used, we must not only treat of those terms which are used in different ways, but we must also try to render their definitions; e.g. we must not merely say that justice and courage are called good in [5] one way, and that what

conduces to vigour and what conduces to health are called so in another, but also that the former are so called because of a certain intrinsic quality they themselves have, the latter because they are productive of a certain result and not because of any intrinsic quality in themselves. Similarly also in other cases.

Whether a term is used in many ways or in one only, may be considered by the [10] following means. First, look and see if its contrary is used in many ways, whether the discrepancy between them be one of kind or one of names. For in some cases a difference is at once displayed even in the names; e.g. the contrary of sharp in the case of a sound is flat, while in the case of a body it is dull. Clearly, then, the [15] contrary of sharp is used in many ways, and if so, so also is sharp; for corresponding to each of the former terms the contrary will be different. For sharp will not be the same when contrary to dull and to flat, though sharp is the contrary of each. Again that in the case of a sound has sharp as its contrary, but in the case of a body raised,<sup>3</sup> so that that is used in many ways, inasmuch as its contrary also is so used. Likewise, [20] also, fine as applied to an animal has ugly as its contrary, but, as applied to a house, mean; so that fine is homonymous.

In some cases there is no discrepancy of any sort in the names used, but a [25] difference of kind is at once obvious: e.g. in the case of clear and obscure;<sup>4</sup> for sound is called clear and obscure, just as colour is too. As regards the names, then, there is no discrepancy, but the difference in kind is at once obvious; for colour is not called clear in a like way to sound. This is plain also through sensation; for of things that are the same in kind we have the same sense, whereas we do not judge clearness by [30] the same sense in the case of sound and of colour, but in the latter case we judge by sight, in the former by hearing. Likewise also with sharp and dull in regard to flavours and bodies: here in the latter case we judge by touch, but in the former by taste. For here again there is no discrepancy in the names used, in the case either of the original terms or of their contraries; for the contrary of sharp in either case is dull. [35]

Moreover, see if one use of a term has a contrary, while another has absolutely none; e.g. the pleasure of drinking has a contrary in the pain of thirst, whereas the pleasure of seeing that the diagonal is incommensurate with the side has none, so that pleasure is used in more than one way. To love also, used of the frame of mind, [106<sup>b</sup>1] has to hate as its contrary, while as used of the physical activity it has none; clearly, therefore, to love is homonymous.

Further, see in regard to their intermediates, if one use has an

intermediate, while another has none, or if both have one but not the same one, as e.g. clear and [5] obscure in the case of colours have grey as an intermediate, whereas in the case of sound they have none, or, if they have, it is muffled, as some people say that a muffled sound is intermediate. Clear, then, is homonymous, and likewise also obscure.

See, moreover, if some of them have more than one intermediate, while others have but one, as is the case with clear and obscure; for in the case of colours there [10] are numbers of intermediates, whereas in regard to sound there is but one, viz. muffled.

Again, in the case of the contradictory opposite, look and see if it is used in more than one way. For if it is, then the opposite of it also will be used in more than [15] one way; e.g. to fail to see is used in more than one way, viz. to fail to possess the power of sight, and to fail to put that power to active use. But if this is used in more than one way, it follows necessarily that to see also is used in more than one way; for there will be an opposite to each way of failing to see; e.g. the opposite of failing to possess the power of sight is to possess it, while of failing to put the power of sight to active use, the opposite is to put it to active use. [20]

Moreover, examine the case of terms that are opposed as privation and possession; for if the one term is used in more than one way, then so will the remaining term: e.g. if to perceive is used in more than one way, as applied to the soul and to the body, then to be imperceptive too will be used in more than one way, as applied to the soul and to the body. That the opposition between the terms now in [25] question depends upon privation and possession is clear, since animals naturally possess each kind of perception, both as applied to the soul and as applied to the body.

Moreover, examine the inflected forms. For if 'justly' is used in more than one way, the 'just', also, will be used in more than one way; for there will be a 'just' [30] corresponding to each 'justly'; e.g. if 'justly' is used of judging according to one's own opinion, and also of judging as one ought, then 'just' also will be used in like manner. In the same way also, if 'healthy' is used in more than one way, then [35] 'healthily' also will be used in more than one way: e.g. if healthy is what produces health and what preserves health and what betokens health, then 'healthily' also will be used to mean 'in such a way as to produce' or 'preserve' or 'betoken' health. Likewise also in other cases, whenever the original term is used in more than one [107<sup>a</sup>1] way, the inflexion also that is formed from it will be used in more than one way, and vice versa.

Look also at the classes of the predicates signified by the term, and see if they are the same in all cases. For if they are not the same, then

clearly the term is [5] homonymous: e.g. good in the case of food is what is productive of pleasure, and in the case of medicine what is productive of health, whereas as applied to the soul it is to be of a certain quality, e.g. temperate or courageous or just; and likewise also, as applied to a man. Sometimes it signifies what happens at a certain time, as (e.g.) what happens at the right time; for what happens at the right time is called good. [10] Often it signifies what is of a certain quantity, e.g. as applied to the proper amount; for the proper amount too is called good. So then good is homonymous. In the same way also clear, as applied to a body, signifies a colour, but in regard to a sound it denotes what is easy to hear. Sharp, too, is in a closely similar case; for the same [15] term does not have the same use in all its applications; for a sharp note is a swift note, as the mathematical theorists of harmony tell us, whereas a sharp angle is one that is less than a right angle, while a sharp dagger is one cut at a sharp angle.

Look also at the genera of the objects denoted by the same name, and see if they are different without the one falling under the other, as (e.g.) donkey is both [20] the animal and the engine. For the account of them that corresponds to the name is different; for the one will be declared to be an animal of a certain kind, and the other to be an engine of a certain kind. If, however, the genera are subordinate one to the other, there is no necessity for the accounts to be different. Thus (e.g.) animal is the genus of raven, and so is bird. Whenever therefore we say that the raven is a bird, we [25] also say that it is a certain kind of animal, so that both the genera are predicated of it. Likewise also whenever we call the raven a winged two-footed animal, we declare it to be a bird; in this way, then, as well, both the genera are predicated of raven. But in the case of genera that are not subordinate one to the other this does not happen; [30] for whenever we call a thing an engine, we do not call it an animal, nor vice versa.

Look also and see not only if the genera of the term before you are different without being subordinate one to the other, but also in the case of its contrary; for if [35] its contrary is used in many ways, clearly the term before you is as well.

It is useful also to look at the definition that arises from the use of the term in combination, e.g. of a clear body and of a clear sound. For then if what is proper to each case be abstracted, the same phrase ought to remain over. This does not happen in the case of homonyms, e.g. in the cases just mentioned. For the former [107<sup>b</sup>1] will be a body possessing such and such a colour, while the latter will be a sound easy to hear.



Abstract, then, 'a body' and 'a sound', and the remainder in each case is not the same. It should, however, have been, had clear in each case been [5] synonymous.

Often in the actual accounts as well homonymy creeps in without being noticed, and for this reason the accounts also should be examined. If (e.g.) any one describes what betokens and produces health as being in a balanced state, we must not desist but go on to examine in what sense he has used the term 'balanced' in each [10] case, e.g. if in the latter case it means that it is of the right amount to produce health, whereas in the former it means that it is such as to betoken what kind of state prevails.

Moreover, see if the terms cannot be compared as more or less or as in like degree, as is the case (e.g.) with a clear sound and a clear argument,<sup>5</sup> and a sharp flavour and a sharp sound. For neither are these things said to be clear or sharp in a [15] like degree, nor yet is the one said to be clearer or sharper than the other. Clear, then, and sharp are homonymous. For synonyms are always comparable; for they will always hold either in like manner, or else in a greater degree in one case.

Now since of genera that are different without being subordinate one to the other the differentiae also are different in kind, e.g. those of animal and knowledge [20] (for the differentiae of these are different), look and see if the items falling under the same term are differentiae of genera that are different without being subordinate one to the other, as e.g. sharp is of a sound and a body. For being sharp differentiates sound from sound, and likewise also one body from another. Sharp, then, is homonymous; for it forms differentiae of genera that are different without [25] being subordinate one to the other.

Again, see if the items falling under the same term themselves have different differentiae, e.g. colour in bodies and colour in tunes; for the differentiae of colour in bodies are dispersing the eye and compressing the eye, whereas colour in melodies [30] has not the same differentiae. Colour, then, is homonymous; for things that are the same have the same differentiae.

Moreover, since the species is never the differentia of anything, look and see if one of the items falling under the same term is a species and another a differentia, as (e.g.) clear as applied to a body is a species of colour, whereas in the case of a [35] sound it is a differentia; for one sound is differentiated from another by being clear.

by these and like means. The differences which things present to each other should be [108<sup>a</sup>1] examined both in the genera themselves (e.g. 'Wherein does justice differ from courage, and wisdom from temperance?'—for all these belong to the same genus); and also from one genus to another, provided they are not too far apart (e.g. 'Wherein does perception differ from knowledge?'); for in the case of genera that [5] are very far apart, the differences are entirely obvious.

**17** · Likeness should be studied, first, in the case of things belonging to different genera, the formula being: as one is to one thing, so is another to another (e.g. as knowledge stands to the object of knowledge, so is perception related to the [10] object of perception), or: as one is in one thing, so is another in another (e.g. as sight is in the eye, so is intellect in the soul, and as is a calm in the sea, so is windlessness in the air). Practice is more especially needed in regard to terms that are far apart; for in the case of the rest, we shall be more easily able to see the points of likeness. We should also look at things which belong to the same genus, to see if any identical [15] attribute belongs to them all, e.g. to a man and a horse and a dog; for in so far as they have any identical attribute, in so far they are alike.

**18** · It is useful to have examined the number of uses of a term both for clearness' sake (for a man is more likely to know what it is he asserts, if it has been [20] made clear to him how many uses it may have), and also with a view to ensuring that our deductions shall be in accordance with the actual facts and not addressed merely to the word used. For as long as it is not clear in how many ways a term is used, it is possible that the answerer and the questioner are not directing their minds upon the same thing; whereas when once it has been made clear how many uses there are, and also upon which of them the former directs his mind when he makes [25] his assertion, the questioner would then look ridiculous if he failed to address his argument to this. It helps us also both to avoid being misled and to mislead by fallacies; for if we know the number of uses of a term, we shall certainly never be misled by fallacy, but shall know if the questioner fails to address his argument to the same point; and when we ourselves put the questions we shall be able to mislead [30] him, if our answerer happens not to know the number of uses of our terms. This, however, is not possible in all cases, but only when of the many uses some are true and others are false. This manner of argument,

however, does not belong properly to dialectic; dialecticians should therefore by all means beware of this kind of verbal [35] discussion, unless any one is absolutely unable to discuss the subject before him in any other way.

The discovery of differences helps us both in deductions about sameness and difference, and also in recognizing what any particular thing is. That it helps us in [108<sup>b</sup>1] deductions about sameness and difference is clear; for when we have discovered a difference of any kind whatever between the objects before us, we shall already have proved that they are not the same; while it helps us in recognizing what a thing is, [5] because we usually distinguish the account that is proper to the substance of each particular thing by means of the differentiae that are appropriate to it.

The examination of likeness is useful with a view both to inductive arguments and to hypothetical deductions, and also with a view to the rendering of definitions. [10] It is useful for inductive arguments, because it is by means of an induction of particulars in cases that are alike that we claim to induce the universal; for it is not easy to do this if we do not know the points of likeness. It is useful for hypothetical deductions because it is a reputable opinion that among similars what is true of one is true also of the rest. If, then, with regard to any of them we are well supplied with [15] matter for a discussion, we shall secure a preliminary admission that however it is in these cases, so it is also in the case before us; then when we have proved the former we shall have proved, on the strength of the hypothesis, the matter before us as well; for we have first made the hypothesis that however it is in these cases, so it is also in the case before us, and have then produced the demonstration. It is useful for the rendering of definitions because, if we are able to see what is the same in each [20] individual case of it, we shall be at no loss when we define it; for of the common predicates that which is most definitely predicated in what the thing is is likely to be the genus. Likewise, also, in the case of objects widely divergent, the examination of likeness is useful for purposes of definition, e.g. the sameness of a calm at sea, and [25] windlessness in the air (each being a form of rest), and of a point on a line and the unit in number (each being a principle). If, then, we render as the genus what is common to all the cases, we shall get the credit of defining not inappropriately. Definition-mongers too nearly always render them in this way; for they declare the unit to be the principle of number, and the point the principle of a line. It is clear, [30] then, that they place them in that which is common to both as their genus.

The instruments, then, whereby deductions are effected, are these; the commonplace rules, for the observance of which the aforesaid instruments are useful, are as follows.

## BOOK II

1 · Of problems some are universal, others particular. Universal problems are such as ‘Every pleasure is good’ and ‘No pleasure is good’; particular problems [35] are such as ‘Some pleasure is good’ and ‘Some pleasure is not good.’ The methods of establishing and overthrowing a view universally are common to both kinds of [109<sup>a</sup>1] problems; for when we have proved that a predicate belongs in every case, we shall also have proved that it belongs in some cases. Likewise, also, if we prove that it does [5] not belong in any case, we shall also have proved that it does not belong in every case. First, then, we must speak of the methods of overthrowing a view universally, because such are common to both universal and particular problems, and because people more usually introduce theses asserting a predicate than denying it, while those who argue with them overthrow it.

The conversion of an appropriate name which is derived from an accident is an extremely precarious thing; for in the case of accidents and in no other it is possible [10] for something to be true in a certain respect and not universally. Names derived from definition and property and genus are bound to be convertible; e.g. if being a two-footed terrestrial animal belongs to something, then it will be true by conversion to say that it is a two-footed terrestrial animal. Likewise, also, if derived [15] from the genus; for if being an animal belongs to something, then it is an animal. The same is true also in the case of a property; for if being capable of learning grammar belongs to something, then it will be capable of learning grammar. For none of these attributes can possibly belong or not belong in part; they must either belong or not belong absolutely. In the case of accidents, on the other hand, there is [20] nothing to prevent an attribute (e.g. whiteness or justice) belonging in part, so that it is not enough to show that whiteness or justice belongs to a man in order to show [25] that he is white or just; for it is open to dispute it and say that he is white or just in part only. Conversion, then, is not a necessary process in the case of accidents.

We must also define the errors that occur in problems. They are of two kinds, caused either by false statement or by transgression of the established use of language. For those who make false statements, and say that something belongs to a [30] thing which does not belong to it, commit error; and those who call objects by the names of other objects (e.g. calling a plane-tree a man) transgress the established terminology.

2 · Now one commonplace rule is to look and see if a man has ascribed as an [35] accident what belongs in some other way. This mistake is most commonly made in regard to the genera of things, e.g. if one were to say that being a colour is an accident of white—for being a colour does not happen by accident to white, but colour is its genus. The assertor may of course make the mistake in so many words, [109<sup>b</sup>1] saying (e.g.) that it is an accident of justice to be a virtue; but often even without such explicitness it is obvious that he has rendered the genus as an accident; e.g. suppose that one were to say that whiteness is coloured or that walking is in motion. For a predicate drawn from the genus is never ascribed to the species in a derived [5] form, but always the genera are predicated of their species synonymously; for the species take on both the name and the account of their genera. A man therefore who says that white is coloured has not rendered it as its genus, seeing that he has used a derived form, nor yet as its property or as its definition; for the definition and [10] property of a thing belong to it and to nothing else, whereas many things besides white are coloured, e.g. a log, a stone, a man, a horse. Clearly then he renders it as an accident.

Another rule is to examine all cases where a predicate has been said to belong to all or none of something. Look at them species by species, and not in their infinite [15] multitude; for then the inquiry will proceed more directly and in fewer steps. You should look and begin with the primitives, and then proceed in order down to those that are not further divisible: e.g. if a man has said that the knowledge of opposites is the same, you should look and see whether it be so of relative opposites and of contraries and of terms opposed as privation and possession, and of contradictory [20] terms. Then, if no clear result is reached so far in these cases, you should again divide these until you come to those that are not further divisible, and see (e.g.) whether it is so of just deeds and unjust, or of the double and the half, or of blindness and sight, or of being and not-being; for if in any case it is proved that the knowledge of them is not the same we shall have demolished the problem. Likewise, also, if the [25] predicate belongs in no case. This rule is convertible for both destructive and constructive purposes; for if, as we proceed with the division, the predicate appears to hold in all or in a large number of cases, we may then claim that the other should actually assert it universally, or else bring an objection to show in what case it is not so; for if he does neither of these things, a refusal to assert it will make him look absurd.

[30] Another rule is to make accounts both of an accident and of its subject, either of both separately or else of one of them, and then look and see if anything untrue has been assumed as true in the accounts. Thus (e.g.) to see if it is possible to wrong a god, ask what is to wrong? For if it be to injure deliberately, clearly it is not possible for a god to be wronged; for it is impossible that God should be injured. Again, to see if the good man is jealous, ask who is the jealous man and what is jealousy. For if [35] jealousy is pain at the apparent success of some honest person, clearly the good man is not jealous; for then he would be bad. Again, to see if the indignant man is jealous, ask who each of them is; for then it will be obvious whether the statement is true or false; e.g. if he is jealous who grieves at the successes of the good, and he is indignant [110<sup>a</sup>1] who grieves at the successes of the evil, then clearly the indignant man would not be jealous. A man should substitute accounts also for the words contained in his [5] account, and not stop until he comes to something familiar; for often when the account is given as a whole, the point at issue is not cleared up, whereas if for one of the words used in the account an account be stated, it becomes obvious.

Moreover, a man should make the problem into a proposition for himself, and [10] then bring an objection against it; for the objection will be a ground of attack upon the thesis. This rule is very nearly the same as the rule to look into cases where a predicate has been said to belong to all or none of something; but it differs in the turn of the argument.

Moreover, you should determine what kind of things should be called as most men call them, and what should not. For this is useful both for establishing and for [15] overthrowing a view: e.g. you should say that we ought to use our words to mean the same things as most people mean by them, but when we ask what kinds of things are or are not of such and such a kind, we should not here go with the multitude: e.g. it is right to call healthy whatever tends to produce health, as do most men; but in saying whether the object before us tends to produce health or not, we should adopt the [20] language no longer of the multitude but of the doctor.

3 · Moreover, if a term be used in several ways, and it has been laid down that it belongs or that it does not belong to something, you should prove your case of one of its several uses, if you cannot prove it of both. This rule is to be observed in [25] cases where the difference of use is undetected; for supposing this to be obvious, then the other man will

object that the point which he himself questioned has not been discussed, but only the other point. This commonplace rule is convertible for purposes both of establishing and of overthrowing a view. For if we want to establish a statement, we shall prove that in one use the attribute belongs, if we cannot show [30] it of both; whereas if we are overthrowing a statement, we shall prove that in one use the attribute does not belong, if we cannot prove it of both. Of course, in overthrowing a statement there is no need to start the discussion by securing any admission, whether the attribute is said to belong to all or to none of something; for if we prove that in any case whatever the attribute does not belong, we shall have demolished the universal assertion of it, and likewise if we prove that it belongs even [35] in a single case, we shall demolish the universal denial of it. Whereas in establishing a statement we ought to secure a preliminary admission that if it belongs in any case whatever, it belongs universally, supposing this claim to be a plausible one. For it is not enough to argue for a single instance in order to prove that an attribute belongs [110<sup>b</sup>1] universally; e.g. to argue that if the soul of man is immortal, then every soul is immortal, so that a previous admission must be secured that if any soul whatever is immortal, then every soul is immortal. This is not to be done in every case, but only [5] whenever we are not easily able to quote any single argument applying to all cases in common, as (e.g.) the geometrician can argue that the triangle has its angles equal to two right angles.

If, again, the multiplicity of uses of a term is obvious, distinguish how many uses it has before proceeding either to demolish or to establish: e.g. supposing the [10] right thing to do to be the expedient or the honourable, you should try either to establish or to demolish both of the subject in question; e.g. by showing that it is honourable and expedient, or that it is neither honourable nor expedient. Supposing, however, that it is impossible to show both, you should prove the one, adding an indication that it is true in the one sense and not in the other. The same rule applies [15] also when the number of uses into which it is divided is more than two.

Again, consider those terms whose uses are many, but differ not by way of homonymy, but in some other way: e.g. The science of many things is one: here many things may be the end and the means to that end, as (e.g.) medicine is the science both of producing health and of dieting; or they may be both of them ends, [20] as the science of contraries is said to be the same (for of contraries the one is no more an end than the other); or again they may be an essential and an accidental



attribute, as (e.g.) the essential fact that the triangle has its angles equal to two right angles, and the accidental fact that the equilateral figure has them so—for it [25] is because of the accident of the equilateral triangle happening to be a triangle that we know that it has its angles equal to two right angles. If, then, it is not possible in any way that the science of many things should be the same, it clearly is altogether impossible that it should be so; or, if it is possible in some way, then clearly it is [30] possible. Distinguish as many uses as are required: e.g. if we want to establish a view, we should bring forward such uses as admit that view, and should divide them only into those which also are required for the establishment of our case; whereas if we want to overthrow a view, we should bring forward all that do not admit that view, and leave the rest aside. We must proceed thus in this case too when the multiplicity of uses goes unnoticed. Further, that one thing is, or is not, of or for another should be established by means of the same commonplace rules; e.g. that a [35] particular science is of a particular thing, treated either as an end or as a means to its end, or as accidentally connected with it; or again that it is not of or for it in any of the aforesaid ways. The same rule holds true also of desire and all other terms [111<sup>a</sup>1] that have more than one object. For the desire for something may be the desire for it as an end (e.g. the desire for health) or as a means to an end (e.g. the desire for being doctored), or as a thing desired accidentally, as, in the case of wine, the sweet-toothed person desires it not because it is wine but because it is sweet. For he [5] desires the sweet for itself, and the wine only accidentally; for if it is dry, he no longer desires it. His desire for it is therefore accidental. This rule is useful in dealing with relative terms; for cases of this kind are generally cases of relative terms.

4 · Moreover, it is well to alter a word into one more familiar, e.g. to substitute ‘clear’ for ‘precise’ in describing a conception, and ‘meddling’ for ‘officious’; for when the expression is made more familiar, the thesis becomes easier [10] to attack. This commonplace rule also is available for both purposes alike, both for establishing and for overthrowing a view.

In order to prove that contrary attributes belong to the same thing, look at its genus; e.g. if we want to prove that rightness and wrongness are possible in regard to [15] perception: to perceive is to judge, and it is possible to judge rightly or wrongly; thus in regard to perception as well rightness and wrongness must be possible. In the present instance the demonstration proceeds from the genus and relates to the species; for

judging is the genus of perceiving; for the man who perceives judges in a certain way. Again, it may proceed from the species to the genus; for all the [20] attributes that belong to the species belong to the genus as well; e.g. if there is a bad and a good knowledge there is also a bad and a good disposition; for disposition is the genus of knowledge. Now the former commonplace argument is false for purposes of establishing a view, while the second is true. For there is no necessity [25] that all the attributes that belong to the genus should belong also to the species; for animal is winged and quadruped, but not so man. All the attributes, on the other hand, that belong to the species must of necessity belong also to the genus; for if man is good, then animal also is good. On the other hand, for purposes of overthrowing a view, the former argument is true while the latter is false; for all the [30] attributes which do not belong to the genus do not belong to the species either; whereas all those that are wanting to the species are not of necessity wanting to the genus.

Since those things of which the genus is predicated must also of necessity have one of its species predicated of them, and since those things that are possessed of the genus in question, or are described by terms derived from that genus, must also of [35] necessity be possessed of one of its species or be described by terms derived from one of its species (e.g. if knowledge is predicated of something, then so too will be grammatical or musical knowledge, or knowledge of one of the other sciences; and if any one possesses knowledge or is described by a term derived from knowledge, then [111<sup>b</sup>1] he will also possess grammatical or musical knowledge or knowledge of one of the other sciences, or will be described by a term derived from one of them, e.g. as a grammarian or a musician)—therefore if any expression be asserted that is in any way derived from the genus (e.g. that the soul is in motion), look and see whether it [5] is possible for the soul to be moved with any of the species of motion; whether (e.g.) it can grow or be destroyed or come to be, and so forth with all the other species of motion. For if it cannot be moved in any of these ways, clearly it does not move at all. This commonplace rule is common for both purposes, both for overthrowing and for establishing a view; for if the soul moves with one of the species of motion, [10] clearly it does move; while if it does not move with any of the species of motion, clearly it does not move.

If you are not well equipped with an argument against the thesis, look among the definitions, real or apparent, of the thing before you, and if one is not enough, draw upon several. For it will be easier to attack people when committed to a [15] definition. [For an attack is always

more easily made on definitions.][<sup>6</sup>

Moreover, look and see in regard to the thing in question, what is such that if it is the case the thing in question is the case, or what is necessarily the case if the thing in question is the case: if you wish to establish a view inquire what there is such that if it is the case the thing in question will be the case (for if the former be [20] proved to hold, then the thing in question will also have been proved to hold); while if you want to overthrow a view, ask what it is that is the case if the thing in question is the case (for if we show that what follows from the thing in question is not the case, we shall have demolished the thing in question).

Moreover, look at the time involved, to see if there is any discrepancy [25] anywhere: e.g. suppose a man to have stated that what is being nourished of necessity grows; for animals are always being nourished, but they do not always grow. Likewise, also, if he has said that knowing is remembering; for the one is concerned with past time, whereas the other has to do also with the present and the future. For we are said to know things present and future (e.g. that there will be an [30] eclipse), whereas it is impossible to remember anything save what is past.

5 · Moreover, there is the sophistic turn of argument, whereby we draw our opponent into the kind of statement against which we shall be well supplied with lines of argument. This process is sometimes a real necessity, sometimes an apparent necessity, sometimes neither an apparent nor a real necessity. It is really [35] necessary whenever the answerer has denied any view that would be useful in attacking the thesis, and the questioner thereupon addresses his arguments to the support of this view, and when moreover the view in question happens to be one of a kind on which he has a good stock of lines of argument. Likewise, also, it is really necessary whenever starting from the view laid down, he reduces it to something [112<sup>a</sup>1] else and then tries to demolish that statement; for when this has been demolished, the view originally laid down is demolished as well. It is an apparent necessity, when the point to which the arguments come to be directed appears to be useful, and relevant to the thesis, without being really so; whether it be that the man who is undertaking the argument has refused to concede something, or whether the [5] questioner has reached it by a reputable reduction based upon the thesis and then tries to demolish it. The remaining case is when the point to which the argument comes to be directed is neither really nor apparently necessary, and it turns out that the answer is

refuted on an irrelevant issue. You should beware of the last of the [10] aforesaid methods; for it appears to be wholly disconnected from, and foreign to, the art of dialectic. For this reason, moreover, the answerer should not lose his temper, but assent to those statements that are of no use in attacking the thesis, adding an indication whenever he assents although he does not agree with the view. For, for the most part, it increases the confusion of questioners if, after all propositions of [15] this kind have been granted them, they can then draw no conclusion.

Moreover, any one who has made any statement whatever has in a certain sense made several statements, inasmuch as each statement has a number of necessary consequences: e.g. anyone who said that something is a man has also said that it is an animal and that it is animate and a biped and capable of acquiring reason and knowledge, so that by the demolition of any single one of these [20] consequences, of whatever kind, the original statement is demolished as well. But you should beware here of making a change to a more difficult subject; for sometimes the consequence, and sometimes the original thesis, is the easier to demolish.

6 · In regard to subjects which must have one and one only of two predicates, as (e.g.) a man must have either illness or health, supposing we are well supplied as [25] regards the one for arguing its presence or absence, we shall be well equipped as regards the remaining one as well. This rule is convertible for both purposes; for when we have proved that the one attribute belongs, we shall have proved that the remaining one does not belong; while if we prove that the one does not belong, we shall have proved that the remaining one does belong. Clearly then the rule is useful [30] for both purposes.

Moreover, you may attack by reinterpreting a word in respect of its account, with the implication that it is most fitting so to take it rather than in its established meaning: e.g. it is not, as established use has it, the courageous man who is strong-hearted, but rather the man the state of whose heart is strong—just as the man whose arms are strong is strong-armed.<sup>7</sup> Likewise also the man whose star is [35] good is well-starred—as Xenocrates says, he who has a noble soul is well-starred. For a man's star is his soul.

Some things occur of necessity, others for the most part, others however it may [112<sup>a</sup>1] chance; if therefore what is necessary has been asserted to hold for the most part, or if what holds for the most part (either itself or its contrary) has been stated to hold of necessity, it always

gives an opportunity for attack. For if what is necessary has [5] been asserted to hold for the most part, clearly the speaker has denied an attribute to be universal which is universal, and so has made a mistake; and so he has if he has declared what holds for the most part to be necessary; for then he declares it to belong universally when it does not so belong. Likewise also if he has declared the contrary of what holds for the most part to be necessary. For the contrary of what [10] holds for the most part is always a comparatively rare attribute: e.g. if men are for the most part bad, they are comparatively seldom good, so that his mistake is even worse if he has declared them to be good of necessity. The same is true also if he has declared a matter of chance to hold of necessity or for the most part; for a matter of chance holds neither of necessity nor for the most part. If the thing holds for the [15] most part, then even supposing his statement does not distinguish whether he meant that it holds for the most part or that it holds necessarily, it is open to you to discuss it on the assumption that he meant that it holds necessarily: e.g. if he has stated without any distinction that disinherited persons are bad, you may assume in discussing it that he means that they are so necessarily. [20]

Moreover, look and see also if he has stated a thing to be an accident of itself, taking it to be a different thing because it has a different name, as Prodicus used to divide pleasures into joy and delight and good cheer; for all these are names of the same thing, to wit, pleasure. If then any one says that joyfulness is an accidental [25] attribute of cheerfulness, he would be declaring it to be an accidental attribute of itself.

7 · Inasmuch as contraries can be conjoined with each other in six ways, and four of these conjunctions constitute a contrariety, we must take hold of contraries in whatever way they may be of use both in demolishing and in establishing a view. [30] Well then, that the modes of conjunction are six is clear; for either each of the one pair of contraries will be conjoined to each of the other; and this gives two modes, e.g. to do good to friends and to do evil to enemies, or *per contra* to do evil to friends and to do good to enemies. Or else both of the first pair may be attached to one of [35] the second; and this too gives two modes, e.g. to do good to friends and to do evil to friends, or to do good to enemies and to do evil to enemies. Or one of the first pair may be attached to both of the second; and this also gives two modes, e.g. to do good to friends and to do good to enemies, or to do evil to friends and evil to enemies.

[113<sup>a</sup>1] The first two then of the aforesaid conjunctions do not

constitute any contrariety; for the doing of good to friends is not contrary to the doing of evil to enemies; for both courses are desirable and belong to the same disposition. Nor is the doing of evil to friends contrary to the doing of good to enemies; for both of these [5] are objectionable and belong to the same disposition; and one objectionable thing is not thought to be the contrary of another, unless the one refers to an excess, and the other to a defect—for an excess is thought to belong to the class of objectionable things, and likewise also a defect. But the other four all constitute a contrariety. For [10] to do good to friends is contrary to the doing of evil to friends; for it proceeds from the contrary disposition, and the one is desirable, and the other objectionable. The case is the same also in regard to the other conjunctions; for in each combination the one course is desirable, and the other objectionable, and the one belongs to an honourable disposition and the other to a bad. Clearly, then, from what has been [15] said, the same thing has more than one contrary. For the doing of good to friends has as its contrary both the doing of good to enemies and the doing of evil to friends. Likewise, if we examine them in the same way, we shall find that the contraries of each of the others also are two in number. Select therefore whichever of the two contraries is useful in attacking the thesis.

[20] Moreover, if the accident of a thing has a contrary, see whether it belongs to the subject to which the accident in question has been declared to belong; for if the latter belongs the former could not belong; for it is impossible that contrary predicates should belong at the same time to the same thing.

Or again, look and see if anything has been said about something, of such a [25] kind that if it is true, contrary predicates must necessarily belong to the thing; e.g. if he has said that the Ideas exist in us. For then the result will be that they are both in motion and at rest, and moreover that they are objects both of sensation and of thought. For according to those who posit the existence of Ideas, those Ideas are at rest and are objects of thought; while if they exist in us, it is impossible that they should be unmoved; for when we move, it follows necessarily that all that is in us [30] moves with us as well. Clearly also they are objects of sensation, if they exist in us; for it is through the sensation of sight that we recognize the form present in each individual.

Again, if there be posited an accident which has a contrary, look and see if that which admits of the accident will admit of its contrary as well; for the same thing admits of contraries. Thus (e.g.) if he has asserted that hatred follows anger, hatred [35] would in that case be in the spirited

faculty; for that is where anger is. You should therefore look and see if its contrary is also in the spirited faculty; for if not—if [113<sup>b</sup>1] friendship is in the faculty of desire—then hatred will not follow anger. Likewise also if he has asserted that the faculty of desire is ignorant. For if it were capable of ignorance, it would be capable of knowledge as well: and this does not seem to be [5] so—I mean that the faculty of desire is capable of knowledge. For purposes, then, of overthrowing a view you should proceed as we have said; but for purposes of establishing one, though the rule will not help you to assert that the accident actually belongs, it will help you to assert that it may possibly belong. For having proved that the thing in question will not admit of the contrary, we shall have [10] proved that the accident neither belongs nor can possibly belong; while on the other hand, if we prove that the contrary belongs, or that the thing is capable of the contrary, we shall not indeed as yet have proved that the accident asserted does belong as well; our proof will merely have gone to this point, that it is possible for it to belong.

8 · Seeing that the modes of opposition are four in number, you should look [15] among the contradictories of your terms, reversing the order of their sequence, both when demolishing and when establishing a view; and you should grasp this by means of induction. E.g. if man is an animal, what is not an animal is not a man; and likewise also in other instances of contradictories. For here the sequence is reversed; for animal follows upon man, but not-animal does not follow upon not-man, but the [20] reverse—not-man upon not-animal. In all cases, therefore, a claim of this sort should be made, (e.g.) that if the honourable is pleasant, what is not pleasant is not honourable, while if the latter is not so, neither is the former. Likewise, also, if what is not pleasant is not honourable, then what is honourable is pleasant. Clearly, then, reversing the sequence in the case of contradictories is a method convertible for both [25] purposes.

Then look also at the case of the contraries, and see if the contrary of the one follows upon the contrary of the other, either directly or conversely, both when you are demolishing and when you are establishing a view; and grasp this too by means of induction. Now the sequence is direct in a case such as that of courage and [30] cowardice; for upon the one of them virtue follows, and vice upon the other; and upon the one it follows that it is desirable, while upon the other it follows that it is objectionable. The sequence in the latter case also is direct; for the desirable is the contrary of the objectionable. Likewise also in other

cases. The sequence is converse in such a case as this: health follows upon vigour, but disease does not follow upon [114<sup>a</sup>1] debility; rather debility follows upon disease. In this case, then, clearly the sequence is converse. Converse sequence is, however, rare in the case of contraries; usually the sequence is direct. If, therefore, the contrary of the one term does not follow upon the contrary of the other either directly or conversely, clearly neither does the [5] one term follow upon the other in the statement made; whereas if the one follows the other in the case of the contraries, it must of necessity do so as well in the original statement.

You should look also into cases of privation and possession in like manner to the case of contraries. Only, in the case of privations the converse sequence does not [10] occur: the sequence is always bound to be direct; e.g. as perception follows sight, while absence of perception follows blindness. For perception is opposed to absence of perception as possession and privation; for the one of them is a possession, and the other privation.

The case of relative terms should also be studied in like manner to privation; [15] for the sequence of these as well is direct; e.g. if thrice is a multiple, then a third is a fraction; for thrice is relative to a third, and so is a multiple to a fraction. Again, if knowledge is a belief, then also the object of knowledge is an object of belief; and if sight is a perception, then also the object of sight is an object of perception. An [20] objection may be made that there is no necessity for the sequence to take place, in the case of relative terms, in the way described; for an object of perception is an object of knowledge, whereas perception is not knowledge. The objection, however, does not seem to be true; for many people deny that there is knowledge of objects of perception. Moreover, the principle stated is just as useful for the contrary purpose, [25] e.g. to show that the object of perception is not an object of knowledge, on the ground that neither is perception knowledge.

9 · Again look at the co-ordinates and the inflexions, both in demolishing and in establishing. By co-ordinates are meant things such as the following: just deeds and the just man are co-ordinates of justice, and courageous deeds and the courageous man are co-ordinates of courage. Likewise also things that tend to [30] produce and to preserve anything are co-ordinates of that which they tend to produce and to preserve, as e.g. healthy habits are co-ordinates of health and vigorous habits of vigour—and so forth also in other cases. Such things, then, are usually



called co-ordinates. Inflexions are such as the following: 'justly', 'courageously', 'healthily', and such as are formed in this way. It is usually held that [35] inflected forms as well are co-ordinates, as (e.g.) 'justly' in relation to justice, and 'courageously' to courage; and then all the members of the same series are co-ordinates, e.g. justice, just man, just deed, justly. Clearly, then, when any one [114<sup>b</sup>1] member, whatever its kind, of the same series is proved to be good or praiseworthy, then all the rest as well come to be proved to be so: e.g. if justice is something praiseworthy, then so will a just man, and a just deed, and 'justly' connote something praiseworthy. Then 'justly' will be rendered also 'praiseworthily', derived by the same inflexion from the praiseworthy as 'justly' is derived from justice. [5]

Look not only in the case of the subject mentioned, but also in the case of its contrary, for the contrary predicate: e.g. argue that good is not necessarily pleasant; for neither is evil painful; or that, if the latter is the case, so is the former. Also, if justice is knowledge, then injustice is ignorance: and if 'justly' means 'knowingly' and 'skilfully', then 'unjustly' means 'ignorantly' and 'unskilfully'; whereas if the [10] latter is not true, neither is the former, as in the instance given just now—for 'unjustly' is more likely to seem equivalent to 'skilfully' than to 'unskilfully'. This commonplace rule has been stated before in dealing with the sequence of contraries; for all we are claiming now is that the contrary follows the contrary [15].

Moreover, look at the modes of generation and destruction of a thing, and at the things which tend to produce or to destroy it, both in demolishing and in establishing a view. For those things whose modes of generation rank among good things, are themselves also good; and if they themselves are good, so also are their modes of generation. If, on the other hand, their modes of generation are evil, then they themselves also are evil. In regard to modes of destruction the converse is true; [20] for if the modes of destruction rank as good things, then they themselves rank as evil things; whereas if the modes of destruction count as evil, they themselves count as good. The same argument applies also to things tending to produce and destroy; for things whose productive causes are good, themselves also rank as good; whereas if causes destructive of them are good, they themselves rank as evil.

10 · Again, look at things which are like the subject in question, and see if [25] they are in like case; e.g. if one branch of knowledge has more

than one object, so also will one opinion; and if to possess sight is to see, then also to possess hearing will be to hear. Likewise also in the case of other things, both those which are and those which are held to be like. The rule in question is useful for both purposes; for if it is as stated in the case of some one like thing, it is so with the other like things as well, [30] whereas if it is not so in the case of some one of them, neither is it so in the case of the others. Look and see also whether the cases are alike as regards a single thing and a number of things; for sometimes there is a discrepancy. Thus, if to know a thing is to think of it, then also to know many things is to be thinking of many things; whereas this is not true; for it is possible to know many things but not to be thinking of them. If, then, the latter is not true, neither was the former that dealt [35] with a single thing, viz. that to know a thing is to think of it.

Moreover, argue from greater and less degrees. There are four commonplace rules. One is: see whether a greater degree of the predicate follows a greater degree of the subject: e.g. if pleasure is good, see whether also a greater pleasure is a greater good; and if to do a wrong is evil, see whether also to do a greater wrong is a [115<sup>a1</sup>] greater evil. Now this rule is of use for both purposes; for if an increase of the accident follows an increase of the subject, as we have said, clearly the accident belongs; while if it does not follow, the accident does not belong. You should [5] establish this by induction. Another rule is: if one predicate is attributed to two subjects, then supposing it does not belong to the subject to which it is the more likely to belong, neither does it belong where it is less likely to belong; while if it does belong where it is less likely to belong, then it belongs as well where it is more likely. Again: if two predicates are attributed to one subject, then if the one which is more generally thought to belong does not belong, neither does the one that is less [10] generally thought to belong; or, if the one that is less generally thought to belong does belong, so also does the other. Moreover: if two predicates are attributed to two subjects, then if the one which is more usually thought to belong to the one subject does not belong, neither does the remaining predicate belong to the remaining subject; or, if the one which is less usually thought to belong to the one subject does belong, so too does the remaining predicate to the remaining subject.

[15] Moreover, you can argue from the fact that an attribute belongs, or is thought to belong, in a like degree, in three ways, viz. those described in the last three rules given in regard to a greater degree. For supposing that one predicate belongs, or is thought to belong, to two subjects in a like degree, then if it does not belong to the one, neither

does it belong to the other; while if it belongs to the one, it belongs to the remaining one as well. Or, supposing two predicates to belong in a like degree to the [20] same subject, then, if the one does not belong, neither does the remaining one; while if the one does belong, the remaining one belongs as well. The case is the same also if two predicates belong in a like degree to two subjects; for if the one predicate does not belong to the one subject, neither does the remaining predicate belong to the remaining subject, while if the one predicate does belong to the one subject, the remaining predicate belongs to the remaining subject as well.

[25] **11** · You can argue, then, from greater or less or like degrees in the aforesaid manner of ways. Moreover, you should argue from the addition of one thing to another. If the addition of one thing to another makes that other good or white, whereas formerly it was not white or good, then the thing added will be white or good—it will possess the character it imparts to the whole as well. Moreover, if an [30] addition of something to a given object intensifies the character which it had, then the thing added will itself as well be of that character. Likewise, also, in the case of other attributes. The rule is not applicable in all cases, but only in those in which an increased intensity is found to take place. The above rule is, however, not convertible for overthrowing a view. For if the thing added does not make the other good, it is not thereby made clear whether in itself it may not be good; for the [115<sup>b</sup>1] addition of good to evil does not necessarily make the whole good, any more than the addition of white to black makes the whole white.

Again, any predicate of which we can speak of greater or less degrees belongs also without qualification; for greater or less degrees of good or of white will not be [5] attributed to what is not good or white; for a bad thing will never be said to have a greater or less degree of goodness, but always of badness. This rule is not convertible, either, for the purpose of overthrowing; for several predicates of which we cannot speak of a greater degree belong without qualification; for the term man [10] is not attributed in greater and less degrees, but a man is a man for all that.

You should examine in the same way predicates attributed in a given respect, and at a given time and place; for if the predicate is possible in some respect, it is possible also without qualification. Likewise, also, what is predicated at a given time or place; for what is without qualification impossible is not possible either in any respect or at any place or time. An objection may be raised that in a given [15] respect people may be good

by nature, e.g. they may be generous or temperately inclined, while they are not good by nature without qualification. Likewise, also, it is possible for a destructible thing to escape destruction at a given time, whereas it is not possible for it to escape without qualification. In the same way also it is a good thing at certain places to follow such and such a diet, e.g. in infected areas, though it [20] is not a good thing without qualification. Moreover, in certain places it is possible for there to be just one man, but without qualification it is not possible for there to be just one man. In the same way also it is in certain places honourable to sacrifice one's father, e.g. among the Triballi, whereas, without qualification, it is not [25] honourable. Or possibly this may indicate a relativity not to places but to persons; for it makes no difference wherever they may be; for everywhere it will be honourable for them. Again, at certain times it is a good thing to take medicines, e.g. when one is ill, but it is not so without qualification. Or possibly this again may indicate a relativity not to a certain time, but to a certain state of health; for it makes no difference when it occurs, if only one is in that state. A thing is without qualification so which without any addition you are prepared to say is honourable or [30] the contrary. Thus (e.g.) you will deny that to sacrifice one's father is honourable: it is honourable only to certain persons; it is not therefore honourable without qualification. On the other hand, to honour the gods you will declare to be honourable without adding anything; hence that is honourable without qualification. So that whatever without any addition is thought to be honourable or dishonourable or anything else of that kind, will be said to be so without [35] qualification.

## BOOK III

1 · The question which is the more desirable, or the better, of two or more [116<sup>a</sup>1] things, should be examined upon the following lines; only first of all it must be clearly laid down that the inquiry we are making concerns not things that are widely divergent and that exhibit great differences from one another (for nobody raises any [5] doubt whether happiness or wealth is more desirable), but things that are nearly related and about which we discuss for which of the two we ought rather to vote, because we do not see any advantage on either side as compared with the other. Clearly, then, in such cases if we can prove a single advantage, or more than one [10], our judgement will record our assent that whichever side happens to have the advantage is the more desirable.

First, then, that which is more lasting or secure is more desirable than that which is less so; and so is that which is more likely to be chosen by the prudent or by [15] the good man or by the right law, or by men who are good in any particular line, when they make their choice as such; i.e. either whatever most of them or what all of them would choose; e.g. in medicine (or in carpentry) those things are more desirable which most, or all, doctors would choose; or, in general, whatever most men or all men or all things would choose, e.g. the good; for everything aims at the good. You should direct the argument to whatever purpose you require. What is [20] absolutely better or more desirable is determined by the better science; what is relatively better, by the appropriate science.

In the second place, that which is essentially so is more desirable than that which does not come within the genus—e.g. justice than a just man; for the former falls within the genus, whereas the other does not, and the former is essentially [25] good, whereas the latter is not; for nothing which does not happen to belong to the genus is essentially the genus; e.g. a white man is not essentially a colour. Likewise also in other cases.

Also, that which is desired for itself is more desirable than that which is desired [30] for something else; e.g. health is more desirable than gymnastics; for the former is desired for itself, the latter for something else. Also, that which is desirable in itself is more desirable than what is desirable *per accidens*; e.g. justice in our friends than justice in our enemies; for the former is desirable in itself, the latter *per accidens*; for we desire that our enemies should be just *per accidens*, in order that they may

do [35] us no harm. This last principle is the same as the one that precedes it, with, however, a different turn of expression. For we desire justice in our friends for itself, even though it will make no difference to us, and even though they be in India; whereas in our enemies we desire it for something else, in order that they may do us no harm.

[116<sup>b</sup>1] Also, that which is in itself the cause of good is more desirable than what is so *per accidens*, e.g. virtue than luck (for the former is in itself, and the latter *per accidens*, the cause of good things), and so in other cases of the same kind. Likewise also in the case of the contrary; for what is in itself the cause of evil is more [5] objectionable than what is so *per accidens*, e.g. vice and chance; for the one is so in itself, whereas chance is so *per accidens*.

Also, what is good absolutely is more desirable than what is good for a particular person, e.g. recovery of health than a surgical operation; for the former is good absolutely, the latter only for a particular person, viz. the man who needs an [10] operation. So too what is good by nature is more desirable than the good that is not so by nature, e.g. justice than the just man; for the one is good by nature, whereas in the other case the goodness is acquired. Also the attribute is more desirable which belongs to the better and more honourable subject, e.g. to a god rather than to a man, and to the soul rather than to the body. So too the property of the better thing is better than the property of the worse, e.g. the property of God than the property [15] of man; for whereas in respect of what is common in both of them they do not differ at all from each other, in respect of their properties the one surpasses the other. Also that is better which is inherent in things better or prior or more honourable: thus (e.g.) health is better than strength and beauty; for the former is inherent in the moist and the dry, and the hot and the cold, in short in all the primary constituents [20] of an animal, whereas the others are inherent in what is posterior, strength being a feature of the sinews and bones, while beauty is thought to consist in a certain symmetry of the limbs. Also the end is generally supposed to be more desirable than the means, and of two means, that which lies nearer the end. In general, too, a means directed towards the end of life is more desirable than a means to anything else, e.g. that which contributes to happiness than that which contributes to [25] prudence. Also the possible is more desirable than the impossible. Moreover, of two productive agents that one is more desirable whose end is better; while between a productive agent and an end we can decide by a proportional sum: whenever the excess of the one end over the other is greater than that of the latter over its own productive means—e.g.

supposing the excess of happiness over health to be greater than that of health over what produces health—then what produces happiness is [30] better than health. For what produces happiness exceeds what produces health just as much as happiness exceeds health. But health exceeds what produces health by a smaller amount; hence, the excess of what produces happiness over what produces health is greater than that of health over what produces health. Clearly, therefore, what produces happiness is more desirable than health; for it exceeds the same [35] standard by a greater amount.

Moreover, what is in itself nobler and more precious and praiseworthy is more desirable, e.g. friendship than wealth, and justice than strength. For the former belong in themselves to the class of things precious and praiseworthy, while the latter do so not in themselves but for something else; for no one prizes wealth for [117<sup>a</sup>1] itself but always for something else, whereas we prize friendship for itself, even though nothing else is likely to come to us from it.

2 · Moreover, whenever two things are very much like one another, and we [5] cannot see any superiority in the one over the other of them, we should look at them from the standpoint of their consequences. For the one which is followed by the greater good is the more desirable; or, if the consequences be evil, that is more desirable which is followed by the less evil. For though both may be desirable, yet there may still be some unpleasant consequence. Our survey from the point of view [10] of consequences lies in two directions, for there are prior consequences and later consequences: e.g. if a man learns, it follows that he was ignorant before and knows afterwards. For the most part, the later consequence is the better. You should take, therefore, whichever of the consequences suits your purpose [15].

Moreover, a greater number of good things is more desirable than a smaller, either absolutely or when the one is included in the other, viz. the smaller number in the greater. An objection may be raised if in some particular case the one is for the sake of the other; for then the two together are not more desirable than the one; e.g. recovery of health and health, than health alone, inasmuch as we desire recovery of [20] health for the sake of health. Also it is quite possible for what are not good things to be more desirable than a number of good things, e.g. the combination of happiness and something else which is not good may be more desirable than the combination of justice and courage. Also, the

same things are more valuable if accompanied than if unaccompanied by pleasure, and likewise when free from pain than when attended with pain.

[25] Also, everything is more desirable at the season when it is of greater consequence; e.g. freedom from pain in old age more than in youth; for it is of greater consequence in old age. On the same principle also, prudence is more desirable in old age; for no man chooses the young as leaders, because he does not expect them to be prudent. With courage, the converse is the case, for it is in youth [30] that the active exercise of courage is more imperatively required. Likewise also with temperance; for the young are more troubled by their passions than are their elders.

Also, that is more desirable which is more useful at every season or at most [35] seasons, e.g. justice and temperance rather than courage; for they are always useful, while courage is only useful at times. Also, that one of two things which if all possess, we do not need the other thing, is more desirable than that which all may possess and still we want the other one as well. Take the case of justice and courage: [117<sup>b</sup>1] if everybody were just, there would be no use for courage, whereas all might be courageous, and still justice would be of use.

Moreover, judge by the destructions and losses and generations and acquisitions and contraries of things; for things whose destruction is more objectionable are [5] themselves more desirable. Likewise also with the losses and contraries of things; for a thing whose loss or whose contrary is more objectionable is itself more desirable. With the generations or acquisitions of things the opposite is the case; for things whose acquisition or generation is more desirable are themselves also more desirable.

[10] Another commonplace rule is that what is nearer to the good is better and more desirable; and also what more nearly resembles the good: thus justice is better than a just man. Also, the one which is more like something better than them both, as e.g. some say that Ajax was a better man than Odysseus because he was more like Achilles. (An objection may be raised to this that it is not true; for it is quite possible [15] that Ajax did not resemble Achilles more nearly in the points which made Achilles the best of them, and that Odysseus was a good man, though unlike Achilles. Look also to see whether the resemblance tends to the ridiculous, like the resemblance of a monkey to a man, whereas a horse bears none; for the monkey is not the more handsome creature, despite its nearer resemblance to a man.) Again, in the case of [20] two things, if



one is more like the better thing while another is more like the worse, then that will be better which is more like the better. (This too, however, admits of an objection; for quite possibly the one only slightly resembles the better, while the other strongly resembles the worse, e.g. supposing the resemblance of Ajax to [25] Achilles to be slight, while that of Odysseus to Nestor is strong.) Also it may be that the one which is like the better resembles it for the worse, whereas the one which is like the worse resembles it for the better: witness the likeness of a horse to a donkey, and that of a monkey to a man.

Another rule is that the more conspicuous good is more desirable than the less conspicuous, and the more difficult than the easier; for we appreciate better the possession of things that cannot be easily acquired. Also the more personal [30] possession is more desirable than the more widely shared. Also, that which we share less in common with evil men; [for what is not attended by any unpleasantness is more desirable than what is so attended.]<sup>8</sup>

Moreover, if one thing is without qualification better than another, then also the best of the members of the former is better than the best of the members of the latter; e.g. if man is better than horse, then also the best man is better than the best [35] horse. Also, if the best is better than the best, then also the former is better than the latter without qualification; e.g. if the best man is better than the best horse, then also man is better than horse without qualification.

Moreover, things which our friends can share are more desirable than those [118a1] they cannot. Also, things which we like rather to do to a friend are more desirable than those we like to do to anyone, e.g. just dealing and the doing of good rather than the semblance of them; for we would rather really do good to our friends than seem to do so, whereas towards anyone the converse is the case. [5]

Also, superfluities are better than necessities, and are sometimes more desirable as well; for the good life is better than mere life, and good life is a superfluity, whereas mere life itself is a necessity. Sometimes, though, what is better is not also more desirable; for there is no necessity that because it is better it should also be more desirable: at least to be a philosopher is better than to make [10] money, but it is not more desirable for a man who lacks the necessities of life. There is superfluity whenever a man possesses the necessities of life and sets to work to secure as well other noble acquisitions. Roughly speaking, perhaps, necessities are more desirable, while superfluities are better. [15]

Also, what cannot be got from another is more desirable than what

can be got from another as well, as (e.g.) is the case of justice compared with courage. Also, a thing is more desirable if it is desirable without the other, but not the other without it: power (e.g.) is not desirable without prudence, but prudence is desirable without power. Also, if of two things we repudiate the one in order to be thought to possess [20] the other, then that one is more desirable which we wish to be thought to possess; thus (e.g.) we repudiate hard work in order that people may think us naturally gifted.

Moreover, that is more desirable in whose absence it is less blameworthy for people to be vexed; and that is more desirable in whose absence it is more [25] blameworthy for a man not to be vexed.

3 · Moreover, of things that belong to the same species one which possesses the virtue appropriate to the species is more desirable than one which does not. If both possess it, then the one which possesses it in a greater degree is more desirable.

Moreover, if one thing makes good whatever it affects, while another does not, [30] the former is more desirable, just as also what makes things warm is warmer than what does not. If both do so, then that one is more desirable which does so in a greater degree, or if it renders good the better and more important object—if (e.g.) the one affects the soul, and the other the body.

Moreover, judge things by their inflexions and uses and actions and effects, [35] and judge these by them; for they go with each other: e.g. if ‘justly’ is more desirable than ‘courageously’, then also justice is more desirable than courage; and if justice is more desirable than courage, then also ‘justly’ is more desirable than ‘courageously’. Similarly also in the other cases.

[118<sup>b</sup>1] Moreover, if one thing exceeds while the other falls short of the same standard of good, the one which exceeds is the more desirable; or if the one exceeds an even higher standard. Again, if there are two things both more desirable than something, the one which is more desirable to a greater degree is more desirable than the one more desirable to a less degree. Moreover, when the excess of a thing is more [5] desirable than the excess of something else, that thing is itself also more desirable than the other, as (e.g.) friendship than money; for an excess of friendship is more desirable than an excess of money. So also that of which a man would rather that it were his by his own doing is more desirable than what he would rather get by another’s doing, e.g.

friends than money.

[10] Moreover, judge by means of an addition, and see which when added to the same thing makes the whole more desirable. You must, however, beware of adducing a case in which the common term uses, or in some other way helps the case of, one of the things added to it, but not the other, as (e.g.) if you took a saw and a [15] sickle in combination with the art of carpentry; for in the combination the saw is a more desirable thing, but it is not a more desirable thing without qualification. Again, a thing is more desirable if, when added to a lesser good, it makes the whole a greater good. Likewise, also, you should judge by means of subtraction; for the thing upon whose subtraction the remainder is a lesser good may be taken to be a greater good, whichever it be whose subtraction makes the remainder a lesser good.

[20] Also, if one thing is desirable for itself, and the other because of opinion, the former is more desirable, as (e.g.) health than beauty. A thing is defined as being desired because of opinion if, supposing no one knew of it, you would not care to have it. Also, it is more desirable if it is desirable both for itself and because of opinion, while the other thing is desirable on the one ground alone. Also, whichever is the more precious in itself, is also better and more desirable. A thing may be taken [25] to be more precious in itself which we choose rather for itself, without anything else being likely to come of it.

Moreover, you should distinguish in how many ways things are called desirable, and with a view to what ends, e.g. expediency or honour or pleasure. For what is useful for all or most of them is more desirable, if they belong to the same [30] degree. If the same characters belong to both things you should look and see which possesses them more markedly, i.e. which of the two is the more pleasant or more honourable or more expedient. Again, that is more desirable which serves the better purpose, e.g. that which serves to promote virtue more than that which serves to promote pleasure. Likewise also in the case of objectionable things; for that is more objectionable which stands more in the way of what is desirable, e.g. disease more [35] than ugliness; for disease is a greater hindrance both to pleasure and to being good.

Moreover, argue by proving that the thing in question is in like measure objectionable and desirable; for a thing of such a character that a man might well desire and object to it alike is less desirable than the other which is desirable only.

4 · Comparisons of things with one another should be conducted in the [119a1] manner prescribed. The same commonplace rules are useful also for showing that anything is desirable or objectionable; for we have only to subtract the excess of one thing over another. For if what is more precious is more desirable, then also what is precious is desirable; and if what is more useful is more desirable, then also what is [5] useful is desirable. Likewise, also, in the case of other things which admit of comparisons of that kind. For in some cases in the very course of comparing the things together we at once assert also that each of them, or the one of them, is desirable, e.g. whenever we call the one good by nature and the other not by nature; [10] for clearly what is good by nature is desirable.

5 · The commonplace rules relating to comparative degrees and amounts ought to be taken in the most general possible form; for when so taken they are likely to be useful in a large number of instances. It is possible to render some of the actual rules given above more universal by a slight alteration of the expression, e.g. [15] that what by nature exhibits such and such a quality exhibits that quality in a greater degree than what exhibits it not by nature. Also, if one thing does, and another does not, impart such and such a quality to that which possesses it, then whichever does impart it is of that quality in greater degree than the one which does not impart it; and if both impart it, then that one exhibits it in a greater degree which imparts it in a greater degree.

Moreover, if in any character one thing exceeds and another falls short of the [20] same standard; also, if the one exceeds something which possesses the character, while the other exceeds something which does not, then clearly the first thing exhibits that character in a greater degree. Moreover, you should judge by means of addition, and see if when added to the same thing it imparts to the whole such and such a character in a more marked degree, or if, when added to a thing which exhibits that character in a less degree, it imparts that character to the whole in a greater degree. Likewise, also, you may judge by means of subtraction; for a thing [25] upon whose subtraction the remainder exhibits such and such a character in a less degree, itself exhibits that character in a greater degree. Also, things exhibit such and such a character in a greater degree if more free from admixture with their contraries; e.g. that is whiter which is more free from admixture with black. Moreover, apart from the rules given above, that has such and such a character in greater degree which admits in a greater degree of the account proper to the given [30]

character; e.g. if the account of 'white' is a colour which disperses the vision, then that is whiter which is in a greater degree a colour that disperses the vision.

6 · If the problem is put in a particular and not in a universal form, in the first place<sup>9</sup> the universal constructive or destructive commonplace rules that have been given may all be brought into use. For in demolishing or establishing a thing [35] universally we also prove it in particular; for if it belongs to all, it belongs also to some, and if to none, not to some. Especially handy and of general application are the commonplace rules that are drawn from the opposites and co-ordinates and inflexions; for it is equally reputable to claim that if all pleasure is good, then also all [119b1] pain is evil, and that if some pleasure is good, then also some pain is evil. Moreover, if some form of perception is not a capacity, then also some form of failure of perception is not a failure of capacity. Also, if some objects of belief are objects of knowledge, then also some form of belief is knowledge. Again, if what happens [5] unjustly is in some cases good, then some unjust things are good. Also, if what is done with pleasure is in some cases objectionable, then pleasure is in some cases an objectionable thing. On the same principle, also, if what is pleasant is in some cases beneficial, then pleasure is in some cases good. The case is the same also as regards the things that destroy, and the processes of generation and destruction. For if some [10] things that destroy pleasure or knowledge are good, then pleasure or knowledge is in some cases an evil thing. Likewise, also, if the destruction of knowledge is in some cases a good thing or its production an evil thing, then knowledge will be in some cases an evil thing; e.g. if for a man to forget his disgraceful conduct is a good thing, or to remember it an evil thing, then the knowledge of his disgraceful conduct is an [15] evil thing. The same holds also in other cases; for all are equally reputable.

Moreover you should judge by means of greater or less or like degree; for if some member of another genus exhibits such and such a character in a more marked degree, while no member of that genus exhibits that character at all, then the object in question will not exhibit it; e.g. if some form of knowledge is good in a [20] greater degree than pleasure, while no form of knowledge is good, then pleasure is not good either. Also, you should judge by a less or like degree in the same way; for so you will find it possible both to demolish and to establish a view, except that whereas both are possible by means of like degrees, by means of a less degree it is possible only to establish, not to overthrow. For if a certain capacity is

good in a like [25] degree to knowledge, and a certain capacity is good, then also is knowledge; while if no capacity is good, then neither is knowledge. If, too, a certain capacity is good in a less degree than knowledge, and a certain capacity is good, then so also is knowledge; but if no capacity is good, there is no necessity that no form of knowledge either should be good. Clearly, then, it is only possible to establish a view [30] by means of a less degree.

Not only by means of another genus can you overthrow a view, but also by means of the same, if you take the most marked instance of the character in question; e.g. if it is maintained that some form of knowledge is good, then, suppose it to be proved that prudence is not good, neither will any other kind be good, seeing that not even the kind upon which there is most general agreement is so. Moreover, you should argue from an hypothesis: you should claim that the attribute, if it [35] belongs or does not belong in one case, does so in a like degree in all, e.g. that if the soul of man is immortal, so are other souls as well, while if this one is not so, neither are the others. If, then, it is maintained that in some instance the attribute belongs, you must prove that in some instance it does not belong; for then it will follow, by [120<sup>a</sup>1] reason of the hypothesis, that it does not belong in any instance. If, on the other hand, it is maintained that it does not belong in some instance, you must prove that it does belong in some instance, for in this way it will follow that it belongs in all instances. It is clear that the maker of the hypothesis universalizes the problem, whereas it was stated in a particular form; for he claims that anyone who agrees to the particular should agree to the universal, inasmuch as he claims that if the attribute belongs in one instance, it belongs also in all instances alike [5].

If the problem is indefinite, it is possible to overthrow it in only one way; e.g. if a man has asserted that some pleasure is good or is not good, without any further definition. For if he has asserted that some pleasure is good, you must prove universally that no pleasure is good, if the proposition in question is to be [10] demolished. And likewise, also, if he has asserted that some pleasure is not good you must prove universally that all pleasure is good: it is impossible to demolish it in any other way. For if we prove that some pleasure is not good or is good, the proposition in question is not yet demolished. It is clear, then, that it is possible to demolish an indefinite statement in one way, whereas it can be established in two ways; for whether we prove universally that all pleasure is good, or that some pleasure is good, [15] the proposition in question will have been proved. Likewise, also, supposing we are required

to argue that some pleasure is not good, if we prove that no pleasure is good or that some pleasure is not good, we shall have produced an argument in both ways, both universally and in particular, to show that some pleasure is not good. If, on the [20] other hand, the thesis is definite, it will be possible to demolish it in two ways; e.g. if it is maintained that it is an attribute of some pleasure to be good, while of some it is not; for whether it is proved that all pleasure, or that no pleasure, is good, the proposition in question will have been demolished. If, however, he has stated that only one single pleasure is good, it is possible to demolish it in three ways; for by [25] proving that all pleasure, or that no pleasure, or that more than one pleasure, is good, we shall have demolished the statement in question. If the thesis is still more definite, e.g. that prudence alone of the virtues is knowledge, there are four ways of demolishing it; for if it is proved that all virtue is knowledge, or that no virtue is, or that some other virtue (e.g. justice) is, or that prudence itself is not knowledge, the [30] proposition in question will have been demolished.

It is useful also to take a look at individual instances, in cases where some attribute has been said to belong or not to belong, as in the case of universal problems. Moreover, you should take a look among genera, dividing them by their [35] species until you come to those that are not further divisible, as has been said before; for whether the attribute is found to belong in all cases or in none, you should, after adducing many instances, claim that he should either admit your point universally, or else bring an objection showing in what case it does not hold. Moreover, in cases where it is possible to divide the accident either specifically or numerically, you should look and see whether none of them belongs, showing e.g. that time is not [120<sup>b</sup>1] moved, nor yet is a movement, by enumerating all the species of movement; for if none of these belongs to time, clearly it does not move, nor yet is a movement. Likewise, also, you can show that the soul is not a number, by dividing all numbers [5] into either odd or even; for if the soul is neither odd nor even, clearly it is not a number.

In regard then to accident, you should set to work by means like these, and in this manner.

## BOOK IV

1 · Next we must go on to examine questions relating to genus and property. These are elements in the questions that relate to definitions, but dialecticians seldom address their inquiries to these by themselves.

[15] If, then, a genus is suggested for something that is, first take a look at all objects which belong to the same genus as the thing mentioned, and see whether the genus suggested is not predicated of some of them, as in the case of accident: e.g. if good is laid down as the genus of pleasure, see whether some pleasure is not good; [20] for, if so, clearly good is not the genus of pleasure; for the genus is predicated of all the members of the same species. Secondly, see whether it is predicated not in what it is, but as an accident, as white is predicated of snow, or self-moved of the soul. For snow is not just what is white, and therefore white is not the genus of snow, nor is the soul just what is moving—its motion is an accident of it, as it often is of an animal to [25] walk or to be walking. Moreover, moving does not seem to indicate what something is, but rather a state of doing or of undergoing. Likewise, also, white; for it indicates not what snow is, but a certain quality of it. So that neither of them is predicated in what it is.

[30] Especially you should take a look at the definition of accident, and see whether it fits the genus mentioned, as (e.g.) is the case in the instances just given. For it is possible for a thing to be and not to be self-moved, and likewise, also, for it to be and not to be white. So that neither of these is the genus but an accident, since we said [35] that an accident is an attribute which can belong to a thing and also not belong.

Moreover, see whether the genus and the species are not found in the same division, but the one is a substance while the other is a quality, or the one is a relative while the other is a quality, as (e.g.) snow and swan are each a substance, while white is not a substance but a quality, so that white is not a genus either of [121<sup>a</sup>1] snow or of swan. Again, knowledge is a relative, while good and noble are each a quality, so that good, or noble, is not the genus of knowledge. For the genera of relatives ought themselves also to be relatives, as is the case with double; for multiple, which is the genus of double, is itself also a relative. To speak generally,



[5] the genus ought to fall under the same division as the species; for if the species is a substance, so too should be the genus, and if the species is a quality, so too the genus should be a quality; e.g. if white is a quality, so too should colour be. Likewise, also, in other cases.

Again, see whether it is necessary or possible for the genus to partake of the [10] object which has been placed in the genus. Partaking is defined as admitting the account of that which is partaken. Clearly, therefore, the species partake of the genera, but not the genera of the species; for the species admits the account of the genus, whereas the genus does not admit that of the species. You must look, therefore, and see whether the alleged genus partakes or can partake of the species, [15] e.g. if any one were to render anything as genus of being or of one; for then the result will be that the genus partakes of the species; for of everything that is, being and one are predicated, and therefore their account as well.

Moreover, see if there is anything of which the alleged species is true, while the [20] genus is not, e.g. supposing being or object of knowledge were stated to be the genus of object of opinion. For object of opinion will be a predicate of what does not exist; for many things which do not exist are objects of opinion; whereas that being or object of knowledge is not predicated of what does not exist is clear. So that neither being nor object of knowledge is the genus of object of opinion; for of the objects of [25] which the species is predicated, the genus ought to be predicated as well.

Again, see whether the object placed in the genus cannot partake of any of its species; for it is impossible that it should partake of the genus if it does not partake of any of its species, unless it is one of the species reached by the first division—these partake of the genus alone. If, therefore, motion is stated as the genus of [30] pleasure, you should look and see if pleasure is neither locomotion nor alteration, nor any of the rest of the given modes of motion; for clearly it will not partake of any of the species, and therefore not of the genus either, since what partakes of the genus must necessarily partake of one of the species as well; so that pleasure could [35] not be a species of motion, nor yet be one of the individual phenomena falling under a species of motion.<sup>10</sup> For individuals as well partake in the genus and the species, as (e.g.) an individual man partakes of both man and animal.

Moreover, see if the term placed in the genus has a wider denotation than the [121<sup>b1</sup>] genus, as (e.g.) object of opinion has, as compared with being; for both what is and what is not are objects of opinion, so that

object of opinion could not be a species of being; for the genus is always of wider denotation than the species. Again, see if the species and its genus have an equal denotation; suppose, for instance, that of the [5] attributes which go with everything, one were to be stated as a species and the other as its genus, as for example being and one; for everything has being and one, so that neither is the genus of the other, since their denotation is equal. Likewise, also, if primitives and principles were to be placed one under the other; for a principle is a [10] primitive and a primitive a principle, so that either the two are identical or neither is the genus of the other. The elementary principle in regard to all such cases is that the genus has a wider denotation than the species and its differentia; for the differentia too has a narrower denotation than the genus.

[15] See also whether the genus mentioned fails, or might be thought to fail, to apply to some object which is not specifically different from the thing in question; or, if your argument is constructive, whether it does so apply. For all things that are not specifically different have the same genus. If, therefore, it is proved to apply to one, then clearly it applies to all, and if it fails to apply to one, clearly it fails to apply to any; e.g. if any one who assumes that there are indivisible lines were to say that [20] the indivisible is their genus. For the aforesaid term is not the genus of divisible lines, and these do not differ as regards their species—for straight lines are never different from each other as regards their species.

2 · Look and see, also, if there is any other genus of the given species which [25] neither embraces the given genus nor falls under it, e.g. suppose any one were to lay down that knowledge is the genus of justice. For virtue is its genus as well, and neither of these genera embraces the remaining one, so that knowledge could not be the genus of justice; for it seems that whenever one species falls under two genera, [30] the one is embraced by the other. Yet a principle of this kind gives rise to a difficulty in some cases. For some people hold that prudence is both virtue and knowledge, and that neither of its genera is embraced by the other—although certainly not everybody admits that prudence is knowledge. If, however, any one were to admit the truth of this assertion, yet it would still be thought to be necessary that the [35] genera of the same object must at any rate be subordinate either the one to the other or both to the same thing as actually is the case with virtue and knowledge. For both fall under the same genus; for each of them is a state and a disposition. You should look, therefore, and see whether neither of these things is true of the given genus; for [122\*1] if the genera are subordinate

neither the one to the other nor both to the same thing, then what is given could not be the genus.

Look, also, at the genus of the given genus, and so continually at the next higher genus, and see whether all are predicated of the species, and predicated in [5] what it is; for the higher genus should be predicated of the species in what it is. If, then, there is anywhere a discrepancy, clearly what is given is not the genus. Again, see whether either the genus itself, or one of its higher genera, partakes of the species; for the higher genus does not partake of any of the lower. If, then, you are [10] overthrowing a view, follow the rule as given; if establishing one, then—suppose that what has been named as genus is admitted to belong to the species, only it is disputed whether it belongs as genus—it is enough to prove that one of its higher genera is predicated of the species in what it is. For if one of them is predicated in [15] what it is, all of them, both higher and lower than this one, if predicated at all of the species, will be predicated of it in what it is; so that what has been given as genus is also predicated in what it is. The proposition that when one genus is predicated in what it is, all the rest, if predicated at all, will be predicated in what it is, should be secured by induction. Supposing, however, that it is disputed whether the given genus belongs at all, it is not enough to prove that one of the higher genera is [20] predicated of the species in what it is: e.g. if any one has given locomotion as the genus of walking, it is not enough to prove that walking is motion in order to prove that it is locomotion, seeing that there are other forms of motion as well; but one must prove in addition that walking does not partake of any of the species of motion [25] produced by the same division as locomotion. For of necessity what partakes of the genus partakes also of one of the species produced by the first division. If, therefore, walking does not partake either of increase or decrease or of the other kinds of motion, clearly it will partake of locomotion, so that locomotion will be the genus of [30] walking.

Again, look among the things of which the given species is predicated as genus, and see if what is given as its genus is also predicated in what it is of the very things of which the species is so predicated, and likewise if all the genera higher than this genus are so predicated as well. For if there is anywhere a discrepancy, clearly what has been given is not the genus; for had it been the genus, then both the genera [35] higher than it, and it itself, would all have been predicated in what it is of those objects of which the species too is predicated in what it is. If, then, you are overthrowing a view, it is useful to see whether the genus fails to be predicated in what it is of those things of which the species is predicated.

If establishing a view, it is useful to see whether it is predicated in what it is; for if so, the result will be that [122<sup>b</sup>1] the genus and the species will be predicated of the same object in what it is, so that the same object falls under two genera; the genera must therefore of necessity be subordinate one to the other, and therefore if it is proved that the one we wish to establish as genus is not subordinate to the species, clearly the species will be [5] subordinate to it, so that it is proved that it is the genus.

Look, also, at the accounts of the genera, and see whether they apply both to the given species and to the objects which partake of the species. For of necessity the accounts of its genera must be predicated of the species and of the objects which partake of the species; if, then, there is anywhere a discrepancy, clearly what has [10] been given is not the genus.

Again, see if he has given the differentia as the genus, e.g. immortal as the genus of God. For immortal is a differentia of living being, seeing that of living beings some are mortal and others immortal. Clearly, then, a mistake has been made; for the differentia of a thing is never its genus. And that this is true is clear; [15] for a thing's differentia never signifies what it is, but rather some quality, as do walking and biped.

Also, see whether he has placed the differentia inside the genus, e.g. saying that the odd is essentially a number. For odd is a differentia of number, not a species. Nor is the differentia thought to partake of the genus; for what partakes of [20] the genus is always either a species or an individual, whereas the differentia is neither a species nor an individual. Clearly, therefore, the differentia does not partake of the genus, so that odd too is no species, seeing that it does not partake of the genus.

[25] Moreover, see whether he has placed the genus inside the species, e.g. by taking contact to be essentially continuity, or mixture essentially fusion, or, as in Plato's definition,<sup>11</sup> change of place to be locomotion. For there is no necessity that contact should be continuity: rather, conversely, continuity must be contact; for what is in contact is not always continuous, though what is continuous is always in [30] contact. Likewise, also, in the remaining instances; for mixture is not always a fusion (for to mix dry things does not fuse them), nor is change of place always locomotion. For walking is not thought to be locomotion; for it is mostly used of things that change one place for another involuntarily, as happens in the case of [35] inanimate things. Clearly, also, the species, in the instances given, has a wider denotation than the genus, whereas it ought to be vice versa.

Again, see whether he has placed the differentia inside the species, by

taking (e.g.) immortal to be essentially a god. For the result will be that the species has an equal or wider denotation; for always the differentia has an equal or a wider [123\*1] denotation than the species. Moreover, see whether he has placed the genus inside the differentia, by making colour (e.g.) to be essentially dispersive, or number essentially odd. Also, see if he has mentioned the genus as differentia; for it is possible for a man to bring forward a thesis of this kind as well, e.g. that mixture is a [5] differentia of fusion, or that change of place is a differentia of locomotion. All such cases should be examined by means of the same principles; for they depend upon common rules; for the genus should have a wider denotation than its differentia, and also should not partake of its differentia; whereas, if it is given in this manner, neither of the aforesaid requirements can be satisfied; for the genus will both have a [10] narrower denotation than its differentia, and will partake of it.

Again, if no differentia belonging to the genus is predicated of the given species, neither will the genus be predicated of it; e.g. of soul neither odd nor even is predicated; neither therefore is number. Moreover, see whether the species is naturally prior and abolishes the genus along with itself; for the contrary seems to [15] be the case. Moreover, if it is possible for the genus stated, or for its differentia, to be absent, e.g. for movement to be absent from the soul, or truth and falsehood from opinion, then neither of the terms stated can be its genus or its differentia; for it seems that the genus and the differentia accompany the species, as long as it exists.

[20] **3** · Look and see, also, if what is placed in the genus partakes or could partake of any contrary of the genus; for in that case the same thing will at the same time partake of contrary things, seeing that the genus is never absent from it, while it partakes, or can partake, of the contrary as well. Moreover, see whether the species shares in any character which it is utterly impossible for any member of the [25] genus to have. Thus (e.g.) if the soul has a share in life, while it is impossible for any number to live, then the soul will not be a species of number.

You should look and see, also, if the species is a homonym of the genus, and employ as your elementary principles those already stated for dealing with homonyms;<sup>12</sup> for the genus and the species are synonymous.

Seeing that of every genus there is more than one species, look and see if it is [30] impossible that there should be another species belonging to the genus stated, for if there is none, then clearly what has been stated will not be a genus at all.

Look and see, also, if he has given as genus something spoken of metaphorically, describing (e.g.) temperance as a harmony; for a genus is always predicated of its species in its literal sense, whereas harmony is predicated of temperance not in a [35] literal sense but metaphorically; for a harmony always consists in notes.

Moreover, if there is any contrary of the species, examine it. The examination [123<sup>b</sup>1] may take different forms; first of all see if the contrary as well is found in the same genus, supposing the genus to have no contrary; for contraries ought to be found in the same genus, if there is no contrary to the genus. Supposing, on the other hand, that there is a contrary to the genus, see if the contrary of the species is found in the [5] contrary genus; for of necessity the contrary must be in the contrary, if there is any contrary to the genus. Each of these points is made plain by means of induction. Again, see whether the contrary of the species is not found in any genus at all, but is itself a genus, e.g. the good; for if this is not found in any genus, neither will its contrary be found in any genus, but will itself be a genus, as happens in the case of [10] good and evil; for neither of these is found in a genus, but each of them is a genus. Moreover, see if both genus and species are contrary to something, and one pair of contraries has an intermediary, but not the other. For if the genera have an intermediary, so should their species as well, and if the species have, so should their [15] genera as well, as is the case with virtue and vice, and with justice and injustice; for each pair has an intermediary. (An objection to this is that there is no intermediary between health and disease, although there is one between evil and good.) Or see whether, though there is an intermediary between both, i.e. both between the species and between the genera, yet it is not similarly related, but in one case negatively, but in the other case as a subject. For it is a reputable opinion that the [20] relation should be similar in both cases, as it is in the cases of virtue and vice and of justice and injustice; for the intermediaries between both are purely negative. Moreover, whenever the genus has no contrary, look and see not merely whether the contrary is found in the same genus, but the intermediate as well; for the genus containing the extremes contains the intermediates as well, as (e.g.) in the case of [25] white and black; for colour is the genus both of these and of all the intermediate colours. (An objection may be raised that defect and excess are found in the same genus (for both are in the genus evil), whereas moderate amount, an intermediate between them, is found not in evil but in good.) Look and see also whether, while the genus has a contrary, the species has none; for if the genus is contrary to anything,

[30] so too is the species, as virtue and vice, and justice and injustice. Likewise, also, if one were to look at other instances, one would come to see this clearly. (An objection may be raised in the case of health and disease; for health without qualification is [35] the contrary of disease, whereas a particular disease, e.g. fever and ophthalmia and any other particular disease, has no contrary.)

[124<sup>a</sup>1] If, therefore, you are demolishing a view, there are all these ways in which you should make your examination; for if the aforesaid characters do not belong to it, clearly what has been given is not the genus. If, on the other hand, you are establishing a view, there are three ways: in the first place, see whether the contrary is found in the genus stated, supposing the genus to have no contrary; for if the [5] contrary is found in it, clearly the species in question is found in it as well. Moreover, see if the intermediate species is found in the genus stated; for whatever genus contains the intermediate contains the extremes as well. Again, if the genus has a contrary, look and see whether the contrary species is found in the contrary genus; for if so, clearly also the species in question is found in the genus in question.

[10] Again, consider in the case of the inflexions and the co-ordinates, and see whether they follow in the same way, both in demolishing and in establishing a view. For whatever attribute belongs or does not belong to one belongs or does not belong at the same time to all; e.g. if justice is a particular form of knowledge, then also justly is knowingly and the just man is a man of knowledge; whereas if any of these things is not so, then neither is any of the rest of them.

[15] **4** · Again, consider the case of things that bear a like relation to one another. Thus (e.g.) the relation of the pleasant to pleasure is like that of the useful to the good; for in each case the one produces the other. If therefore pleasure is essentially good, then also the pleasant will be essentially useful; for clearly it will be productive of good, seeing that pleasure is good. In the same way also consider the [20] processes of generation and destruction; if (e.g.) to build is to be active, then to have built is to have been active, and if to learn is to recollect, then also to have learnt is to have recollected, and if to be decomposed is to be destroyed, then to have been decomposed is to have been destroyed, and decomposition is a kind of destruction. Consider also in the same way the case of things that generate or destroy, and of the [25] capacities and uses of things; and in general, both in demolishing and in establishing, you should examine things in the light of any resemblance of whatever

description, as we were saying in the case of generation and destruction. For if what tends to destroy tends to decompose, then also to be destroyed is to be decomposed; [30] and if what tends to generate tends to produce, then to be generated is to be produced, and generation is production. Likewise, also, in the case of the capacities and uses of things; for if a capacity is a disposition, then also to be capable is to be disposed, and if the use of anything is an activity, then to use it is to be active, and to have used it is to have been active.

[35] If the opposite of the species is a privation, there are two ways of demolishing an argument. First of all by looking to see if the opposite is found in the given genus; for either the privation is never absolutely in the same genus, or at least not in the same ultimate genus: e.g. if the ultimate genus containing sight is perception, then blindness will not be a perception. Secondly, if there is a privation opposed to both genus and species, but the opposite of the species is not found in the opposite of the [124<sup>b</sup>1] genus, then neither will the given species be in the given genus. If, then, you are demolishing a view, you should follow the rule as stated; but if establishing one there is but one way; for if the opposite species is found in the opposite genus, then also the species in question will be found in the genus in question: e.g. if blindness is [5] a form of lack of perception, then sight is a form of perception.

Again, look at the negations in reverse order, according to the method described in the case of accident:<sup>13</sup> e.g. if the pleasant is essentially good, what is not good is not pleasant. [For were this not so, something not good would then be pleasant.]<sup>14</sup> For it is impossible, if good is the genus of pleasant, that anything not [10] good should be pleasant; for of things of which the genus is not predicated, none of the species is predicated either. Also, in establishing a view, you should adopt the same method of examination; for if what is not good is not pleasant, then what is pleasant is good, so that good is the genus of pleasant.

If the species is a relative, see whether the genus is a relative as well; for if the [15] species is a relative, so too is the genus, as is the case with double and multiple; for each is a relative. If, on the other hand, the genus is a relative, there is no necessity that the species should be so as well; for knowledge is a relative, but not so grammar. (Or possibly not even the first statement would seem true; for virtue is essentially [25] noble and essentially good, and yet, while virtue is a relative, good and noble are not relatives but qualities.)

Again, see whether the species fails to be related to the same thing in its own right, and in respect of its genus: e.g. if double is the double of a



half, then it ought also to be multiple of a half. Otherwise multiple will not be the genus of double.[25]

Moreover, see whether it fails to be related to the same thing both in respect of its genus and in respect of all the genera of its genus. For if the double is a multiple of a half, then it will also be in excess of a half; and, in general, in respect of all the [30] higher genera it will be related to a half. (An objection may be raised that there is no necessity for a term to be related to the same thing in its own right and in respect of its genus; for knowledge is called knowledge of an object of knowledge, whereas it is called a state and disposition not of an object of knowledge but of the soul.)

Again, see whether the genus and the species are used in the same way in [35] respect of the inflexions they take, e.g. datives and genitives and all the rest.<sup>15</sup> For as the species is used, so should the genus be as well, as in the case of double and its higher genera; for both double and multiple take a genitive. Likewise, also, in the case of knowledge; for both knowledge itself and its genera, e.g. disposition and state, take a genitive. (An objection may be raised that in some cases it is not so; for [125<sup>a</sup>1] different and contrary take a dative, whereas other, which is the genus of these terms, takes a genitive—for we talk of being other than something.)

[5] Again, see whether terms used in like manner in respect of inflexions fail to yield a like construction when converted, as do double and multiple. For each of these terms takes a genitive both in itself and in its converted form; for both a half and a fraction take the genitive. The case is the same also as regards both [10] knowledge and belief; for they take a genitive themselves, and likewise after conversion; for object of knowledge and object of belief both take a dative. If, then, in any cases the constructions after conversion are not alike, clearly the one term is not the genus of the other.

Again, see whether the species and the genus fail to be used in relation to an [15] equal number of things; for it seems that the uses of both are alike and equal in number, as is the case with transfers and gifts. For a transfer is of something and to someone, and also a gift is of something and to someone; and transfer is the genus of gift, for a gift is a transfer that need not be returned. In some cases, however, it turns out that they are not related to an equal number of things; for while double is [20] double of something, in excess and greater are in something, as well as of something; for what is in excess or greater is always in excess in something, as well as in excess of something.<sup>16</sup> Hence the terms in question are not the genera of double, inasmuch as they are not used in

relation to an equal number of things with the species. Or perhaps it is not universally true that species and genus are used in relation to an equal number of things.

[25] See, also, if the opposite of the species has the opposite of the genus as its genus, e.g. whether, if multiple is the genus of double, fraction is of half. For the opposite of the genus should always be the genus of the opposite. If, then, anyone were to assert that knowledge is essentially perception, then also the object of knowledge will have to be essentially an object of perception, whereas it is not; for an object of knowledge is not always an object of perception; for objects of [30] knowledge include some of the objects of the intellect as well. Hence object of perception is not the genus of object of knowledge; and if it is not, neither is perception the genus of knowledge.

Seeing that of relatives some are of necessity found in, or about, the things in relation to which they happen at any time to be used (e.g. composition and state and [35] balance; for in nothing else can the aforesaid terms possibly be found except in the things in relation to which they are used), while others need not be found in the things in relation to which they are used at any time, though they still may be (e.g. if the soul is an object of knowledge, for it is quite possible that the soul should possess knowledge of itself, but it is not necessary—for knowledge may just as well be found [125<sup>b</sup>1] in something different), while for others, again, it is absolutely impossible that they should be found in the things in relation to which they happen at any time to be used (as e.g. that a contrary should be found in its contrary or knowledge in the object of knowledge unless the object of knowledge happens to be a soul or a man)—you [5] should look, therefore, and see whether he places a term of one kind inside a genus that is not of that kind, e.g. suppose he has said that memory is a persisting of knowledge. For a persisting is always found in that which persists, and is about it, so that the persisting of knowledge also will be found in knowledge. Memory, then, is found in knowledge, seeing that it is a persisting of knowledge. But this is impossible; for memory is always found in the soul. The aforesaid commonplace [10] rule is common to the subject of accident as well; for it makes no difference whether you say that persisting is the genus of memory, or allege that it is an accident of it. For if in any way whatever memory is a persisting of knowledge, the same argument in regard to it will apply.

5 · Again, see if he has placed what is a state inside the genus activity, or an [15] activity inside the genus state, e.g. by calling

perception a movement communicated through the body; for perception is a state, whereas movement is an activity. Likewise, also, if he has said that memory is a state that is retentive of a belief; for memory is never a state, but rather an activity.

They also make a mistake who rank a state within the capacity that attends it, [20] e.g. by calling good temper mastery of anger, and courage and justice mastery of fears and of gains; for courage and good temper belong to the man who is immune from passion, whereas mastery is exhibited by the man who is exposed to passion and not led by it. Quite possibly, indeed, each of the former is attended by a capacity such that, if he were exposed to passion, he would control it and not be led [25] by it; but, for all that, this is not what is meant by being courageous in the one case, and good-tempered in the other; what is meant is an absolute immunity from any passions of that kind at all.

Sometimes, also, people state any kind of attendant feature as the genus, e.g. pain as the genus of anger and belief as that of conviction. For both of the things in [30] question follow in a certain sense upon the given species, but neither of them is genus to it. For when the angry man feels pain, the pain has appeared in him earlier than the anger; for his anger is not the cause of his pain, but his pain of his anger, so that anger simply is not pain. By the same reasoning, neither is conviction belief; for it is possible to have the same belief even without being convinced of it, whereas this [35] is impossible if conviction is a species of belief; for it is impossible for a thing still to remain the same if it is entirely transferred out of its species, just as the same animal could not at one time be, and at another not be, a man. If, on the other hand, anyone says that a man who has a belief must of necessity be also convinced of it, then belief and conviction will be used with an equal denotation, so that not even so [126<sup>a</sup>1] could the former be the genus of the latter—for the denotation of the genus should be wider.

See, also, whether both naturally come to be in the same thing; for what contains the species contains the genus as well: e.g. what contains white contains colour as well, and what contains knowledge of grammar contains knowledge as [5] well. If, therefore, any one says that shame is fear, or that anger is pain, the result will be that genus and species are not found in the same thing; for shame is found in the reasoning faculty, whereas fear is in the spirited faculty; and pain is found in the [10] faculty of desire (for in this pleasure also is found), whereas anger is found in the spirited faculty. Hence the terms given are not the genera, seeing that they do not naturally come to be in the same thing as the

species. Likewise, also, if friendship is found in the faculty of desire, it is not a form of wishing; for wishing is always found in the reasoning faculty. This commonplace rule is useful also in dealing with accident; for the accident and that of which it is an accident are both found in the [15] same thing, so that if they do not appear in the same thing, clearly it is not an accident.

Again, see if the species partakes of the alleged genus only in some particular respect; for it seems that the genus is not partaken in only in some particular respect; for a man is not an animal in a particular respect, nor is grammar [20] knowledge. Likewise also in other instances. Look, therefore, and see if in certain cases the genus is partaken in only in a certain respect; e.g. if animal has been described as essentially an object of perception or of sight. For an animal is an object of perception or of sight in a particular respect only; for it is in respect of its body that it is perceived and seen, not in respect of its soul; so that object of sight [25] and object of perception will not be the genus of animal.

Sometimes also people unawares place the whole inside the part, calling (e.g.) animal an animate body; whereas the part is not predicated in any sense of the whole, so that body could not be the genus of animal, seeing that it is a part.

[30] See also if he has put anything that is blameworthy or objectionable into capacity or the capable, e.g. by calling a sophist or a slanderer or a thief one who is capable of secretly thieving other people's property. For none of the aforesaid characters is so called because he is capable in one of these respects; for even God [35] and the good man are capable of doing bad things, but that is not their character; for it is always in respect of their choice that bad men are so called. Moreover, a capacity is always a desirable thing; for even the capacities for doing bad things are desirable, and that is why we say that even God and the good man possess them; for [126<sup>b</sup>1] they are capable (we say) of doing evil. So then capacity can never be the genus of anything blameworthy. Otherwise, the result will be that some blameworthy thing is desirable; for there will be a capacity that is blameworthy.

Also, see if he has put anything that is precious or desirable for its own sake [5] into capacity or the capable or the productive. For capacity, and what is capable or productive of anything, is always desirable for the sake of something else.

Or see if he has put anything that is in two genera or more into one of them only. For some things it is impossible to place in a single genus, e.g.

the cheat and the slanderer; for neither he who has the intention without the capacity, nor he who [10] has the capacity without the intention, is a slanderer or cheat, but he who has both of them. Hence he must be put not into one genus, but into both the aforesaid genera.

Moreover, people sometimes give things the wrong way about, genus as differentia, and differentia as genus, calling (e.g.) astonishment an excess of [15] wonderment and conviction strength of belief. For neither excess nor strength is the genus, but the differentia; for astonishment seems to be an excessive wonderment, and conviction to be a strong belief, [so that wonderment and belief are the genus, while excess and strength are the differentia.]<sup>17</sup> Moreover, if any one gives excess and strength as genera, then inanimate things will be convinced and astonished. For [20] the strength and excess of a thing are found in that thing of which they are. If, therefore, astonishment is an excess of wonderment the astonishment will be found in the wonderment, so that wonderment will be astonished. Likewise, also, conviction will be found in belief, if it is strength of belief, so that the belief will be [25] convinced. Moreover, a man who argues in this style will in consequence find himself calling strength strong and excess excessive; for there is such a thing as a strong conviction; if then conviction is strength there will be a strong strength. [30] Likewise, also, there is such a thing as excessive astonishment; if then astonishment is an excess, there will be an excessive excess. But neither of these things seems to be the case any more than that knowledge is an object of knowledge or motion a moving thing.

Sometimes, too, people make the mistake of putting an affection into that [35] which is affected, as its genus, e.g. those who say that immortality is everlasting life; for immortality seems to be a certain affection or accidental feature of life. That this is true would appear clear if anyone were to admit that a man can pass from being mortal and become immortal; for no one will assert that he takes another life, but that a certain accidental feature or affection enters into this one as it is. So then [127<sup>a</sup>1] life is not the genus of immortality.

Again, see if they say that an affection is that of which it is an affection, calling (e.g.) wind air in motion; [Rather, wind is a movement of air]<sup>18</sup> for the same air [5] persists both when it is in motion and when it is still. Hence wind is not air at all; for then there would also have been wind when the air was not in motion, seeing that the same air which formed the wind persists. Likewise, also, in other cases of the kind. Even, then, if we ought in this instance to admit that wind is air in motion, yet we [10] should not accept this sort of thing in all those things of which

the genus is not true, but only in cases where the given genus is truly predicated. For in some cases, e.g. mud or snow, it does not seem to be true. For people say that snow is frozen water and mud is earth mixed with moisture, whereas snow is not water, nor mud earth, so [15] that neither of the given terms could be the genus; for the genus should be true of all its species. Likewise neither is wine fermented water, as Empedocles speaks of ‘water fermented in wood’<sup>19</sup>—for it simply is not water at all.

6 · Moreover, see whether the given term fails to be the genus of anything at [20] all; for then clearly it also fails to be the genus of the species mentioned. Examine the point by seeing whether the objects that partake of the genus fail to be specifically different from one another, e.g. white objects; for these do not differ specifically from one another, whereas of a genus the species are always different, so that white will not be the genus of anything. [25]

Again, see whether he has named as genus or differentia some feature that goes with everything; for there are several attributes that follow everything: thus (e.g.) being and one are among the attributes that follow everything. If, therefore, he has rendered being as a genus, clearly it will be the genus of everything, seeing [30] that it is predicated of everything; for the genus is never predicated of anything except of its species. Hence one will be a species of being. The result, therefore, is that of all things of which the genus is predicated, the species is predicated as well, seeing that being and one are predicates of absolutely everything, whereas the predication of the species ought to be of narrower range. If, on the other hand, he [35] has named as differentia some attribute that follows everything, clearly the denotation of the differentia will be equal to, or wider than, that of the genus. For if the genus, too, is an attribute that follows everything, the denotation of the differentia will be equal to its denotation, while if the genus does not follow everything, it will be wider.

[127<sup>b</sup>1] Moreover, see if the given genus is said to be *in* the species as subject, as white in the case of snow, thus showing clearly that it will not be the genus; for the genus is only said *of* the species as subject.

[5] Look and see also if the genus fails to be synonymous with its species. For the genus is always predicated of its species synonymously.

Moreover, beware, whenever both species and genus have a contrary,

and he places the better of the contraries inside the worse genus; for the result will be that [10] the remaining species will be found in the remaining genus, seeing that contraries are found in contrary genera, so that the better species will be found in the worse genus and the worse in the better; but it seems that of the better species the genus too is better. Also see if he has placed something inside the worse and not inside the better genus, when it is related in like manner to both, as (e.g.) if he has called the [15] soul essentially a form of motion or a moving thing. For the same soul seems to be a principle alike of rest and of motion, so that, if rest is the better of the two, this is the genus into which the soul should have been put.

Moreover, judge by means of greater and less degrees: if overthrowing a view, see whether the genus admits of a greater degree, whereas neither the species itself [20] nor anything that is called after it does so; e.g. if virtue admits of a greater degree, so too does justice and the just man; for one man is called more just than another. If, therefore, the given genus admits of a greater degree, whereas neither the species itself nor anything called after it does so, then what has been given will not be the [25] genus.

Again, if what is more generally, or as generally, thought to be the genus is not so, clearly neither is the given genus. The commonplace rule in question is useful especially in cases where the species appears to have several predicates in what it is, and where it has not been determined and we cannot say which of them is genus; e.g. [30] both pain and belief seem to be predicated of anger in what it is; for the angry man is both in pain and also believes that he is slighted. The same mode of inquiry may be applied also to the case of the species, by comparing it with some other species; for if the one which is more generally, or as generally, thought to be found in the [35] given genus is not found therein, then clearly neither will the given species be found therein.

In demolishing a view, therefore, you should follow the rule as stated. In establishing one, on the other hand, the commonplace rule that you should see if both the given genus and the species admit of a greater degree will not serve; for [128<sup>a</sup>1] even though both admit it, it is still possible for one not to be the genus of the other. For both beautiful and white admit of a greater degree, and neither is the genus of the other. On the other hand, the comparison of the genera and of the species one with another is of use: e.g. supposing this and that to have a like claim to be genus, [5] then if one is a genus, so also is the other. Likewise also, if what has less claim is a genus, so also is what has more claim: e.g. if

capacity has more claim than virtue to be a genus of self-control, and virtue is a genus, so also is capacity. The same observations will apply also in the case of the species. For instance, supposing this and that to have a like claim to be a species of the genus in question, then if the one [10] is a species, so also is the other; and if that which is less generally thought to be so is a species, so also is that which is more generally thought to be so.

Moreover, to establish a view, you should look and see if the genus is predicated in what it is of those things to which it has been ascribed as genus, supposing there to have been given not one single species but several different ones; [15] for then clearly it will be the genus. If, on the other hand, a single species has been given, look and see whether the genus is predicated of the other species as well; for then, again, the result will be that it is predicated of several different species.

Since some people think that the differentia, too, is a predicate of the various [20] species in what it is, you should distinguish the genus from the differentia by employing the aforesaid elementary principles—first, that the genus has a wider denotation than the differentia; then, that in giving what a thing is it is more fitting to state the genus than the differentia, for anyone who says that man is an animal [25] shows what man is better than he who describes him as terrestrial; also that the differentia always signifies a quality of the genus, whereas the genus does not do this of the differentia; for he who says terrestrial describes an animal of a certain quality, whereas he who says animal does not describe a terrestrial thing of a certain quality.

The differentia, then, should be distinguished from the genus in this manner. [30] Now since it seems that if what is musical, in being musical, possesses knowledge in some respect, then also music is a particular kind of knowledge; and also that if what walks is moved in walking, then walking is a particular kind of movement; you should therefore examine in the aforesaid manner any genus in which you want to establish the presence of something: e.g., if you wish to prove that knowledge is [35] essentially conviction, see whether the knower in knowing is convinced; for then clearly knowledge will be a particular kind of conviction. You should proceed in the same way also in regard to the other cases of this kind.

Moreover, seeing that it is difficult to distinguish whatever always follows along with a thing, and is not convertible with it, from its genus, if this follows that universally, whereas that does not follow this universally—as e.g. calm always [128<sup>b</sup>1] follows windlessness and



divisible follows number, but not conversely (for the divisible is not always a number, nor windlessness calm)—you may yourself argue as though the one which always follows is the genus, whenever the other is not convertible with it; if, on the other hand, some one else puts forward the proposition, [5] do not accept it universally. An objection to it is that not-being always follows what is coming to be (for what is coming to be is not) and is not convertible with it (for what is not is not always coming to be), but nevertheless not-being is not the genus [10] of coming to be; for not-being has not any species at all.

Questions, then, in regard to genus should be investigated in the ways described.

## BOOK V

1 · The question whether the attribute stated is or is not a property, should [15] be examined by the following methods. A property is given either in its own right and for always or relative to something else and for a time: e.g. it is property in its own right of man to be by nature a civilized animal; a relative property is one like that of the soul in relation to the body, viz. that the one is fitted to command, and the other to obey; a property that always holds is one like the property which belongs to God, of being an immortal living being; a property that holds for a time is [20] one like the property which belongs to any particular man of walking in the gymnasium.

When a property is given relatively to something else, there are either two problems or four. For if you ascribe this same property to one thing and deny it of another, only two problems arise, as in the case of a statement that it is a property of [25] a man, in relation to a horse, to be a biped. For one might try both to show that a man is not a biped, and also that a horse is a biped: in both ways the property would be upset. If on the other hand you ascribe one of two attributes to each of two things, and deny it in each case of the other, there will then be four problems; as in the case of a statement that it is a property of a man in relation to a horse for the former to be [30] a biped and the latter a quadruped. For then it is possible to try to show both that a man is not naturally a biped, and that he is a quadruped, and also that the horse is a biped, and that it is not a quadruped. If you prove any of these at all, the intended attribute is demolished.<sup>20</sup>

A property in its own right is one which is ascribed to a thing in comparison with everything else and distinguishes it from everything else, as does being a [35] mortal living being capable of receiving knowledge in the case of man. A property relative to something else is one which separates its subject off not from everything else but only from a particular definite thing, as does the property which virtue possesses, relative to knowledge, viz. that the former is naturally produced in more than one faculty, whereas the latter is produced in that of reason alone, and in those who have a reasoning faculty. A property for always is one which is true at every [129<sup>a</sup>1] time, and never fails, like being compounded of soul and body, in the case of a living creature. A property

for a time is one which is true at some particular time, and does not of necessity always follow; as, of some particular man, that he walks in the [5] market-place.

To ascribe a property relatively to something else means to state the difference between them as it is found either universally and always, or for the most part and in most cases: thus a difference that is found universally and always, is one such as man possesses relatively to a horse, viz. being a biped; for a man is always and in every case a biped, whereas no horse is ever a biped. On the other hand, a difference [10] that is found for the most part and in most cases, is one such as the faculty of reason possesses relative to that of desire and spirit, in that the former commands, while the latter obeys; for the reasoning faculty does not always command, but sometimes also is under command, nor is that of desire and spirit always under command, but [15] also on occasion assumes the command, whenever the man's soul is vicious.

Of properties the most general are those which hold in their own right and always and the relative. For a relative property gives rise, as we said before, to several problems; for of necessity the problems arising are either two or four, so that [20] arguments in regard to these are several. A property in its own right and one for always you can discuss in relation to many things, or can observe in relation to many periods of time: if in its own right, discuss it in relation to many things; for the property ought to belong to its subject relatively to every single thing that there is, so that if the subject is not distinguished relatively to everything else, the property will not have been given correctly. A permanent property you should observe in [25] relation to many periods of time; for if it does not or did not, or is not going to, belong, it will not be a property. On the other hand, about a temporary property we do not inquire further than in regard to the present; and so arguments in regard to it are not many; whereas a general problem is one in regard to which it is possible for [30] arguments both numerous and good to arise.

The so-called relative property, then, should be examined by means of the commonplace arguments relating to accident, to see whether it belongs to the one thing and not to the other; on the other hand, permanent and essential properties should be considered by the following methods.

2 · First, see whether the property has or has not been rendered correctly. Of [129<sup>b</sup>1] a rendering being incorrect or correct, one test is to

see whether the terms in which the property is stated are not or are more familiar—for destructive purposes, whether they are not so, and for constructive purposes, whether they are so. Of the terms not being more familiar, one test is to see whether the property which he [5] renders is altogether more unintelligible than the subject whose property he has stated; for, if so, the property will not have been stated correctly. For we form a property for the sake of knowledge; the terms, therefore, in which it is rendered should be more familiar; for in that case it will be possible to conceive it more adequately. E.g. anyone who has stated that it is a property of fire to bear a very [10] close resemblance to the soul, uses the term soul, which is less intelligible than fire—for we know better what fire is than what soul is—and therefore bearing a very close resemblance to the soul can not be a correctly stated property of fire. Another test is to see whether the attribution of the one to the other fails to be more familiar. For not only should the property be more familiar than its object, but also it should be something whose attribution to it is more familiar. For he who does not [15] know whether it belongs to the object, will not know either whether it belongs to it alone. Hence whichever of these results happens, the property becomes unclear. Thus (e.g.) a man who has stated that it is a property of fire to be the primary element wherein the soul is naturally found, has introduced something more [20] unintelligible than fire, viz. whether the soul is found in it, and whether it is found there primarily; and therefore to be the primary element in which the soul is naturally found will not be a correctly stated property of fire. On the other hand, for constructive purposes, see whether the terms in which the property is stated are more familiar, and whether they are more familiar in each of the aforesaid ways. For then the property will have been correctly stated in this respect; for of [25] constructive rules for correctness, some will prove correctness in a certain respect only, while others will prove it without qualification. Thus (e.g.) a man who has said that the possession of perception is a property of animal has both used more familiar terms and has rendered the property more familiar in each of the aforesaid senses; so that to possess perception will in this respect have been correctly rendered as a property of animal.

[30] Next, for destructive purposes, see whether any of the words given in the property is used in more than one way, or whether the whole expression too signifies more than one thing. For then the property will not have been correctly stated. Thus (e.g.) seeing that to perceive signifies more than one thing, viz. to possess perception, and to use perception,

having perception will not be a correctly stated [130<sup>a</sup>1] property of animal. The reason why neither the word, nor the whole expression signifying the property should have more than one use is this, that an expression having more than one use makes what is said unclear, because the man who is about to attempt an argument is in doubt which of the various uses the expression has; and [5] this will not do, for the object of giving the property is to gain knowledge. Moreover, in addition to this, it is inevitable that those who render a property after this fashion should be somehow refuted whenever any one addresses his deduction to that one of the several uses which does not agree. For constructive purposes, on the other hand, see whether neither any of the terms nor the expression as a whole has more than [10] one use; for then the property will have been correctly stated in this respect. Thus (e.g.) seeing that ‘body’ does not bear several meanings, nor ‘quickest to move upwards in space’, nor yet the whole expression made by putting them together, it would be in this respect a correctly stated property of fire to be the body quickest to move upwards in space.

[15] Next, for destructive purposes, see if the term of which he renders the property is used in more than one way, and it has not been determined which of them it is whose property he is stating; for then the property will not have been correctly rendered. The reasons why this is so are quite clear from what has been said above; for the same results are bound to follow. Thus (e.g.) seeing that ‘the knowledge of [20] this’ signifies many things—for it means the possession of knowledge by it, and the use of knowledge by it, and the possession of knowledge about it, and the use of knowledge about it—no property of the knowledge of this could be rendered correctly unless it were determined which of these it is whose property is being rendered. For constructive purposes, a man should see if the term of which he is stating the property does not have many uses but is one and simple; for then the property will have been correctly stated in this respect. Thus (e.g.) seeing that man [25] is used in a single way, being a naturally civilized animal will be in this respect correctly stated as a property of man.

Next, for destructive purposes, see whether the same term has been repeated in the property. For people often do this unawares in rendering properties, just as they [30] do in their definitions as well; but a property to which this has happened will not have been correctly stated; for the repetition of it confuses the hearer. Thus inevitably it becomes unclear, and further, such people are thought to babble. Repetition of the same

term is likely to happen in two ways: one is, when a man [35] repeatedly uses the same word, as would happen if any one were to render, as a property of fire, the body which is the most rarefied of bodies (for he has repeated the word 'body'); the second is, if a man replaces words by their definitions, as would happen if any one were to render, as a property of earth, the substance which is by its nature most easily of all bodies borne downwards in space, and were then to [130<sup>b</sup>1] substitute 'substances of such and such a kind' for 'bodies' (for a body and a substance of such and such a kind are one and the same thing). For he will have repeated the word 'substance'. Hence neither of the properties will be correctly [5] stated. For constructive purposes, on the other hand, see whether he avoids ever repeating the same word; for then the property will in this respect have been correctly rendered. Thus (e.g.) seeing that he who has stated animal capable of acquiring knowledge as a property of man has not used the same term several times, the property will in this respect have been correctly rendered of man. [10]

Next, for destructive purposes, see whether he has rendered in the property any term that belongs to everything. For one which does not distinguish its subject from other things is useless, and it is the business of what is stated in properties, as also of what is stated in definitions, to distinguish. Hence the property will not have been correctly rendered. Thus (e.g.) a man who has stated that it is a property of [15] knowledge to be belief incontrovertible by argument, because it is one, has used in the property a term of that kind, viz. one, which belongs to everything; and therefore the property of knowledge could not have been correctly stated. For constructive purposes, on the other hand, see whether he has avoided all terms that are common to everything and used a term that distinguishes the subject from something; for then the property will in this respect have been correctly stated. Thus (e.g.) inasmuch as he who has said that it is a property of a living creature to have a [20] soul has used no term that is common to everything, it will in this respect have been correctly stated to be a property of a living creature to have a soul.

Next, for destructive purposes see whether he renders more than one property of the same thing, without a definite proviso that he is stating more than one; for then the property will not have been correctly stated. For just as in the case of [25] definitions too there should be no further addition beside the account which shows the substance of the thing, so too in the case of properties nothing further should be rendered beside the account that makes what is stated a property; for such an addition is made to no purpose. Thus (e.g.) a man who has said that it is a property

of fire to be the most rarefied and lightest body has rendered more than one [30] property (for each term is true of fire alone); and so it could not be a correctly stated property of fire to be the most rarefied and lightest body. On the other hand, for constructive purposes, see whether he has avoided giving more than one property of the same thing, and has given one only; for then the property will in this respect [35] have been correctly stated. Thus (e.g.) a man who has said that it is a property of a liquid to be a body adaptable to every shape has given a single property and not several, and so the property of liquid will in this respect have been correctly stated.

3 · Next, for destructive purposes, see whether he has used in addition either the actual subject whose property he is rendering, or any of its species; for then the [131<sup>a</sup>1] property will not have been correctly stated. For the object of giving the property is to gain knowledge: now the subject itself is just as unintelligible as itself, while any one of its species is posterior to it, and so is no more familiar. Accordingly it is impossible to gain any knowledge by the use of these terms. Thus (e.g.) any one who [5] has said that it is a property of animal to be the substance to which man belongs as a species has employed one of its species, and therefore the property will not have been correctly stated. For constructive purposes, on the other hand, see whether he avoids introducing either the subject itself or any of its species; for then the property will in this respect have been correctly stated. Thus (e.g.) a man who has stated that it is a property of a living creature to be compounded of soul and body has used in [10] addition neither the subject itself nor any of its species, and therefore in this respect the property of a living creature will have been correctly rendered.

You should inquire in the same way also in the case of other terms that do or do not make the subject more familiar: thus, for destructive purposes, see whether he has used in addition anything either opposite to the subject or, in general, anything [15] simultaneous by nature with it or posterior to it; for then the property will not have been correctly stated. For an opposite is simultaneous by nature with its opposite, and what is simultaneous by nature or is posterior to it does not make its subject more familiar. Thus (e.g.) any one who has said that it is a property of good to be the most direct opposite of evil, has used in addition the opposite of good, and so the [20] property of good could not have been correctly rendered. For constructive purposes, on the other hand, see

whether he has used in addition neither anything opposite to, nor, in general, simultaneous by nature with the subject, nor posterior to it; for then the property will in this respect have been correctly rendered. Thus (e.g.) a man who has stated that it is a property of knowledge to be the most convincing belief has not used in addition anything either opposite to, or simultaneous by nature with, or [25] posterior to, the subject; and so the property of knowledge will in this respect have been correctly stated.

Next, for destructive purposes, see whether he has rendered as property something that does not always<sup>21</sup> follow the subject but sometimes ceases to be its property; for then the property will not have been correctly described. For there is no necessity either that the name of the subject must also be true of anything to [30] which we find it belonging; or that the name of the subject will be untrue of anything to which it is found not to belong. Hence the property will not have been correctly stated. Moreover, in addition to this, even after he has rendered the property it will not be clear whether it belongs, seeing that it is the kind of attribute that may fail; and so the property will not be clear. Thus (e.g.) a man who has stated [35] that it is a property of animal sometimes to move and sometimes to stand still has given as a property the kind of thing which sometimes is not a property, and so the property will not have been correctly stated. For constructive purposes, on the other hand, see whether he has rendered something that of necessity must always be a property; for then the property will have been in this respect correctly stated. Thus [131<sup>b</sup>1] (e.g.) a man who has stated that it is a property of virtue to be what makes its possessor good has rendered as property something that always follows, and so the property of virtue will in this respect have been correctly rendered.

Next, for destructive purposes, see whether in rendering a present property he [5] has omitted to make a definite proviso that it is a present property which he is rendering; for else the property will not have been correctly stated. For in the first place, any unusual procedure always needs a definite proviso; and for the most part everybody is accustomed to render as property some attribute that always follows. In the second place, a man who omits to provide definitely whether it was the [10] present property which he intended to state, is obscure; and one should not give any occasion for adverse criticism. Thus (e.g.) a man who has stated it as the property of a particular man to be sitting with a particular man, states the present property, and so he cannot have rendered the property correctly, seeing that he has described it without any definite



proviso. For constructive purposes, on the other hand, see whether, in giving a present property, he has, in stating it, made a definite proviso [15] that it is the present property that he is stating; for then the property will in this respect have been correctly stated. Thus (e.g.) a man who has said that it is the property of a particular man to be walking now, has made this distinction in his statement, and so the property will have been correctly stated.

Next, for destructive purposes, see whether he has rendered a property of the kind whose presence is not obvious except by perception; for then the property will [20] not have been correctly stated. For every perceptible attribute, once it passes beyond the range of perception, becomes obscure. For it is not clear whether it still belongs, because it is known only by perception. This will be true in the case of any attributes that do not always and necessarily follow. Thus (e.g.) any one who has stated that it is a property of the sun to be the brightest star that moves over the [25] earth, has used in the property something, viz. moving over the earth, of a kind which is known by perception; and so the sun's property will not have been correctly rendered; for it will be obscure, whenever the sun sets, whether it continues to move over the earth, because perception then fails us. For constructive purposes, on the [30] other hand, see whether he has rendered the property of a kind that is not obvious by perception, or, if it is perceptible, must clearly belong of necessity; for then the property will in this respect have been correctly stated. Thus (e.g.) a man who has stated that it is a property of a surface to be the primary thing that is coloured, has used in addition something perceptible, being coloured, but something which [35] evidently always belongs, and so the property of surface will in this respect have been correctly rendered.

Next, for destructive purposes, see whether he has rendered the definition as a property; for then the property will not have been correctly stated; for the property [132<sup>a</sup>1] of a thing ought not to show its essence. Thus (e.g.) a man who has said that it is a property of man to be a terrestrial two-footed animal has rendered as a property of man something that signifies his essence, and so the property of man will not have been correctly rendered. For constructive purposes, on the other hand, see whether [5] the property which he has rendered is predicated convertibly without, however, signifying its essence; for then the property will in this respect have been correctly rendered. Thus (e.g.) he who has stated that it is a property of man to be a naturally civilized animal has rendered the property so as to be predicated convertibly without,

however, showing its essence, and so the property of man will in this respect have been correctly rendered.

[10] Next, for destructive purposes, see whether he has rendered the property without having placed it in what it is. For of properties, as also of definitions, the first term to be rendered should be the genus, and then the rest of it should be appended immediately afterwards, and should distinguish its subject from other things. Hence a property which is not stated in this way will not have been correctly [15] rendered. Thus (e.g.) a man who has said that it is a property of a living creature to have a soul has not placed living creature within what it is and so the property of a living creature will not have been correctly stated. For constructive purposes, on the other hand, see whether a man first places within what it is the subject whose property he is rendering, and then appends the rest; for then the property will in this respect have been correctly rendered. Thus (e.g.) he who has stated that it is a [20] property of man to be an animal capable of receiving knowledge, has rendered the property after placing the subject within what it is, and so the property of man will in this respect have been correctly rendered.

4 · The inquiry, then, whether the property has been correctly rendered or no, should be made by these means. The question, on the other hand, whether what is stated is or is not a property at all, you should examine from the following points [25] of view. For the commonplace rules which establish absolutely that the property is correctly stated will be the same as those that constitute it a property at all; accordingly they will be described in the course of them.

Firstly, then, for destructive purposes, take a look at each subject of which he has rendered the property, and see (e.g.) if it fails to belong to any of them at all, or [30] to be true of them in respect of that character of which he has rendered the property; for then what is stated to be a property will not be a property. Thus, for example, inasmuch as it is not true of the geometrician that he cannot be deceived by an argument (for a geometrician is deceived when his figure is misdrawn), it will not be a property of the man of science that he is not deceived by an argument. For constructive purposes, on the other hand, see whether the property rendered be true [35] of every instance, and true in that particular respect; for then what is stated not to be a property will be a property. Thus, for example, inasmuch as being an animal capable of receiving knowledge is true of every man, and true of him *qua* man, it [132<sup>b</sup>1] will

be a property of man to be an animal capable of receiving knowledge. [This commonplace rule means—for destructive purposes, see if the account fails to be true of that of which the name is true; and if the name fails to be true of that of which the account is true; for constructive purposes, on the other hand, see if the [5] account too is predicated of that of which the name is predicated, and if the name too is predicated of that of which the account is predicated.]<sup>22</sup>

Next, for destructive purposes, see if the account fails to apply to that to which the name applies, and if the name fails to apply to that to which the account applies; for then what is stated to be a property will not be a property. Thus (e.g.) inasmuch [10] as being a living being that partakes of knowledge is true of God, while man is not predicated of God, to be a living being that partakes of knowledge will not be a property of man. For constructive purposes, on the other hand, see if the name as well is predicated of that of which the account is predicated, and if the account as well is predicated of that of which the name is predicated. For then what is stated [15] not to be a property will be a property. Thus (e.g.) living creature is true of that of which having a soul is true, and having a soul is true of that of which living creature is true; and so having a soul will be a property of living creature.

Next, for destructive purposes, see if he has rendered a subject as a property of that which is said to be in the subject; for then what has been stated to be a property [20] will not be a property. Thus (e.g.) inasmuch as he who has rendered fire as the property of the body with the most rarefied particles, has rendered the subject as the property of its predicate, fire will not be a property of the body with the most rarefied particles. The reason why the subject will not be the property of that which is found in the subject is this, that then the same thing will be the property of a [25] number of things that are specifically different. For the same thing has quite a number of specifically different predicates that belong to it alone, and the subject will be a property of all of these, if anyone states the property in this way. For constructive purposes, on the other hand, see if he has rendered what is found in the subject as a property of the subject; for then what has been stated not to be a [30] property will be a property, if it is predicated only of the things of which it has been stated to be a property. Thus (e.g.) he who has said that it is a property of earth to be specifically the heaviest body has rendered of the subject as its property something that is said of the object alone, and is said of it as a property, and so the property of earth will have been rightly stated.

Next, for destructive purposes, see if the property has been given by way of [35] participation; for then what is stated to be a property will not be a property. For an attribute which belongs by way of participation is a constituent part of the essence; [133<sup>a</sup>1] and an attribute of that kind will be a differentia applying to some one species. E.g., inasmuch as he who has said that being terrestrial and two-footed is a property of man has rendered the property by way of participation, being terrestrial and [5] two-footed will not be a property of man. For constructive purposes, on the other hand, see if he has avoided rendering the property by way of participation, or as showing the essence, though the subject is predicated convertibly with it; for then what is stated not to be a property will be a property. Thus (e.g.) he who has stated that to be naturally percipient is a property of animal has rendered the property neither by way of participation nor as showing the essence, though the subject is [10] predicated convertibly with it; and so to be naturally percipient will be a property of animal.

Next, for destructive purposes, see if the property may belong not simultaneously, but either as posterior or as prior to the name; for then what is stated to be a property will not be a property—either never, or not always. Thus (e.g.) inasmuch [15] as it is possible for walking through the market-place to belong to an object as prior and as posterior to ‘man,’<sup>23</sup> walking through the market-place will not be a property of man—either never, or not always. For constructive purposes, on the other hand, see if it always and of necessity belongs simultaneously, without being either a definition or a differentia; for then what is stated not to be a property will be a [20] property. Thus (e.g.) being an animal capable of receiving knowledge always and of necessity belongs simultaneously with ‘man’, and is neither differentia nor definition, and so being an animal capable of receiving knowledge will be a property of man.

Next, for destructive purposes, see if the same thing fails to be a property of [25] things that are the same so far as they are the same; for then what is stated to be a property will not be a property. Thus, for example, inasmuch as it is no property of an object of pursuit to appear good to certain persons, it will not be a property of the desirable either to appear good to certain persons; for an object of pursuit and the desirable are the same. For constructive purposes, on the other hand, see if the same thing is a property of something that is the same in so far as it is the same. For then [30] what is stated not to be a property will be a property. Thus (e.g.) inasmuch as it is said to be a property of a man, in so far as he is a man, to have a tripartite soul, it will also be a property of a mortal, in

so far as he is a mortal, to have a tripartite soul. This commonplace rule is useful also in dealing with accident; for the same attributes ought either to belong or not belong to the same things, in so far as they are the same.

[35] Next, for destructive purposes, see if the property of things that are the same in kind fails to be always the same in kind; for then neither will what is stated to be a [133<sup>b</sup>1] property be a property of the subject in question. Thus (e.g.) inasmuch as a man and a horse are the same in kind, and it is not always a property of a horse to stand still by his own initiative, it will not be a property of a man to move by his own initiative; [5] for to stand still and to move by one's own initiative are the same in kind, because they belong to each of them in so far as each is an animal. For constructive purposes, on the other hand, see if of things that are the same in kind the property is always the same in kind; for then what is stated not to be a property will be a property. Thus (e.g.) since it is a property of man to be two-footed and terrestrial, it will also be a property of a bird to be two-footed and winged; for each of these is the same in kind, in so far as the one pair are species that fall under the same genus, being under the [10] genus animal, while the other pair are differentiae of the genus, viz. of animal. This commonplace rule is false whenever one of the properties mentioned belongs to some one species only while the other belongs to many, as does terrestrial quadruped.

Inasmuch as 'same' and 'different' are used in several ways, it is a job to render [15] to a sophistical questioner a property that belongs to one thing and that only. For an attribute that belongs to something qualified by an accident will also belong to the accident taken along with the subject which it qualifies; e.g. an attribute that belongs to man will belong also to white man, if there is a white man, and one that [20] belongs to white man will belong also to man. One might, then, discredit the majority of properties, by representing the subject as being one thing in itself, and another thing when combined with its accident, saying, for example, that man is one thing, and white man another. Again, one might do so by representing as different a [25] certain state and what is called after that state; for an attribute that belongs to the state will belong also to what is called after that state, and one that belongs to what is called after a state will belong also to the state: e.g. inasmuch as the condition of the scientist is called after his science, it will not be a property of science that it is incontrovertible by argument; for then the scientist also will be incontrovertible by [30] argument. For constructive purposes,

however, you should say that the subject of an accident is not different without qualification from the accident taken along with its subject; though it is called another thing because what it is to be them is different; for it is not the same thing for a man to be a man and for a white man to be a white [35] man. Moreover, you should take a look along the inflections, and say that the man of science is not that which is incontrovertible by argument, but he who is incontrovertible by argument, and that science is not that which is incontrovertible [134<sup>a</sup>1] by argument, but she who is incontrovertible by argument.<sup>24</sup> For against an objector who sticks at nothing the defence should stick at nothing.

5 · Next, for destructive purposes, see if, while intending to render an [5] attribute that naturally belongs, he states it in his language in such a way as to indicate one that invariably belongs; for then it would seem that what has been stated to be a property is upset. Thus (e.g.) the man who has said that being two-footed is a property of man intends to render the attribute that naturally belongs, but his expression indicates one that invariably belongs; accordingly, being [10] two-footed will not be a property of man; for not every man is possessed of two feet. For constructive purposes, on the other hand, see if he intends to render the property that naturally belongs, and indicates it in that way in his language; for then the property will not be upset in this respect. Thus (e.g.) he who renders as a property of man, being an animal capable of receiving knowledge, both intends, and by his [15] language indicates, the property that belongs by nature, and so being an animal capable of receiving knowledge will not be upset or shown in that respect not to be a property of man.

Moreover, as regards all the things that are called as they are primarily after something else, or primarily in themselves, it is a job to render the property of such [20] things. For if you render a property of what is so called after something else, then it will be true of its primary subject as well; and if you state it of its primary subject, then it will be predicated also of the thing that is so called after this other. Thus (e.g.) if any one renders being coloured as a property of surface, being coloured will be true of body as well; whereas if he ascribes it to body, it will be predicated also of [25] surface. Hence the name as well will not be true of that of which the account is true.

In the case of some properties it happens for the most part that some error is incurred because of a failure to define how and to what things the property is stated to belong. For every one tries to render as the property

of a thing something that [30] belongs to it either naturally, as being two-footed belongs to man, or actually, as having four fingers belongs to a particular man, or specifically, as consisting of most rarefied particles belongs to fire, or without qualification, as living to living being, or in virtue of something else, as being prudent to the soul, or as the primary subject, as being prudent to the rational faculty, or because the thing is in a certain state, as [35] being incontrovertible by argument belongs to a scientist (for simply and solely by reason of his being in a certain state will he be incontrovertible by argument), or because it is the state possessed by something, as being incontrovertible by [134<sup>b</sup>1] argument belongs to science, or because it is partaken of, as perceiving belongs to animal (for other things as well perceive, e.g. man, but they perceive because they partake of animal), or because it partakes of something else, as living belongs to a particular kind of living being. Accordingly he makes a mistake if he has failed to [5] add the word 'naturally' (because what belongs naturally may fail to belong to the thing to which it naturally belongs, as (e.g.) it belongs to man to have two feet); or if he does not make a definite proviso that he is rendering what actually belongs (because it will not be such as to belong to it, e.g. the man's possession of four [10] fingers); or if he has not shown that he states it as the primary subject, or in virtue of something else (because then its name will not also be true of that of which the account is true, as is the case with being coloured, whether rendered as a property of surface or of body); or if he has not said beforehand that he has rendered a property to a thing either because that thing possesses a state, or because it is a state possessed by something (because then it will not be a property—for, supposing he [15] renders the property to something as being a state possessed, it will belong to what possesses that state; while supposing he renders it to what possesses the state, it will belong to the state possessed, as did being incontrovertible by argument when stated as a property of science or of the scientist); or if he has not indicated beforehand that the property belongs because the thing partakes of, or is partaken of by, something (because then the property will belong to certain other things as [20] well—for if he renders it because its subject is partaken of, it will belong to the things which partake of it; whereas if he renders it because its subject partakes of something else, it will belong to the things partaken of, as (e.g.) if he were to state living to be a property of a particular kind of living being, or just of living being); or if he has not expressly distinguished the property that belongs specifically (because then it will belong only to one of the things that fall under the term of

which he states the property—for the superlative belongs only to one of them, e.g. being lightest as applied to fire). Sometimes, too, a man may even add the word [25] ‘specifically’, and still make a mistake. For the things in question should all be of one species, whenever the word ‘specifically’ is added; and in some cases this does not occur, as it does not, in fact, in the case of fire. For fire is not all of one species; for live coals and flame and light are each of them fire, but are of different species. The reason why, whenever ‘specifically’ is added, there should not be any species [30] other than the one mentioned, is this, that if there is, then the property in question will belong to some of them in a greater and to others in a less degree, as happens with consisting of most rarefied particles in the case of fire; for light consists of more rarefied particles than live coals and flame. And this should not happen unless the name too is predicated in a greater degree of that of which the account is true to a [35] greater degree; otherwise it will not be the case that where the account is true to a greater degree the name too is true to a greater degree. Moreover, in addition to [135<sup>a</sup>1] this, the same attribute will be the property both of the term which has it without qualification and of that element therein which has it<sup>25</sup> in the highest degree, as is the condition of consisting of most rarefied particles in the case of fire; for this same attribute will be a property of light as well; for it is light that consists of the most [5] rarefied particles. If, then, any one else renders a property in this way one should attack it; for oneself, one should not give occasion for this objection, but should define in what manner one states the property at the actual time of making the statement.

Next, for destructive purposes, see if he has stated a thing as a property of itself; for then what has been stated to be a property will not be a property. For a [10] thing itself always shows its own essence, and what shows the essence is not a property but a definition. Thus (e.g.) he who has said that becoming is a property of beautiful has rendered the term as a property of itself (for beautiful and becoming are the same); and so becoming will not be a property of beautiful. For constructive purposes, on the other hand, see if he has avoided rendering a thing as a property of [15] itself, but has yet stated a convertible predicate; for then what is stated not to be a property will be a property. Thus he who has stated animate substance as a property of living creature has not stated living creature as a property of itself, but has rendered a convertible predicate, so that animate substance will be a property of living creature.

Next, in the case of things consisting of like parts, you should look and see, for [20] destructive purposes, if the property of the whole is not



true of the part, or if that of the part is not predicated of the whole; for then what has been stated to be a property will not be a property. In some cases it happens that this is so; for sometimes in rendering a property in the case of things that consist of like parts a [25] man may have his eye on the whole, while sometimes he may address himself to what is predicated of the part; and then in neither case will it have been rightly rendered. Take an instance referring to the whole: the man who has said that it is a property of the sea to be the largest volume of salt water, has stated the property of something that consists of like parts, but has rendered an attribute of such a kind as [30] is not true of the part (for a particular sea is not the largest volume of salt water); and so the largest volume of salt water will not be a property of the sea. Now take one referring to the part: the man who has stated that it is a property of air to be breathable has stated the property of something that consists of like parts, but he has stated an attribute such as, though true of some air, is still not predicable of the whole (for the whole of the air is not breathable); and so breathable will not be a [135<sup>b</sup>1] property of air. For constructive purposes, on the other hand, see whether, while it is true of each of the things with similar parts, it is also a property of them taken as a collective whole; for then what has been stated not to be a property will be a property. Thus (e.g.) while it is true of earth everywhere that it naturally falls [5] downwards, it is a property of the various particular pieces of earth taken as the Earth,<sup>26</sup> so that it will be a property of earth naturally to fall downwards.

6 · Next, look from the point of view of the opposites, and first from that of the contraries, and see, for destructive purposes, if the contrary of the term rendered fails to be a property of the contrary subject. For then neither will the contrary of the first be a property of the contrary of the second. Thus (e.g.) inasmuch as [10] injustice is contrary to justice, and the lowest evil to the highest good, but to be the highest good is not a property of justice, therefore to be the lowest evil will not be a property of injustice. For constructive purposes, on the other hand, see if the contrary is the property of the contrary; for then also the contrary of the first will be a property of the contrary of the second. Thus (e.g.) inasmuch as evil is contrary to [15] good, and objectionable to desirable, and desirable is a property of good, objectionable will be a property of evil.

Secondly look from the point of view of relative terms and see, for destructive purposes, if the correlative of the term rendered fails to be a property of the correlative of the subject; for then neither will the

correlative of the first be a property of the correlative of the second. Thus (e.g.) inasmuch as double is relative [20] to half, and in excess to exceeded, while in excess is not a property of double, exceeded will not be a property of half. For constructive purposes, on the other hand, see if the correlative is a property of the correlative; for then also the correlative of the first will be a property of the correlative of the second: e.g. inasmuch as double is relative to half, and the proportion 1 : 2 is relative to the [25] proportion 2 : 1, while it is a property of double to be in the proportion of 1 : 2: it will be a property of half to be in the proportion of 2 : 1.

Thirdly, for destructive purposes, see if an attribute described in terms of a possession fails to be a property of the given possession; for then neither will the attribute described in terms of the privation be a property of the privation. Also if an attribute described in terms of the privation is not a property of the given [30] privation, neither will the attribute described in terms of the possession be a property of the possession. Thus, for example, inasmuch as it is not predicated as a property of deafness to be a lack of perception, neither will it be a property of hearing to be a perception. For constructive purposes, on the other hand, see if an attribute described in terms of a possession is a property of the given possession; for then also the attribute that is described in terms of the privation will be a property of the privation. Also, if an attribute described in terms of a privation is a property [35] of the privation, then also the attribute that is described in terms of the possession will be a property of the possession. Thus (e.g.) inasmuch as to see is a property of [136<sup>a</sup>1] sight, in so far as we have sight, failure to see will be a property of blindness, in so far as we have not got the sight we should naturally have.

Next, look from the point of view of affirmations and negations; and first from [5] the point of view of the predicates taken by themselves. This commonplace rule is useful only for a destructive purpose. Thus (e.g.) see if the affirmation or the attribute predicated affirmatively is a property of the subject; for then neither the negation nor the attribute predicated negatively will be a property of the subject. Also if the negation or the attribute predicated negatively is a property of the [10] subject, then neither the affirmation nor the attribute predicated negatively will be a property of the subject: e.g. inasmuch as animate is a property of living creature, inanimate will not be a property of living creature.

Secondly look from the point of view of the predicates, positive or negative, and their respective subjects; and see, for destructive purposes, if the affirmation fails to [15] be a property of the affirmation; for then neither will the negation be a property of the negation. Also, if the negation fails to be a property of the negation, neither will the affirmation be a property of the affirmation. Thus (e.g.) inasmuch as animal is not a property of man, neither will not-animal be a property of not-man. Also if [20] not-animal seems not to be a property of not-man, neither will animal be a property of man. For constructive purposes, on the other hand, see if the affirmation is a property of the affirmation; for

then the negation will be a property of the negation as well. Also if the negation is a property of the negation, the affirmation will be a property of the affirmation as well. Thus (e.g.) inasmuch as it is a property of [25] not-animal not to live, it will be a property of animal to live; also if it seems to be a property of animal to live, it will also seem to be a property of not-animal not to live.

Thirdly, look from the point of view of the subjects taken by themselves, and see, for destructive purposes, if the property rendered is a property of the [30] affirmation; for then the same term will not be a property of the negation as well. Also, if the term rendered is a property of the negation, it will not be a property of the affirmation. Thus (e.g.) inasmuch as animate is a property of living creature, animate will not be a property of not-living creature. For constructive purposes, on the other hand, see if the term rendered fails to be a property of the affirmation; for [35] if it is not a property of the affirmation,<sup>27</sup> it will be a property of the negation. This commonplace rule is, however, false; for an affirmation is not a property of a [136b1] negation, or a negation of an affirmation. For an affirmation does not belong at all to a negation, while a negation, though it belongs to an affirmation, does not belong as a property.

Next, look from the point of view of the co-ordinate members of a division, and see, for destructive purposes, if none of the one set of co-ordinate members is a property of any of the remaining set of co-ordinate members; for then neither will [5] the term stated be a property of that of which it is stated to be a property. Thus (e.g.) inasmuch as perceptible living being is not a property of any of the other living beings, intelligible living being will not be a property of God. For constructive purposes, on the other hand, see if some one or other of the remaining co-ordinate members is a property of each of these co-ordinate members; for then the remaining [10] one too will be a property of that of which it has been stated not to be a property. Thus (e.g.) inasmuch as it is a property of prudence to be essentially the natural virtue of the rational faculty, and so too taking each of the other virtues in this way, it will be a property of temperance to be essentially the natural virtue of the faculty of desire.

[15] **7** · Next, look from the point of view of the inflexions, and see, for destructive purposes, if the inflexion fails to be a property of the inflexion; for then neither will the other inflexion be a property of the other inflexion. Thus (e.g.) inasmuch as beautifully is not a property of justly, neither will beautiful be a property of just. For constructive

purposes, on the other hand, see if the inflexion is a property of the inflexion; for then also the other inflexion will be a property of the [20] other inflexion. Thus (e.g.) inasmuch as being terrestrial and two-footed is a property of man, it will be a property of 'to a man' to be described as 'to a terrestrial and two-footed thing'. Not only in the case of the actual term mentioned should one look at the inflexions, but also in the case of its opposites, as we said in the case of the former commonplace rules as well.<sup>28</sup> Thus, for destructive purposes, see if the [25] inflexion of the opposite fails to be the property of the inflexion of the opposite; for then neither will the inflexion of the other opposite be a property of the inflexion of the other opposite. Thus (e.g.) inasmuch as 'well' is not a property of 'justly', neither will 'badly' be a property of 'unjustly'. For constructive purposes, on the other hand, see if the inflexion of the opposite is a property of the inflexion of the opposite; for [30] then also the inflexion of the other opposite will be a property of the inflexion of the other opposite. Thus (e.g.) inasmuch as best is a property of the good, worst also will be a property of the evil.

Next, look from the point of view of things that are in a like relation, and see, for destructive purposes, if what is in a like relation fails to be a property of what is in a like relation; for then neither will what is in a relation like that of the first be a property of what is in a relation like that of the second. Thus (e.g.) inasmuch as the [35] relation of the builder towards the production of a house is like that of the doctor towards the production of health, and it is not a property of a doctor to produce health, it will not be a property of a builder to produce a house. For constructive [137<sup>a</sup>1] purposes, on the other hand, see if what is in a like relation is a property of what is in a like relation; for then also what is in a relation like that of the first will be a property of what is in a relation like that of the second. Thus (e.g.) inasmuch as the relation of a doctor towards the possession of ability to produce health is like that of a trainer towards the possession of ability to produce vigour, and it is a property of a [5] trainer to possess the ability to produce vigour, it will be a property of a doctor to possess the ability to produce health.

Next look from the point of view of things that are identically related, and see, for destructive purposes, if what is identically related fails to be a property of what is identically related; for then neither will what is identically related be a property [10] of what is identically related. If, on the other hand, what is identically related is a property of what is identically related, then it will not be a property of that of which it has been stated to be a property. Thus (e.g.) inasmuch as prudence is

identically related to both the noble and the base, since it is knowledge of each of them, and it is not a property of prudence to be knowledge of the noble, it will not be a property of [15] prudence to be knowledge of the base. And if prudence is a property of knowledge of the noble, it will not be a property of knowledge of the base.<sup>29</sup> For it is impossible for the same thing to be a property of more than one subject. For constructive purposes, on the other hand, this commonplace rule is of no use; for what is identically related is a single thing brought into comparison with more than one thing. [20]

Next, for destructive purposes, see if the predicate qualified by the verb 'to be' fails to be a property of the subject qualified by the verb 'to be'; for then neither will the destruction of the one be a property of the other qualified by the verb 'to be destroyed', nor will the becoming of the one be a property of the other qualified by the verb 'to become'. Thus (e.g.) inasmuch as it is not a property of man to be an animal, neither will it be a property of becoming a man to become an animal; nor [25] will the destruction of an animal be a property of the destruction of a man. You should argue from becoming to being and to being destroyed, and from being destroyed to being and to becoming, exactly as we have just argued from being to becoming and being destroyed. For constructive purposes, on the other hand, see if [30] the predicate qualified by the verb 'to be' is a property of the subject so qualified; for then also the subject qualified by the verb 'to become' will have the predicate qualified by 'to become' as its property, and the subject qualified by the verb 'to be destroyed' will have as its property the predicate rendered with this qualification. Thus, for example, inasmuch as it is a property of man to be a mortal, it will be a [35] property of becoming a man to become a mortal, and the destruction of a mortal will be a property of the destruction of a man. In the same way one should argue from becoming and being destroyed both to being and to the conclusions that follow [137<sup>b</sup>1] from them, exactly as was said in the case of destruction.

Next take a look at the Idea of the subject stated, and see, for destructive purposes, if it fails to belong to the Idea, or fails to belong to it in virtue of that character which causes it to bear the description of which the property was [5] rendered; for then what has been stated to be a property will not be a property. Thus (e.g.) inasmuch as being motionless does not belong to man-himself *qua* man, but *qua* Idea, it could not be a property of man to be motionless. For constructive purposes, on the other hand, see if the property in question belongs to the Idea, and belongs to it in that respect in virtue of which there is

predicated of it that character of which the predicate in question has been stated not to be a property; for then [10] what has been stated not to be a property will be a property. Thus (e.g.) inasmuch as it belongs to living-creature-itself to be compounded of soul and body, and further this belongs to it *qua* living-creature, it will be a property of living-creature to be compounded of soul and body.

8 · Next look from the point of view of greater and less degrees, and first for [15] destructive purposes, see if what is so-and-so to a greater degree fails to be a property of what is such-and-such to a greater degree; for then neither will what is less be a property of what is less, nor least of least, nor most of most, nor will what is so-and-so without qualification be a property of what is such-and-such without qualification. Thus (e.g.) inasmuch as being more highly coloured is not a property of what is more a body, neither will being less highly coloured be a property of what [20] is less a body, nor being coloured be a property of body at all. For constructive purposes, on the other hand, see if what is more is a property of what is more; for then also what is less will be a property of what is less, and least of least, and most of most, and without qualification of without qualification. Thus (e.g.) inasmuch as a higher degree of perception is a property of a higher degree of life, a lower degree of [25] perception will be a property of a lower degree of life, and the highest of the highest and the lowest of the lowest degree, and perception without qualification of life without qualification.

Also you should look at the argument from unqualified predication to these qualified types, and see, for destructive purposes, if what is so-and-so without qualification fails to be a property of what is such-and-such without qualification; [30] for then neither will more be a property of more, nor less of less, nor most of most, nor least of least. Thus (e.g.) inasmuch as virtuous is not a property of man, neither will more virtuous be a property of what is more human. For constructive purposes, on the other hand, see if what is without qualification is a property of what is [35] without qualification; for then more will be a property of more, and less of less, and least of least, and most of most. Thus (e.g.) a tendency to move upwards by nature is [138<sup>a</sup>1] a property of fire, and so also a greater tendency to move upwards by nature will be a property of what is more fiery. In the same way too one should look at the arguments from the others to all these.

Secondly, for destructive purposes, see if the more fails to be a

property of the [5] more; for then neither will the less be a property of the less. Thus (e.g.) inasmuch as perceiving is more a property of animal than knowing of man, and perceiving is not a property of animal, knowing will not be a property of man. For constructive purposes, on the other hand, see if the less is a property of the less; for then too the more will be a property of the more. Thus (e.g.) inasmuch as to be naturally [10] civilized is less a property of a man than to live of an animal, and it is a property of man to be naturally civilized, it will be a property of animal to live.

Thirdly, for destructive purposes, see if the predicate fails to be a property of that of which it is more a property; for then neither will it be a property of that of which it is less a property; while if it is a property of the former, it will not be a [15] property of the latter. Thus (e.g.) inasmuch as to be coloured is more a property of a surface than of a body, and it is not a property of a surface, to be coloured will not be a property of body; while if it is a property of a surface, it will not be a property of a body. For constructive purposes, on the other hand, this commonplace rule is not of any use; for it is impossible for the same thing to be a property of more than one [20] thing.

Fourthly, for destructive purposes, see if what is more a property of a given subject fails to be its property; for then neither will what is less a property of it be its property. Thus (e.g.) inasmuch as perceptible is more a property of animal than divisible, and perceptible is not a property of animal, divisible will not be a property of animal. For constructive purposes, on the other hand, see if what is less a property [25] of it is a property; for then what is more a property of it will be a property as well. Thus, for example, inasmuch as perception is less a property of animal than life, and perception is a property of animal, life will be a property of animal.

Next, look from the point of view of the attributes that belong in a like degree, [30] and first, for destructive purposes, see if what is as much a property fails to be a property of that of which it is as much a property; for then neither will that which is as much a property as it be a property of that of which it is as much a property. Thus (e.g.) inasmuch as desiring is as much a property of the faculty of desire as [35] reasoning is a property of the faculty of reason, and desiring is not a property of the faculty of desire, reasoning will not be a property of the faculty of reason. For constructive purposes, on the other hand, see if what is as much a property is a property of that of which it is as much a property; for then



also what is as much a property as it will be a property of that of which it is as much a property. Thus (e.g.) [138<sup>b</sup>1] inasmuch as it is as much a property of the faculty of reason to be the primary seat of prudence as it is of the faculty of desire to be the primary seat of temperance, and it is a property of the faculty of reason to be the primary seat of prudence, it will be a property of the faculty of desire to be the primary seat of temperance. [5]

Secondly, for destructive purposes, see if what is as much a property of anything fails to be a property of it; for then neither will what is as much a property be a property of it. Thus (e.g.) inasmuch as seeing is as much a property of man as hearing, and seeing is not a property of man, hearing will not be a property of man. For constructive purposes, on the other hand, see if what is as much a property of it [10] is its property; for then what is as much a property of it will be its property as well. Thus (e.g.) it is as much a property of the soul for a part of it to be the primary seat of desire as for a part to be the primary seat of reason, and it is a property of the soul for a part of it to be the primary seat of desire, and so it will be a property of the soul [15] for a part of it to be the primary seat of reason.

Thirdly, for destructive purposes, see if it fails to be a property of that of which it is as much a property; for then neither will it be a property of that of which it is as much a property; while if it is a property of the former, it will not be a property of the other. Thus (e.g.) inasmuch as to burn is as much a property of flame as of live coals, and to burn is not a property of flame, to burn will not be a property of live [20] coals: while if it is a property of flame, it will not be a property of live coals. For constructive purposes, on the other hand, this commonplace rule is of no use.

The rule based on things that are in a like relation differs from the rule based on attributes that belong in a like degree, because the former point is secured by [25] analogy, not from reflection on the belonging of any attribute, while the latter is judged by a comparison based on the fact that an attribute belongs.

9 · Next, for destructive purposes, see if in rendering the property potentially, he has also through that potentiality rendered the property relatively to something that does not exist, when the potentiality cannot belong to what does not [30] exist; for then what is stated to be a property will not be a property. Thus (e.g.) he who has said that

breathable is a property of air has rendered the property potentially (for that is breathable which is such as can be breathed), and he has also rendered the property relatively to what does not exist (for while air may exist, even though there exists no animal so constituted as to breathe the air, it is not possible to [35] breathe it if no animal exists; so that it will not be a property of air to be such as can be breathed at a time when there exists no animal such as to breathe it) and so it follows that breathable will not be a property of air.

[139a1] For constructive purposes, see if in rendering the property potentially he renders the property either relatively to something that exists, or to something that does not exist, when the potentiality can belong to what exists;<sup>30</sup> for then what has been stated not to be a property will be a property. Thus (e.g.) he who renders it as a [5] property of existing to be capable of being acted upon or of acting, in rendering the property potentially, has rendered the property relatively to something that exists; for when it is existent, it will be capable of being acted upon or of acting in a certain way; so that to be capable of being acted upon or of acting will be a property of existing.

Next, for destructive purposes, see if he has stated the property in the [10] superlative; for then what has been stated to be a property will not be a property. For people who render the property in that way find that of the object of which the account is true, the name is not true as well; for though the object perishes the account will continue in being none the less; for it will belong in the greatest degree to something that is in being. An example would be supposing anyone were to [15] render the lightest body as a property of fire; for, though fire may perish, there will still be some form of body that is the lightest, so that the lightest body will not be a property of fire. For constructive purposes, on the other hand, see if he has avoided rendering the property in the superlative; for then the property will in this respect have been correctly stated. Thus (e.g.) inasmuch as he who states a naturally civilized animal as a property of man has not rendered the property in the superlative, the property will in this respect have been correctly stated. [20]

## BOOK VI

1 · The discussion of definitions falls into five parts. For you have to show either that it is not true at all to apply the account to that to which the name is [25] applied (for the definition of man ought to be true of every man); or that though the object has a genus, he has failed to put the object defined into the genus, or to put it into the appropriate genus (for the framer of a definition should first place the object in its genus, and then append its differences; for of the elements of the definition the genus seems to be the principal mark of the substance of what is defined); or that the account is not proper to the object (for, as we said above as [30] well,<sup>31</sup> a definition ought to be proper); or else see if, though he has observed all the aforesaid cautions, he has yet failed to define the object, that is, to express the essence of what is being defined. It remains, apart from the foregoing, to see if he has defined it, but defined it incorrectly. [35]

Whether, then, the account is not also true of that of which the name is true you should examine according to the commonplace rules that relate to accident. For there too the question is always 'Is so and so true or untrue?'; for whenever we argue [139<sup>b</sup>1] that an accident belongs, we declare it to be true, while whenever we argue that it does not belong, we declare it to be untrue. Whether he has failed to place the object in the appropriate genus, or whether the given account is not proper, we must examine according to the commonplace rules that relate to genus and property. [5]

It remains, then, to say how to investigate whether the object has been either not defined at all, or else defined incorrectly. First, then, we must examine if it has been defined incorrectly; for with anything it is easier to do it than to do it correctly—clearly, then, more mistakes are made in the latter task on account of its greater difficulty, so that the attack becomes easier in the latter case than in the [10] former.

Incorrectness falls into two branches: first, the use of obscure language (for the language of a definition ought to be the very clearest possible, seeing that the purpose of rendering it is to make something known); secondly, if the account is [15] longer than is necessary (for all additional matter in a definition is superfluous). Again, each of the aforesaid branches is divided into a number of others.

2 · One commonplace rule, then, in regard to obscurity is to see if what is stated is homonymous with something, e.g. that becoming is a passage into being, or [20] that health is the balance of hot and cold elements. Here passage and balance are homonymous; it is accordingly not clear which of the several possible senses of the term he intends to convey. Likewise also, if the term defined is used in different [25] ways and he has spoken without distinguishing between them; for then it is not clear to which of them the definition rendered applies, and one can then bring a captious objection on the ground that the account does not apply to all the things whose definition he has rendered—this kind of thing is particularly easy in the case where the definer does not see the homonymy. Or, again, the questioner may himself [30] distinguish the various uses of the term rendered in the definition, and then produce a deduction; for if the expression used is not adequate to the subject in any of its senses, it is clear that he cannot have defined it aright.

Another rule is to see if he has used a metaphorical expression, as, for instance, if he has defined knowledge as unsupplanted, or the earth as a nurse, or temperance as a harmony. For a metaphorical expression is always obscure. It is [35] possible, also, to argue captiously against the user of a metaphorical expression as though he had used it in its literal sense; for the definition stated will not apply, e.g. in the case of temperance; for harmony is always found between notes. Moreover, if harmony is the genus of temperance, then the same object will occur in two genera [40a1] of which neither contains the other; for harmony does not contain virtue, nor virtue harmony.

Again, see if he uses terms that are not in current use, as when Plato describes the eye as brow-shaded, or a certain spider as poison-fanged, or the marrow as [5] bone-formed. For an unusual phrase is always obscure.

Sometimes a phrase is used neither homonymously, nor yet metaphorically, nor yet literally, as when the law is said to be the measure or image of the things that are by nature just. Such phrases are worse than metaphor; for metaphor does make [10] what it signifies to some extent familiar because of the likeness involved (for those who use metaphors do so always in view of some likeness), whereas this kind of thing makes nothing familiar, (for there is no likeness in virtue of which the law is a measure or image nor is the law ordinarily so called). So then, if a man says that the law is literally a measure or an image, he speaks falsely; for an image is something [15] produced by imitation, and this is not found in the case of the law. If, on the other hand, he does not

mean the term literally, it is clear that he has used an obscure expression, and one that is worse than any sort of metaphorical expression.

Moreover, see if from the expression used the account of the contrary is not clear; for definitions that have been correctly rendered also indicate their contraries [20] as well. Or, again, see if, when it is merely stated by itself, it is not evident what it defines—just as in the works of the old painters, unless there were an inscription, the figures used to be unrecognizable.

3 · If, then, the definition is not clear, you should examine on lines such as these. If he has phrased the definition redundantly, first of all look and see whether [25] he has used any attribute that belongs universally, either to entities in general, or to all that fall under the same genus as the object defined; for the mention of this is sure to be redundant. For the genus ought to divide the object from other things, and the differentia from any of the things contained in the same genus. Now any term that belongs to everything separates off the given object from absolutely nothing, while any that belongs to all the things that fall under the same genus does [30] not separate it off from the things contained in the same genus. Any addition, then, of that kind will be pointless.

Or see if, though the additional matter is proper to the given term, yet when it is struck out the rest of the account too is proper and makes clear the substance of the term. Thus, in the account of man, the addition ‘capable of receiving knowledge’ [35] is superfluous; for strike it out, and still the account is proper and makes clear his substance. Speaking generally, everything is superfluous upon whose removal the [140<sup>b</sup>1] remainder still makes the term that is being defined clear. Such, for instance, would also be the definition of the soul, assuming it to be stated as a self-moving number; for the soul is just what is self-moving, as Plato defined it.<sup>32</sup> Or perhaps the expression used, though proper, yet does not show the substance if number is [5] eliminated. Which of the two is the real state of the case it is difficult to determine clearly: the right way to treat the matter in all cases is to be guided by convenience. Thus (e.g.) it is said that the definition of phlegm is the undigested moisture that comes first off food. What is first is one, not many; so that the addition of the word ‘undigested’ is superfluous; so that even when this is left out the remaining account [10] will still be proper; for it is impossible that both phlegm and also something else should both be the first to arise from the

food. Or perhaps the phlegm is not absolutely the first thing to come off the food, but only the first of the undigested matters, so that the addition 'undigested' is required; for stated the other way the definition would not be true unless the phlegm comes first of all. [15]

Moreover, see if anything contained in the account fails to apply to everything that falls under the same species; for this sort of account is worse than those which include an attribute belonging to all things universally. For in that case, if the remainder of the account is proper, the whole too will be proper; for absolutely always, if to something proper anything whatever that is true is added, the whole too [20] becomes proper. Whereas if any part of the account does not apply to everything that falls under the same species, it is impossible that the account as a whole should be proper; for it will not be predicated convertibly with the object; e.g. a terrestrial two-footed animal six feet high—for an account of that kind is not predicated convertibly with the object, because being six feet high does not belong to [25] everything that falls under the same species.

Again, see if he has said the same thing more than once, saying (e.g.) that desire is appetite for the pleasant. For desire is always for the pleasant, so that what is the same as desire will also be for the pleasant. Accordingly our definition of desire becomes appetite for the pleasant for the pleasant; for there is no difference [30] between desire and appetite for the pleasant, so that both alike will be for the pleasant. Or perhaps there is no absurdity in this; for man is a biped; therefore, what is the same as man is a biped; but a terrestrial biped animal is the same as man, and [35] therefore a terrestrial biped animal is a biped. But this involves no real absurdity. For biped is not predicated of terrestrial animal (if it were, then we should certainly have biped predicated twice of the same thing); but the subject said to be a biped is [141<sup>a</sup>1] a terrestrial biped animal, so that biped is only predicated once. Likewise in the case of desire as well; for being of the pleasant is not predicated of appetite, but rather of the whole, so that there too the predication is only made once. Absurdity results, [5] not when the same word is uttered twice, but when the same thing is more than once predicated of a subject—as Xenocrates says that prudence defines and contemplates reality; for definition is a certain type of contemplation, so that by adding 'and contemplates' he says the same thing twice over. Likewise those who say that [10] cooling is the privation of natural heat. For all privation is a privation of some natural attribute, so that the addition of 'natural' is superfluous: it would have been enough to say privation of heat, for

privation itself makes it familiar that the heat meant is natural heat.

[15] Again, see if a universal has been mentioned and then a particular case of it added as well, e.g. Equity is a remission of what is expedient and just; for what is just is a branch of what is expedient and is therefore included in the latter: it is therefore redundant, an addition of the particular after the universal has been already stated. So also, if he defines medicine as knowledge of what makes for [20] health in animals and men, or the law as the image of what is by nature noble and just; for what is just is a branch of what is noble, so that he says the same thing more than once.

4 · Whether, then, a man defines a thing correctly or incorrectly you should examine on these and similar lines. But whether he has mentioned and defined its [25] essence or not, should be examined as follows.

First of all, see if he has failed to make the definition through terms that are prior and more familiar. For a definition is rendered in order to come to know the term stated, and we come to know things by taking not any random terms, but such [30] as are prior and more familiar, as is done in demonstrations (for so it is with all teaching and learning); accordingly, it is clear that a man who does not define through terms of this kind has not defined at all. Otherwise, there will be more than one definition of the same thing; for clearly he who defines through terms that are prior and more familiar has framed a better definition, so that both will then be definitions of the same object. This sort of thing, however, does not seem to be so; for [35] of each entity there is a single essence; if, then, there are to be a number of definitions of the same thing, the object defined will be the same as the essences represented in each of the definitions; but these are not the same, inasmuch as the [141<sup>b</sup>1] definitions are different. Clearly, then, any one who has not defined a thing through terms that are prior and more familiar has not defined it at all.

The statement that a definition has not been made through more familiar terms may be understood in two ways either supposing that its terms are without qualification less intelligible, or supposing that they are less intelligible to us; for [5] either way is possible. Thus the prior without qualification is more familiar than the posterior, a point, for instance, than a line, a line than a plane, and a plane than a solid; just as a unit is more intelligible than a number; for it is prior to and a principle

of all number. Likewise, also, a letter is more familiar than a syllable. Whereas to us it sometimes happens that the converse is the case; for a solid falls under perception most of all, and a plane more than a line, and a line more than a [10] point; for most people learn such things earlier; for any ordinary intelligence can grasp them, whereas the others require a precise and exceptional understanding.

Absolutely, then, it is better to try to come to know what is posterior through [15] what is prior, inasmuch as such a way of procedure is more scientific. Of course, in dealing with persons who cannot recognize things through terms of that kind, it may perhaps be necessary to frame the account through terms that are familiar to them. Among definitions of this kind are those of a point, a line, and a plane, all of which [20] explain the prior by the posterior; for they say that a point is the limit of a line, a line of a plane, a plane of a solid. One must, however, not fail to observe that those who define in this way cannot show the essence of what they define, unless it so happens that the same thing is more familiar both to us and also without qualification, since [25] a correct definition must define a thing through its genus and its differentiae, and these belong to the order of things which are without qualification more familiar than, and prior to, the species. For annul the genus and differentia, and the species too is annulled, so that these are prior to the species. They are also more familiar; for if the species is known, the genus and differentia must of necessity be known as [30] well (for any one who knows what a man is knows also what animal and terrestrial are), whereas if the genus or the differentia is known it does not follow of necessity that the species is known as well; thus the species is less intelligible. Moreover, those who say that such definitions, viz. those which proceed from what is familiar to [35] some individual, accord with the truth, will have to say that there are several definitions of one and the same thing. For in fact different things are more familiar to different people, not the same things to all; and so a different definition would have to be rendered to each several person, if the definition is to be constructed from [142<sup>a</sup>1] what is more familiar to particular individuals. Moreover, to the same people different things are more familiar at different times: first of all the objects of sense; then, as they become more acute, the converse; so that those who hold that a definition ought to be rendered through what is more familiar to particular individuals will not have to render the same definition at all times even to the same [5] person. It is clear, then, that the right way to define is not through terms of that kind, but through what is without qualification more familiar; for



only in this way could the definition come always to be one and the same. Perhaps, also, what is familiar without qualification is what is familiar, not to all, but to those who are in a [10] sound state of understanding, just as what is without qualification healthy is what is healthy to those in a sound state of body. All such points as this ought to be made very precise, and made use of in the course of discussion as occasion requires.

The demolition of a definition will most surely win a general approval if the definer happens to have framed his account neither from what is without qualification [15] more intelligible nor yet from what is so to us.

One form, then, of the failure to work through more familiar terms is the exhibition of the prior through the posterior, as we remarked before. Another form occurs if we find that the account has been rendered of what is at rest and definite [20] through what is indefinite and in motion; for what is still and definite is prior to what is indefinite and in motion.

Of the failure to use terms that are prior there are three forms. The first is when an opposite has been defined through its opposite, e.g. good through evil; for opposites are always simultaneous by nature. Some people think, also, that both are [25] objects of the same science, so that the one is not even more familiar than the other. One must, however, observe that it is perhaps not possible to define some things in any other way, e.g. the double without the half, and all terms that are essentially relative; for in all such cases to be them is the same as to be somehow related to [30] something, so that it is impossible to know the one without the other, and accordingly in the account of the one the other too must be embraced. One ought to recognize all such points as these, and use them as occasion may seem to require.

Another is—if he has used the term defined itself. This passes unobserved when the actual name of the object being defined is not used, e.g. supposing anyone [142<sup>b</sup>1] had defined the sun as a star that appears by day. For in bringing in day he brings in the sun. To detect errors of this sort, exchange the name for its account, e.g. the account of day as the passage of the sun over the earth. Clearly, whoever has [5] mentioned the passage of the sun over the earth has mentioned the sun, so that in bringing in the day he has brought in the sun.

Again, see if he has defined one co-ordinate member of a division by another, e.g. an odd number as that which is greater by one than an even number. For the co-ordinate members of a division that are derived from the same genus are [10] simultaneous by nature, and odd and even are

such terms; for both are differentiae of number.

Likewise also, see if he has defined a superior through a subordinate term, e.g. an even number as a number divisible into halves, or the good as a state of virtue. For 'into halves' is derived from 'two', and two is an even number; and virtue is a [15] kind of good—so that the latter terms are subordinate to the former. Moreover, in using the subordinate term one is bound to use the other as well; for whoever introduces virtue introduces the good, seeing that virtue is a certain kind of good; likewise, also, whoever employs 'into halves' employs the even, for to be divided into halves means to be divided into two, and two is even.

[20]5 · Generally speaking, then, one commonplace rule relates to the failure to frame the account by means of terms that are prior and more familiar; and of this the subdivisions are those specified above. A second is to see whether, though the object is in a genus, it has not been placed in a genus. This sort of error is always found where what the object is does not stand first in the account, e.g. the definition [25] of body as that which has three dimensions, or the definition of man, supposing anyone to give it, as that which knows how to count; for it is not stated what it is that has three dimensions, or what it is that knows how to count; whereas the genus is meant to indicate what it is, and is submitted first of the terms in the definition.

Moreover, see if, while the term to be defined is used in relation to many [30] things, he has failed to render it in relation to all of them; as (e.g.) if he defines grammar as the knowledge how to write from dictation; for he ought also to say that it is a knowledge how to read as well. For one who renders it as knowledge of writing has no more defined it than one who renders it as knowledge of reading: neither in fact has succeeded, but only one who mentions both these things, since it is impossible that there should be more than one definition of the same thing. It is only, however, in some cases that what has been said corresponds to the actual state [143<sup>a</sup>1] of things: in some it does not, e.g. all those terms which are not used in their own right in relation to both things—as medicine is said to deal with the production of disease and health; for it is said in its own right to do the latter, but the former only by accident; for it is absolutely alien to medicine to produce disease. Here, then, the [5] man who renders medicine as relative to both of these things has not defined it any better than he who mentions the one only. In fact he has done it perhaps worse; for any one else besides the doctor is

capable of producing disease.

Moreover, in a case where the term to be defined is used in relation to several things, see if he has rendered it as relative to the worse rather than to the better; for [10] every form of knowledge and potentiality is generally thought to be relative to the best.

Again, if the thing in question is not placed in its own proper genus, one must examine it according to the elementary rules in regard to genera, as has been said before.

Moreover, see if he passes over the genera, defining, e.g., justice as a state that [15] produces equality or distributes what is equal; for by defining it so he passes over virtue, and so by leaving out the genus of justice he fails to express its essence; for the substance of a thing in each case involves its genus. This is the same as not putting the object into its nearest genus; for the man who puts it into the nearest one [20] has stated all the higher genera, seeing that all the higher genera are predicated of the lower. Either, then, it ought to be put into its nearest genus, or else to the higher genus all the differentiae ought to be appended whereby the nearest genus is defined. For then he would not have left out anything, but would have mentioned the subordinate genus by an account instead of by a name. On the other hand, he [25] who mentions merely the higher genus by itself, does not state the subordinate genus as well: in mentioning a plant a man does not mention a tree.

6 · Again, in regard to the differentiae, we must examine in like manner whether the differentiae that he has stated are those of the genus. For if a man has [30] not defined the object by the differentiae to it, or has mentioned something such as is utterly incapable of being a differentia of anything, e.g. animal or substance, clearly he has not defined it at all; for the aforesaid terms are not differentiae of anything at all. Further, we must see whether the differentia stated possesses anything that is co-ordinate with it in a division; for, if not, clearly the one stated [35] will not be a differentia of the genus. For a genus is always divided by differentiae that are co-ordinate members of a division, as, for instance, animal by terrestrial, [143<sup>b</sup>1] and winged [and aquatic and biped].<sup>33</sup> Or see if, though the contrasted differentia exists, it yet is not true of the genus; for then, clearly, neither of them could be a [5] differentia of the genus; for differentiae that are co-ordinates in a division are all true of the genus. Likewise, also, see if, though it is true, yet the addition of it to the genus fails to make a species. For then, clearly, this

will not be a specific differentia of the genus; for a specific differentia, along with the genus, always makes a species. If, however, this is no differentia, no more is the one adduced, seeing that it is a [10] co-ordinate member of a division with this.

Moreover, see if he divides the genus by a negation, as those do who define a line as length without breadth; for this means simply that it has not any breadth. The genus will then be found to partake of its own species; for, since of everything [15] either the affirmation or the negation is true, length must always either lack breadth or possess it, so that length as well, i.e. the genus of line, will be either with or without breadth. But length without breadth is the account of a species, as also is length with breadth; for without breadth and with breadth are differentiae, and the [20] genus and differentia constitute the account of the species. Hence the genus will admit of the account of its species. Likewise, also, it will admit of the account of the differentia, seeing that one or the other of the aforesaid differentiae is of necessity predicated of the genus. This principle is useful against those who posit Ideas; for if [25] length itself exists, how will it be predicable of the genus that it has breadth or that it lacks it? For one assertion or the other will have to be true of length universally, if it is to be true of the genus; and this is contrary to the fact; for there exist both lengths which have, and lengths which have not, breadth. Hence the only people [30] against whom the rule can be employed are those who assert that every genus is numerically one; and this is what is done by those who posit the Ideas; for they allege that length itself and animal itself are the genus. It may be that in some cases the definer is obliged to employ a negation, e.g. in defining privations. For a thing is blind which cannot see when its nature is to see.

[35] There is no difference between dividing the genus by a negation, and dividing it by such an affirmation as is bound to have a negation as its co-ordinate in a division, e.g. supposing he had defined something as length possessed of breadth; for [144a1] co-ordinate in the division with that which is possessed of breadth is that which possesses no breadth and that only, so that again the genus is divided by a negation.

[5] Again, see if he rendered the species as a differentia, as do those who define contumely as insolence accompanied by jeering; for jeering is a kind of insolence, hence it is a species and not a differentia.

Moreover, see if he has stated the genus as the differentia, e.g. virtue as a good [10] or noble state; for good is the genus of virtue. Or possibly good here is not the genus but the differentia, on the principle that the

same thing cannot be in two genera of which neither contains the other; for good does not include state, nor vice versa; for [15] not every state is good nor every good a state. Both, then, will not be genera, and consequently, if state is the genus of virtue, clearly good cannot be its genus: it must rather be a differentia. Moreover, a state indicates what virtue is, whereas good indicates not what it is but a quality, and to indicate a quality seems to be the function of the differentia.

See, further, whether the given differentia indicates a certain 'this' rather than [20] a quality; for it seems that the differentia always expresses a quality.

Look and see, further, whether the differentia belongs only by accident to the object defined. For the differentia is never an accidental attribute, any more than [25] the genus is; for the differentia of a thing cannot both belong and not belong to it.

Moreover, if either the differentia or the species, or any of the things which are under the species, is predicated of the genus, then he will not have defined the term. For none of the aforesaid can be predicated of the genus, seeing that the genus is the [30] term with the widest range of all. Again, see if the genus is predicated of the differentia; for it seems that the genus is predicated, not of the differentia, but of the objects of which the differentia is predicated. Animal (e.g.) is predicated of man and ox and other terrestrial animals, not of the differentia itself, which we predicate [35] of the species. For if animal is to be predicated of each of its differentiae, then many animals will be predicated of the species; for the differentiae are predicated of the species. Moreover, the differentiae will be all either species or individuals, if they [144<sup>b</sup>1] are animals; for every animal is either a species or an individual.

Likewise you must inquire also if the species or any of the objects that come under it is predicated of the differentia; for this is impossible, seeing that the [5] differentia is a term with a wider range than the species. Moreover, if any of the species is predicated of it, the result will be that the differentia is a species: if man is predicated, the differentia is clearly man. Again, see if the differentia fails to be prior to the species; for the differentia ought to be posterior to the genus, but prior to [10] the species.

Look and see also if the differentia mentioned belongs to a different genus, neither contained in nor containing the genus in question. For it seems that the same differentia cannot be used of two genera neither of which contains the other. Otherwise, the result will be that the same species as well will be in two genera [15] neither of which contains the

other; for each of the differentiae imports its appropriate genus, e.g. terrestrial and biped import with them animal. Hence each of the genera as well is true of that of which the differentia is true; and it clearly follows that the species must be in two genera neither of which contains the other. Or perhaps it is not impossible for the same differentia to be used of two genera [20] neither of which contains the other, and we ought to add 'if they do not both fall under the same genus'. Thus terrestrial animal and winged animal are genera neither of which contains the other, and biped is a differentia of both. So we ought to add 'if they do not both fall under the same genus'; for both these are subordinate [25] to animal. From this possibility, that the same differentia may be used of two genera neither of which contains the other, it is clear also that there is no necessity for the differentia to carry with it every appropriate genus, but only the one or the other together with the genera that are higher than this, as biped carries with it either winged or terrestrial animal. [30]

See, too, if he has rendered being in something as the differentia of a thing's substance; for it seems that locality cannot differentiate between one substance and another. Hence, too, people condemn those who divide animals by means of the terms terrestrial and aquatic, on the ground that terrestrial and aquatic indicate [35] locality. Or possibly in this case the censure is undeserved; for aquatic does not mean 'in' anything; nor does it denote a locality, but a certain quality; for even if the thing is on the dry land, still it is aquatic—and likewise a land animal, even though [145<sup>a</sup>1] it is in the water, will still be a land animal and not aquatic. But all the same, if ever the differentia does denote being in something, clearly he will have made a mistake.

Again, see if he has rendered an affection as the differentia; for every affection, if intensified, subverts the substance of the thing, while the differentia is [5] not of that kind; for the differentia seems rather to preserve that which it differentiates; and it is absolutely impossible for a thing to exist without its appropriate differentia—if there is nothing terrestrial, there will be no man. To speak generally, a thing cannot have as its differentia anything in respect of which it is subject to alteration; for all things of that kind, if intensified, subvert its [10] substance. If, then, a man has rendered any differentia of this kind, he has made a mistake; for we undergo absolutely no alteration in respect of our differentiae.

Again, see if he has failed to render the differentia of a relative term relatively to something else; for the differentiae of relative terms are

themselves relative, as in [15] the case of knowledge. This is classed as speculative, practical, and productive; and each of these denotes a relation; for it speculates upon something, and produces something, and does something.

Look and see also if the definer renders each relative term relatively to its [20] natural correlative; for while some things can be used in relation to their natural correlative only and to nothing else, some can be used in relation to something else as well. Thus sight can only be used for seeing, but a strigil can also be used to draw off liquid. Still, if any one were to define a strigil as an instrument for drawing off [25] liquid, he would make a mistake; for that is not its natural correlative. The definition of a thing's natural correlative is that for which it would be used by the prudent man, acting as such, and by the science appropriate to that thing.

Or see if, whenever a term happens to be used in a number of relations, he has failed to introduce it in its primary relation: e.g. by defining prudence as the virtue [30] of man or of the soul, rather than of the reasoning faculty; for prudence is the virtue primarily of the reasoning faculty; for it is in virtue of this that both the man and his soul are said to be prudent.

Moreover, if the thing of which the term defined has been stated to be an affection or disposition, or whatever it may be, is unable to admit it, the definer has [35] made a mistake. For every disposition and every affection is formed naturally in that of which it is an affection or disposition, as knowledge is formed in the soul, being a disposition of soul. Sometimes, however, people make mistakes in matters of [145<sup>b1</sup>] this sort, e.g. all those who say that sleep is an incapacity to perceive, or that perplexity is a state of equality between contrary reasonings, or that pain is a violent disruption of parts that are naturally conjoined. For sleep is not an attribute of perception, whereas it ought to be, if it is an incapacity to perceive. Likewise, perplexity is not an attribute of opposite reasonings, nor pain of parts naturally [5] conjoined; for then inanimate things will be in pain, since pain will be present in them. Similar in character, too, is the definition of health, if it is a balance of hot and cold elements; for then health will be necessarily exhibited by the hot and cold elements; for a balance of anything belongs to those things of which it is the [10] balance, so that health will be an attribute of them. Moreover, people who define in this way put effect for cause, or cause for effect. For the disruption of parts naturally conjoined is not pain, but a cause of pain; nor again is an incapacity to perceive sleep, but the one is the cause

of the other—for either we go to sleep [15] because of the incapacity, or we are incapable because we go to sleep. Likewise also an equality between contrary reasonings would seem to be a cause of perplexity; for it is when we reflect on both sides of a question and find everything alike to be in keeping with either course that we are perplexed which of the two we are to do. [20]

Moreover, with regard to all periods of time look and see whether there is any discrepancy: e.g. supposing the immortal to be defined as a living thing immune at present from destruction. For a living thing that is immune at present from destruction will be immortal at present. Possibly, indeed, in this case this result does not follow, owing to the ambiguity of the words ‘immune at present from destruction’; for they may mean either that the thing has not been destroyed at [25] present, or that it cannot be destroyed at present, or that at present it is such that it never can be destroyed. Whenever, then, we say that a living thing is at present immune from destruction, we mean that it is at present a living thing of such a kind as never to be destroyed; and this is equivalent to saying that it is immortal, so that it is not meant that it is immortal only at present. Still, if ever it does happen that [30] the attribute given by the account belongs in the present or past, whereas that given by the name does not so belong, then the two will not be the same. So, then, this commonplace rule ought to be used as we have said.

7 · You should look and see also whether the term defined is applied in consideration of something other than the account given. Suppose (e.g.) a definition [35] of justice as the ability to distribute what is equal. Now it is the man who chooses, rather than the man who is able, to distribute what is equal who is just; so that justice will not be an ability to distribute what is equal; for then also the most just [146<sup>a</sup>1] man will be the man with the most ability to distribute what is equal.

Moreover, see if the object admits of degrees, whereas what is given by the account does not, or, vice versa, what is given by the account admits of degrees while [5] the object does not. For either both must admit them or else neither, if indeed what is given by the account is the same as the object. Moreover, see if, while both of them admit of degrees, they yet do not both become greater together: e.g. suppose love to be the desire for intercourse; now he who is more intensely in love has not a [10] more intense desire for intercourse, so that both do not become intensified at once: they certainly should, however, had they been the



same thing.

Moreover, suppose two things to be before you, see if the object applies in greater degree to the one to which the content of the account is less applicable. [15] Take, for instance, the definition of fire as the body that consists of the most rarefied particles. For flame is fire in greater degree than light is, but flame is less the body that consists of the most rarefied particles than is light; but both ought to be applicable in greater degree to the same thing, if they had been the same. Again, see if the one applies in equal degree to both the objects before you, while the other [20] does not apply to both alike, but more particularly to one of them.

Moreover, see if he renders the definition relative to two things taken separately: thus, the beautiful is what is pleasant to the eyes or to the ears; or the existent is what is capable of being acted upon or of acting. For then the same thing will be both beautiful and not beautiful, and likewise will be both existent and [25] non-existent. For pleasant to the ears will be the same as beautiful, so that not pleasant to the ears will be the same as not beautiful; for of identical things the opposites, too, are identical, and the opposite of beautiful is not beautiful, while of pleasant to the ears the opposite is not pleasant to the ears—clearly, then, not pleasant to the ears is the same thing as not beautiful. If, therefore, something is [30] pleasant to the eyes but not to the ears, it will be both beautiful and not beautiful. In like manner we shall prove also that the same thing is both existent and non-existent.

Moreover, of both genera and differentiae and all the other terms rendered in definitions you should frame accounts in lieu of the names, and then see if there is [35] any discrepancy between them.

8 · If the term defined is relative, either in itself or in respect of its genus, see whether the definition fails to mention that to which the term, either in itself or in [146<sup>b</sup>1] respect of its genus, is relative, e.g. if he has defined knowledge as an incontrovertible belief or wishing as painless appetition. For of everything relative the substance is relative to something else, seeing that the being of every relative term is identical with being in a certain relation to something. He ought, therefore, to have [5] said that knowledge is belief about a knowable and that wishing is appetition for a good. Likewise, if he has defined grammar as knowledge of letters—for in the definition there ought to be rendered either the thing to which the term itself is relative, or that to which its genus is relative. Or see if a relative term has been [10] described not in

relation to its end, the end in anything being whatever is best or gives its purpose to the rest. Certainly it is what is best or final that should be stated, e.g. that desire is not for the pleasant but for pleasure; for this is our purpose in choosing what is pleasant.

Look and see also if that in relation to which he has rendered the term is a process or an activity; for nothing of that kind is an end, for the completion of the [15] activity or process is the end rather than the process or activity itself. Or perhaps this rule is not true in all cases; for almost everybody would rather be enjoying themselves than have ceased enjoying themselves, so that they would count the activity as the end rather than its completion.

[20] Again see in some cases if he has failed to distinguish the quantity or quality or place or other differentiae of an object; e.g. the quality and quantity of the honour the striving for which makes a man ambitious—for all men strive for honour, so that it is not enough to define the ambitious man as him who strives for honour, but the aforesaid differentiae must be added. Likewise, also, in defining the covetous man the quantity of money he aims at, or in the case of the incontinent man the quality of [25] the pleasures, should be stated. For it is not the man who gives way to any sort of pleasure whatever who is called incontinent, but only he who gives way to a certain kind of pleasure. Or again, people sometimes define night as a shadow on the earth, or an earthquake as a movement of the earth, or a cloud as condensation of the air, or a wind as a movement of the air; whereas they ought to specify as well quantity, [30] quality, place, and cause. Likewise, also, in other cases of the kind; for by omitting any differentiae whatever he fails to state the essence. One should always attack deficiency. For a movement of the earth does not constitute an earthquake, nor a movement of the air a wind, irrespective of its manner and the amount involved. [35]

Moreover, in the case of appetitions, and in any other cases where it applies, see if the word ‘apparent’ is left out: e.g. wishing is an appetite after the good, or desire is an appetite after the pleasant—instead of the apparently good or [147<sup>a</sup>1] pleasant. For often those who exhibit the appetite do not perceive what is good or pleasant, so that their aim need not be really good or pleasant, but only apparently so. They ought, therefore, to have rendered the definition accordingly. On the other hand, any one who maintains the existence of Ideas ought to be brought face to face [5] with his Ideas, even though he does render the term in question; for there can be no Idea of anything apparent and it seems that an Idea is

always spoken of in relation to an Idea—thus desire itself is for the pleasant itself, and wishing itself is for the good itself; they therefore cannot be for an apparently good or an apparently pleasant; for the existence of the apparently good (or pleasant) itself would be an [10] absurdity.

9 · Moreover, if the definition is of the state of anything, look at what is in the state, while if it is of what is in the state, look at the state; and likewise in other cases of the kind. Thus if the pleasant is essentially beneficial, then, too, the man who is pleased is benefited. Speaking generally, in definitions of this sort it happens [15] that what the definer in a sense defines is more than one thing; for in defining knowledge, a man in a sense defines ignorance as well, and likewise also what has knowledge and what lacks it, and what it is to know and to be ignorant. For if the first is made clear, the others become in a certain sense clear as well. We have, then, [20] to be on our guard in all such cases against discrepancy, using the elementary principles drawn from consideration of contraries and of co-ordinates.

Moreover, in the case of relative terms, see if the species is rendered as relative to a species of that to which the genus is rendered as relative, e.g. supposing belief to be relative to the object of belief, see whether a particular belief is made relative to [25] some particular object of belief; and, if a multiple is relative to a fraction, see whether a particular multiple is made relative to a particular fraction. For if it is not so rendered, clearly a mistake has been made.

See, also, if the opposite of the term has the opposite account, whether (e.g.) [30] the account of half is the opposite of that of double; for if double is that which exceeds another by an equal amount to that other, half is that which is exceeded by an amount equal to itself. In the same way, too, with contraries. For to the contrary term will apply the account that is contrary in some one of the ways in which contraries are conjoined. Thus (e.g.) if useful is productive of good, injurious is productive of evil or destructive of good—for one or the other of these is bound to be [147<sup>b</sup>1] contrary to the term originally used. Suppose then, neither of these things to be the contrary of the term originally used, then clearly neither of those rendered later will be an account of the contrary; and therefore the account originally rendered has not [5] been rightly rendered either. Seeing, moreover, that of contraries, the one is sometimes named by the privation of the other, as (e.g.) inequality seems

to be the privation of equality (for things that are not equal are called unequal), it is therefore clear that the contrary named by the privation must of necessity be defined through the other; whereas the other cannot then be defined through the one named by the privation; for else we should find that each was being made known [10] by the other. We must in the case of contrary terms keep an eye on this mistake, e.g. supposing any one were to define equality as the contrary of inequality; for then he is defining it through the one named by the privation of it. Moreover, a man who so defines is bound to use in his definition the very term he is defining; and this becomes clear, if for the name we substitute its account. For to say 'inequality' is the [15] same as to say 'privation of equality'. Therefore equality will be the contrary of the privation of equality, so that he will have used the very term to be defined. Suppose, however, that neither of the contraries is named by the privation, but yet the account of it is rendered in a manner like the above, e.g. suppose good to be defined as the contrary of evil, then it is clear that evil will be the contrary of good (for the accounts of things that are contrary in this way must be rendered in a like manner), [20] so that again he uses the very term being defined—for good is inherent in the account of evil. If, then, good is the contrary of evil, and evil is nothing other than the contrary of good, then good will be the contrary of the contrary of good. Clearly, [25] then, he has used the very term to be defined.

Moreover, see if in rendering a term named by the privation, he has failed to render the term of which it is the privation, e.g. the state, or contrary, or whatever it may be whose privation it is; also if he has omitted to add that in which the privation is naturally formed—either without qualification or else that in which it is naturally [30] formed primarily: e.g. whether in defining ignorance as a privation he has failed to say that it is the privation of knowledge; or has failed to add in what it is naturally formed, or, though he has added this, has failed to render the thing in which it is primarily formed, placing it (e.g.) in man or in the soul, and not in the reasoning faculty; for if in any of these respects he fails, he has made a mistake. Likewise, also, if he has failed to say that blindness is the privation of sight in an eye; for a proper [148<sup>a</sup>1] rendering of what it is must state both of what it is the privation and what it is that is deprived.

Examine further whether he has defined as a privation something not named by a privation—a mistake of this sort would seem to be incurred in the case of ignorance by any one who is not using it as a merely negative term. For what seems [5] to be ignorant is not that which has no

knowledge, but rather that which has been deceived (for this reason we do not talk of inanimate things or of children as being ignorant). Ignorance, then, is not named by the privation of knowledge.

10 · Moreover, see whether the like inflexions in the account apply to the [10] like inflexions of the word; e.g. if beneficial is productive of health, is beneficially productively of health and a benefactor a producer of health?

Look too and see whether the definition given will apply to the Idea as well. For in some cases it will not do so; e.g. in the Platonic definition where he adds the word [15] ‘mortal’ in his definitions of living creatures; for the Idea (e.g. man itself) is not mortal, so that the account will not fit the Idea. In general, wherever the words ‘capable of acting on’ or ‘capable of being acted upon’ are added, the definition and the Idea are bound to be discrepant; for those who assert the existence of Ideas hold [20] that they are incapable of being acted upon, or of motion. In dealing with these people arguments of this kind are useful.

Further, see if he has rendered a single common account of terms that are used homonymously. For things whose account corresponding to their name is one and the same, are synonymous; if, then, the definition applies in a like manner to the [25] whole range of the homonym, it does not define any one of the objects described by the term. This is what happens to Dionysius’ definition of life when stated as a movement of a creature sustained by nutriment, congenitally present with it; for this is found in plants as much as in animals, whereas life seems to be not one kind of thing only, but one thing in animals and another in plants. It is possible to hold the [30] view that life is synonymous and of one kind only, and therefore to render the definition in this way on purpose; or it may quite well happen that a man may see the homonymy and wish to render the definition of the one sense only, and yet fail to see that he has rendered an account common to both instead of proper to one. In [35] either case, whichever course he pursues, he is equally at fault. Since homonymies sometimes pass unobserved, it is best in questioning to treat them as though they were synonymous (for the definition of the one will not apply to the other, so that [148<sup>b</sup>1] the answerer will seem not to have defined it correctly—for it should apply to the whole range of the synonym, whereas in answering you should yourself distinguish between them). Further, as some answerers call homonymous what is really synonymous, whenever the given account fails to apply to the whole

range, and, vice versa, call synonymous what is really homonymous if it applies to both, one should [5] secure a preliminary agreement on such points, or else prove beforehand that so-and-so is homonymous or synonymous, as the case may be; for people are more ready to agree when they do not foresee what the consequence will be. If, however, no agreement has been made, and the man asserts that what is really synonymous is [10] homonymous because the account he has given will not apply to the second sense as well, see if the account of this second sense applies to the others; for if so, this must clearly be synonymous with those others. Otherwise, there will be more than one [15] definition of the others; for there are applicable to them two accounts corresponding to their names, viz. the one previously rendered and also the later one. Again, if anyone were to define a term used in several ways, and, finding that his account does not apply to them all, were to contend not that the term is homonymous, but that the name does not apply to all of them, just because his account will not do so [20] either, then one may retort to such a man that though in some things one must not speak with the vulgar, yet in a question of terminology one is bound to employ the received and traditional usage and not to upset matters of that sort.

11 · Suppose now that a definition has been rendered of some complex, take [25] away the account of one of the elements in the complex, and see if the rest of the account defines the rest of it: if not, it is clear that neither does the whole account define the whole complex. Suppose, e.g., that some one has defined a finite straight line as the limit of a finite plane, such that its centre is in a line with its extremes; if now the account of a finite line is the limit of a finite plane, the rest (viz. ‘such that [30] its centre is in a line with its extremes’) ought to be an account of straight. But an infinite straight line has neither centre nor extremes and yet is straight, so that the remainder is not an account of the remainder.

Moreover, if the term defined is a compound, see if the account given has as many members as the term defined. An account is said to have as many members as [35] the term defined when the number of the elements compounded is the same as the number of names and verbs in the account. For in such cases, there is bound to be an exchange of word for word, in the case of some if not of all, seeing that there are no [149<sup>a</sup>] more words used now than formerly; whereas in a definition words ought to be rendered by accounts, if possible in every case, or if not, in the

majority. For at that rate, simple objects too could be defined by merely calling them by a different name, e.g. cloak instead of doublet.

[5] The mistake is even worse, if in addition a less intelligible word is substituted, e.g. pellucid mortal for white man; for it is no definition, and is less clear when put in that form.

Look and see also whether, in the exchange of words, the sense fails still to be the same. Take, for instance, the explanation of speculative knowledge as speculative [10] belief; for belief is not the same as knowledge—as it certainly ought to be if the whole is to be the same too; for though the word ‘speculative’ is common to both accounts, yet the remainder is different.

Moreover, see if in replacing one of the names by something else he has [15] exchanged the genus and not the differentia, as in the example just given; for speculative is less intelligible than knowledge; for the one is the genus and the other the differentia, and the genus is always the most familiar of all; so that it is not this, but the differentia, that ought to have been changed, seeing that it is the less [20] intelligible. (It might be held that this criticism is ridiculous because there is no reason why the most familiar name should not describe the differentia, and not the genus; in which case, clearly, the word to be altered should be that denoting the genus and not the differentia.) If, however, a man is substituting for a word not a word but an account, clearly it is of the differentia rather than of the genus that a [25] definition should be rendered, seeing that the object of rendering the definition is to make the subject familiar; for the differentia is less familiar than the genus.

If he has rendered the definition of the differentia, see whether the definition rendered is common to it and something else as well: e.g. whenever he says that an [30] odd number is a number with a middle, further definition is required of how it has a middle; for number is common to both accounts, and it is the word ‘odd’ for which the account has been substituted. Now both a line and a body have a middle, yet they are not odd; so that this will not be a definition of odd. And if having a middle is [35] used in several ways, the way here intended requires to be defined. So that this will either discredit the definition or prove that it is no definition at all.

12 · Again, see if the account is given of an entity, whereas what falls under the account is a non-entity. E.g., suppose white to be defined as colour mingled with [149<sup>b</sup>1] fire; for what is bodiless cannot be

mingled with body, so that colour cannot be mingled with fire, whereas white does exist.

Moreover, those who in the case of relative terms do not distinguish to what the object is related, but have described it only so as to include it among a number of [5] things, are wrong either wholly or in part; e.g. suppose some one to have defined medicine as a science of what exists. For if medicine is not a science of anything that exists, the definition is clearly altogether false; while if it is a science of some things, but not of others, it is partly false; for it ought to hold of everything, if it is said to be of what exists essentially and not accidentally—as is the case with other relative [10] terms; for every object of knowledge is relative to knowledge. Likewise, also, with other relative terms, inasmuch as all such are convertible. Moreover, if the right way to render account of a thing is to render it as it is not in itself but accidentally, then each relative term will be used in relation not to one thing but to a number of things. For there is no reason why the same thing should not be both existent and [15] white and good, so that it will be a correct rendering to render the object in relation to any one whatsoever of these, if to render what it is accidentally is a correct way to render it. It is, moreover, impossible that an account of this sort should be proper to the term rendered; for not only medicine, but the majority of the other sciences too, [20] have for their object some entity, so that each will be a science of what exists. Clearly, then, such a definition does not define any science at all; for a definition ought to be proper, not common.

Sometimes, again, people define not the object but only the object in a good or perfect condition. Such is the definition of an orator as one who can see what will [25] persuade in any circumstances, and omit nothing; or of a thief, as one who pilfers in secret; for clearly, if they each do this, then the one will be a good orator, and the other a good thief; whereas it is not the actual pilfering in secret, but the wish to do it, that constitutes the thief. [30]

Again, see if he has rendered what is desirable for its own sake as desirable for what it produces or does, or as in any way desirable because of something else, e.g. by saying that justice is what preserves the laws or that wisdom is what produces happiness; for what produces or preserves something else is one of the things [35] desirable because of something else. It might be said that it is possible for what is desirable in itself to be desirable because of something else as well; but still to define what is desirable in itself in such a way is none the less wrong; for what is best in anything is especially part of its substance, and it is better for a thing to



be desirable in itself than to be desirable because of something else, so that the definition ought rather to have indicated this.

[150<sup>a</sup>1] **13** · See also whether in defining anything a man has defined it as *these* things, or as made from these things or as this together with that. If he defines it as *these* things, the definition will be true of both and yet of neither of them; suppose, e.g., justice to be defined as temperance and courage. For if of two persons each has [5] one of the two only, both and yet neither will be just; for both together have justice, and yet each singly fails to have it. Even if the situation here described does not so far appear very absurd because of the occurrence of this kind of thing in other cases also (for it is quite possible for two men to have a pound between them, though neither of them has it by himself), yet at least that they should have contrary [10] attributes surely seems quite absurd; and yet this will follow if the one is temperate and cowardly, and the other brave and profligate; for then both will exhibit both justice and injustice; for if justice is temperance and bravery, the injustice will be [15] cowardice and profligacy. In general, too, all the ways of showing that the whole is not the same as the sum of its parts are useful in meeting the type just described; for a man who defines in this way seems to assert that the parts are the same as the whole. The arguments are particularly appropriate in cases where the process of putting the parts together is obvious, as in a house and other things of that sort; for [20] there, clearly, you may have the parts and yet not have the whole, so that parts and whole cannot be the same.

If he has said that the term being defined is not these things but made from these things, look and see in the first place if they cannot in the nature of things have a single product; for some things are so related to one another that nothing can come [25] from them, e.g. a line and a number. Moreover, see if the term that has been defined is in the nature of things found primarily in some single subject, whereas the things from which he has said it is made are not found primarily in any single subject, but each in a separate one. If so, clearly that will not be made from these things; for the whole is bound to be in the same things wherein its parts are, so that the whole will [30] then be found primarily not in one thing, but in a number of them. If, on the other hand, both parts and whole are found primarily in some single subject, see if that is not the same, but one thing in the case of the whole and another in that of the parts. Again, see whether the parts perish together with the whole; for it ought to happen

vice versa, that the whole perishes when the parts perish: when the whole perishes, [35] there is no necessity that the parts should perish too. Or again, see if the whole is good or evil, and the parts neither, or, vice versa, if the parts are good or evil and the whole neither. For it is impossible either for a neutral thing to produce something [150<sup>b</sup>1] good or bad, or for things good or bad to produce a neutral thing. Or again, see if the one thing is more good than the other is evil, and yet the product is no more good than evil, e.g. suppose shamelessness is the product of courage and false opinion: here courage is more good than false opinion is evil; accordingly the product of these ought to follow the greater, and be either good without qualification, or at least [5] more good than evil. Or it may be that this does not necessarily follow, unless each is in itself good or bad; for many things that are productive are not good in themselves, but only in combination; or, vice versa, they are good taken singly, and bad or neutral in combination. What has just been said is more clearly illustrated in the [10] case of things that make for health or sickness; for some drugs are such that each taken alone is good, but if they are both administered in a mixture, bad.

Again, see whether the whole, as produced from a better and worse, fails to be worse than the better and better than the worse element. This again, however, need [15] not necessarily be the case, unless the elements compounded are in themselves good; if they are not, the whole may very well not be good, as in the cases just instanced.

Moreover, see if the whole is synonymous with one of the elements; for it ought not to be, any more than in the case of syllables; for a syllable is not synonymous [20] with any of the letters of which it is made up.

Moreover, see if he has failed to state the manner of their composition; for saying that it is made from these things is not enough to make the thing intelligible. For the substance of any compound thing is not merely that it is made from these things, but that it is made from them in such and such a way, as in the case of a [25] house; for here the materials do not make a house irrespective of the way they are put together.

If a man has defined an object as this together with that, the first thing to be said is that this together with that is the same as these things, or as what is made from these things. For 'honey together with water' means either 'honey and water', or 'what is made from honey and water'. If, then, he admits that this together with [30] that is the same as either of these two things, the same criticisms will apply as have already been given for meeting each of them. Moreover, distinguish between the

different ways in which one thing may be said to be together with another, and see if there is none of them in which this is together with that. Thus e.g. supposing one thing to be together with another either in that some identical thing contains them (as e.g. justice and courage are found in the soul), or as being in the same place or in [35] the same time, and if this is in no way true of the things in question, clearly the definition rendered will not hold of anything, as this is not in any way together with that. If, however, among the various ways distinguished, each is found in the same [151<sup>a</sup>1] time as the other, look and see if possibly the two are not used in the same relation. Thus e.g. suppose courage to have been defined as daring with right reasoning: here it is possible that a person exhibits daring in robbery, and right reasoning in regard to the means of health—but he is not courageous just because he has this together [5] with that at the same time. Moreover, even though both are used in the same relation, e.g. in relation to medical treatment (for a man may exhibit both daring and right reasoning in respect of medical treatment), still a man who has this together with that is not yet courageous. For the two must not relate to any casual [10] object that is the same, any more than each to a different object; rather, they must relate to the function of courage, e.g. meeting the perils of war, or whatever is more properly speaking its function than this.

Some definitions rendered in this form fail to come under the aforesaid division [15] at all, e.g. a definition of anger as pain with a consciousness of being slighted. For what this means to say is that it is because of a consciousness of this sort that the pain occurs; but to occur because of a thing is not the same as to occur together with it in any of the aforesaid ways.

[20] **14** · Again, if he has described the whole as the composition of these things (e.g. a living creature as a composition of soul and body), first of all see whether he has omitted to state the kind of composition, as (e.g.) in a definition of flesh or bone as the composition of fire, earth, and air. For it is not enough to say it is a composition, but you should also go on to define the kind of composition; for these [25] things do not form flesh irrespective of the manner of their composition, but when compounded in one way they form flesh, when in another, bone. It appears, moreover, that neither of the aforesaid things is the same as a composition at all; for a composition always has a dissolution as its contrary, whereas neither of the aforesaid has any contrary. Moreover, if

it is equally plausible that every compound [30] is a composition and that none is, and if every kind of living creature, though a compound, is not a composition, then no other compound will be a composition either.

Again, if two contraries are equally liable to occur naturally in a thing, and the thing has been defined through the one, clearly it has not been defined; otherwise there will be more than one definition of the same thing; for how is it any more a [35] definition to define it through this one than through the other, seeing that both are equally liable to occur naturally in it? Such is the definition of the soul, if defined as [151<sup>b</sup>1] a substance capable of receiving knowledge; for it has an equal capacity for receiving ignorance.

Also, even when one cannot attack the definition as a whole because the whole [5] is not familiar, one should attack some part of it, if it is familiar and is evidently incorrectly rendered; for if the part is demolished, so too is the whole definition. Where, again, a definition is obscure, one should first of all correct and reshape it in order to make some part of it clear and get a handle for attack, and then proceed to examine it. For the answerer is bound either to accept the sense as taken by the [10] questioner, or else himself to explain clearly whatever it is that his account means. Moreover, just as in the assemblies the ordinary practice is to introduce a law and, if the introduced law is better, to repeal the existing one, so one ought to do in the case of definitions as well: one ought oneself to propose a second definition; for if it is [15] seen to be better, and more indicative of the object defined, clearly the definition laid down will have been demolished, on the principle that there cannot be more than one definition of the same thing.

In combating definitions it is always one of the chief elementary principles to take by oneself a happy shot at a definition of the object before one, or to adopt some correctly expressed definition. For one is bound, with the model (as it were) before [20] one's eyes, to discern both the lack of any features that the definition ought to have, and also any superfluous addition, so that one is better supplied with lines of attack.

As to definitions, then, let so much suffice.

## BOOK VII

1 · Whether two things are the same or different, in the most strict of the meanings ascribed to ‘sameness’ (and we said<sup>34</sup> that the same applies in the most strict sense to what is numerically one), may be examined in the light of their inflexions and coordinates and opposites. For if justice is the same as courage, then [30] too the just man is the same as the courageous man, and justly is the same as courageously. Likewise, too, in the case of their opposites; for if two things are the same, their opposites also will be the same, in any of the recognized forms of opposition. For it is the same thing to take the opposite of the one or that of the other, seeing that they are the same. Again it may be examined in the light of those [152<sup>a</sup>1] things which tend to produce or to destroy the things in question, of their formation and destruction, and in general of anything that is related in like manner to each. For where things are the same without qualification, their formations and destructions also are the same, and so are the things that tend to produce or to destroy them.

Look and see also, in a case where one of two things is said to be something or [5] other in a superlative degree, if the other of these identical things can also be described by a superlative in the same respect. Thus Xenocrates argues that the happy life and the good life are the same, seeing that of all forms of life the good life is the most desirable and so also is the happy life; for only one thing is the most desirable and greatest. Likewise also in other cases of the kind. Each of the two [10] things termed greatest or most desirable must be numerically one: otherwise no proof will have been given that they are the same; for it does not follow because Peloponnesians and Spartans are the bravest of the Greeks, that Peloponnesians are the same as Spartans, seeing that Peloponnesian and Spartan are not numerically [15] one; it only follows that the one must be included under the other as Spartans are under Peloponnesians—for otherwise, if the one class is not included under the other, each will be better than the other. For then the Peloponnesians are bound to be better than the Spartans, seeing that the one class is not included under the [20] other; for they are better than anybody else. Likewise also the Spartans must perforce be better than the Peloponnesians; for they too are better than anybody else; each then is better than the other. Clearly therefore what is styled best and [25] greatest must be numerically one, if it is to be proved to be the same as another. This is why Xenocrates fails to prove his case; for the happy life

is not numerically one, nor yet the good life, so that it does not follow that, because they are both the most [30] desirable, they are therefore the same, but only that the one falls under the other.

Again, look and see if, supposing the one to be the same as something, the other also is the same as it; for if they are not both the same as the same thing, clearly neither are they the same as one another.

Moreover, examine them in the light of their accidents or of the things of which they are accidents; for any accident belonging to the one must belong also to [35] the other, and if the one belongs to anything as an accident, so must the other also. If in any of these respects there is a discrepancy, clearly they are not the same.

See further whether, instead of both being found in one class of predicates, the one signifies a quality and the other a quantity or relation. Again, see if the genus of [152<sup>b</sup>1] each is not the same, the one being good and the other evil, or the one being virtue and the other knowledge; or see if, though the genus is the same, the differentiae predicated of either are not the same, the one being distinguished as a speculative [5] science, the other as a practical science. Likewise also in other cases.

Moreover, from the point of view of degrees, see if the one admits an increase of degree but not the other, or if though both admit it, they do not admit it at the same time; just as it is not the case that a man desires intercourse more intensely, the more intensely he is in love, so that love and the desire for intercourse are not the same.

[10] Moreover, examine them by means of addition, and see whether the addition of each to the same thing fails to make the same whole; or if the subtraction of the same thing from each leaves a different remainder. Suppose (e.g.) that he has declared double a half to be the same as a multiple of a half: then, subtracting a half [15] from each, the remainders ought to have signified the same thing; but they do not; for double and a multiple do not signify the same thing.

Inquire also not only if some impossible consequence results directly from the statement—but also whether it may result from a supposition as happens to those [20] who assert that empty is the same as full of air; for clearly if the air is exhausted, the vessel will not be less but more empty, though it will no longer be full of air. So that by a supposition, which may be true or may be false (it makes no difference which), the one character is annulled and not the other, showing that they are not the same.

[25] Speaking generally, one ought to be on the look-out for any discrepancy anywhere in any sort of predicate of each term, and in the things of which they are predicated. For all that is predicated of the one should be predicated also of the other, and of whatever the one is a predicate, the other should be a predicate as well.

[30] Moreover, as sameness is a term used in many ways, see whether things that are the same in one way are the same also in a different way. For there is either no necessity or even no possibility that things that are the same specifically or generically should be numerically the same—and we face the question whether they are or are not the same in that sense.

Moreover, see whether the one can exist without the other; for, if so, they will [35] not be the same.

2 · Such is the number of commonplace rules that relate to sameness. It is clear from what has been said that all the destructive commonplaces relating to sameness are useful also in questions of definition, as was said before;<sup>35</sup> for if what is signified by the name and by the account are not the same, clearly the account given will not be a definition. None of the constructive commonplaces, on the other hand, [153<sup>a</sup>1] helps in the matter of definition; for proving that what falls under the account and the name are the same does not suffice to establish that the former is a definition, but a definition must have also all the other characters already announced. [5]

3 · This then is the way, and these the arguments, whereby the attempt to demolish a definition should always be made. If, on the other hand, we desire to establish one, the first thing to observe is that few if any who engage in discussion arrive at a definition by deduction: they always assume something of the kind as their starting point—both in geometry and in arithmetic and the other studies of [10] that kind. In the second place, to say accurately what a definition is, and how it should be given, belongs to another inquiry. At present it concerns us only so far as is required for our present purpose, and accordingly we need only make the bare statement that it is possible for there to be a deduction of a thing's definition and essence. For if a definition is an account signifying the essence of the thing and the [15] predicates contained therein ought also to be the only ones which are predicated of the thing in what it is, and genera and differentiae are predicated in what it is it is obvious that

if one were to get an admission that these are the only attributes predicated in what it is, the account containing them will of necessity be a [20] definition; for it is impossible that anything else should be a definition, seeing that there is not anything else predicated of the object in what it is.

That a definition may thus be reached by a process of deduction is obvious. The means whereby it should be established have been more precisely defined elsewhere,<sup>36</sup> but for the purposes of the inquiry now before us the same common-place [25] rules serve. For we have to examine into the contraries and other opposites of the thing, surveying the accounts used both as wholes and in part; for if the opposite account defines the opposite term, the account given must define the term before us. Seeing, however, that contraries may be conjoined in more than one way, we have to [30] select from those contraries the one to whose definition the definition in question seems most contrary.<sup>37</sup> The accounts, then, have to be examined each as a whole in the way we have said, and also in part as follows. First of all, see that the genus rendered is correctly rendered; for if the contrary is found in the contrary genus, and the thing before you is not in that same genus, then it will clearly be in the contrary genus; for contraries must of necessity be either in the same genus or in [35] contrary genera. And we claim that contrary differentiae are predicated of contraries, e.g. of white and black, for the one disperses the vision, while the other compresses it. So that if contrary differentiae are predicated of the contrary term, [153<sup>b</sup>1] then those rendered in the definition will be predicated of the term before us. Seeing, then, that both the genus and the differentiae have been rightly rendered, clearly the account given must be a definition. It might be replied that there is no [5] necessity why contrary differentiae should be predicated of contraries, unless the contraries are found within the same genus: of things whose genera are themselves contraries it may very well be that the same differentia is used of both, e.g. of justice and injustice; for the one is a virtue and the other a vice of the soul: 'of the soul', [10] therefore, is the differentia in both cases, seeing that the body as well has its virtue and vice. But this much at least is true, that the differentiae of contraries are either contrary or else the same. If, then, the contrary differentia is predicated of the contrary term and not of the one in hand, clearly the differentia stated must be predicated of the latter. Speaking generally, seeing that the definition consists of [15] genus and differentiae, if the definition of the contrary term is apparent, the definition of the term before you will be apparent also; for since its contrary is found either in



the same genus or in the contrary genus, and likewise also the differentiae [20] predicated of opposites are either contrary or the same, clearly of the term before you there will be predicated either the same genus as of its contrary, while, of its differentiae, either all are contrary to those of its contrary, or at least some of them are so while the rest remain the same; or, vice versa, the differentiae will be the same and the genera contrary; or both genera and differentiae will be contrary. For that both should be the same is not possible; else contraries will have the same definition.

[25] Moreover, look at it from the point of view of its inflexions and coordinates. For genera and definitions are bound to correspond in either case. Thus if forgetfulness is loss of knowledge, to forget is to lose knowledge, and to have forgotten is to have lost knowledge. If, then, anyone whatever of these is agreed to, [30] the others must of necessity be agreed to as well. Likewise, also, if destruction is dissolution of substance, then to be destroyed is for a substance to be dissolved, and destructively is in such a way as to dissolve; if again destructive is apt to dissolve the substance, then also destruction is dissolution of substance. Likewise also with the rest: get an admission of any one of them whatever, and all the rest are admitted [35] too.

Moreover, look at it from the point of view of things that stand in the same relation to each other. For if healthy is productive of health, vigorous will be [154<sup>a</sup>1] productive of vigour, and useful will be productive of good. For each of these things is related in like manner to its appropriate end, so that if one of them is defined as productive of that end, this will be the definition of each of the rest as well.

Moreover, look at it from the point of view of greater and equal degrees, in all [5] the ways in which it is possible to establish a result by comparing two and two together. Thus if this defines that better than something else defines something else, and the latter is a definition, so too is the former. Further, if this defines that to the same degree as something else defines something else, and the latter is a definition, then so too is the former. This examination from the point of view of greater degrees is of no use when a single definition is compared with two, or two definitions with [10] one; for there cannot possibly be one definition of two things or two of the same thing.

4 · The most handy of the commonplace arguments are those just mentioned and those from coordinates and inflexions, and these therefore

are those which it is most important to master and to have ready to hand; for they are the most useful on the greatest number of occasions. Of the rest, too, the most important are those of [15] most general application; for these are the most effective, e.g. that you should examine the individual cases, and that you should look to see in the case of their various species whether the account applies. For the species is synonymous with its individuals. This sort of inquiry is of service against those who assume the existence of Ideas, as has been said before.<sup>38</sup> Moreover see if a man has used a name [20] metaphorically, or predicated it of itself as though it were something different. So too if any other of the commonplace rules is of general application and effective, it should be employed.

5 · That it is more difficult to establish than to overthrow a definition, is obvious from considerations presently to be urged. For to see for oneself, and to secure from those whom one is questioning, an admission of propositions of this sort [25] is no simple matter, e.g. that of the elements of the given account the one is genus and the other differentia, and that the genus and differentiae are predicated in what it is. Yet without these it is impossible to deduce a definition; for if any other things as well are predicated of the object in what it is, there is no telling whether the [30] account stated or some other one is its definition; for a definition is an account indicating the essence of a thing. The point is clear also from the following. It is easier to draw one conclusion than many. Now in demolishing a definition it is sufficient to argue against one point only (for if we have overthrown any single point whatsoever, we shall have demolished the definition); whereas in establishing a [35] definition, one must argue that everything contained in the definition is attributable. Moreover, in establishing a case, the deduction brought forward must be universal; for the definition must be predicated of everything of which the name is, [154<sup>b</sup>1] and must moreover be convertible, if the definition rendered is to be proper to the subject. In overthrowing a view, on the other hand, there is no longer any necessity to prove one's point universally; for it is enough to prove that the account is untrue of any one of the things embraced under the name. Further, even supposing it should be necessary to overthrow something by a universal proposition, not even so [5] is there any need for it to be convertible in case of overthrowing. For proving that the definition is predicated of none of the things of which the name is predicated, is enough to overthrow it universally; and there is no need to prove in

addition the converse of this, that the name is predicated of things of which the [10] account is not predicated. Moreover, even if it applies to everything embraced under the term, but not to it alone, the definition is demolished.

The case stands likewise in regard to the property and genus of a term also. For in both cases it is easier to overthrow than to establish. As regards the property this is clear from what has been said; for the property is for the most part rendered in a [15] complex phrase, so that to overthrow it, it is only necessary to demolish one of the terms used, whereas to establish it it is necessary to deduce them all. Then, too, nearly all the other rules that apply to the definition will apply also to the property [20] of a thing. For in establishing a property one has to show that it is true of everything included under the name, whereas to overthrow one it is enough to show in a single case only that it fails to belong; further, even if it belongs to everything falling under the term, but not to that only, it is overthrown in this case as well, as was explained in the case of the definition. In regard to the genus, it is clear that you are bound to establish it in one way only, viz. by showing that it belongs in every case, while of [25] overthrowing it there are two ways; for if it has been proved that it belongs either to none or not to some, the original statement has been demolished. Moreover, in establishing a genus it is not enough to prove that it belongs, but you must prove also that it belongs as a genus; whereas in overthrowing it, it is enough to prove that it [30] does not belong either to some or to all. It appears as though, just as in other things to destroy is easier than to create, so in these matters too to overthrow is easier than to establish.

In the case of an accidental attribute the universal proposition is easier to overthrow than to establish; for to establish it, one has to prove that it belongs in [35] every case, whereas to overthrow it, it is enough to prove that it does not belong in one single case. The particular proposition is, on the contrary, easier to establish than to overthrow; for to establish it, it is enough to prove that it belongs in a [155<sup>a</sup>1] particular instance, whereas to overthrow it, it has to be proved that it belongs to none.

It is clear also that the easiest thing of all is to overthrow a definition. For on account of the number of statements involved we are presented in the definition with the greatest number of points for attack, and the more plentiful the material, [5] the quicker a deduction comes; for there is more likelihood of a mistake occurring in a large than in a small number of things. Moreover, the other rules too may be used as means for

attacking a definition; for if either the account is not proper, or what is rendered is not the genus, or something included in the account does not belong, the [10] definition is thereby demolished. On the other hand, against the others we cannot bring all of the arguments drawn from definitions, nor yet of the rest; for only those relating to accidental attributes apply generally to all the aforesaid kinds of attribute. For each of the aforesaid kinds must belong; yet the genus may very well not belong as a property without as yet being thereby demolished; likewise also the [15] property need not belong as a genus, nor the accident as a genus or property, so long as they do belong. So that it is impossible to use one set as a basis of attack upon the other except in the case of definition. Clearly, then, it is the easiest of all things to demolish a definition, while to establish one is the hardest. For there one both has to establish all those other points by deduction (i.e. that the attributes stated belong, [20] and that what is rendered is the genus, and that the account is proper), and moreover, besides this, that the account indicates the essence of the thing; and this has to be done correctly.

Of the rest, the property is most nearly of this kind; for it is easier to demolish, because for the most part it contains several terms; while it is the hardest to establish, both because of the number of things that you must argue for, and, [25] besides this, because it belongs to its subject alone and is predicated convertibly with its subject.

The easiest thing of all to establish is an accidental predicate; for in other cases one has to prove not only that the predicate belongs, but also that it belongs in such and such a way; whereas in the case of the accident it is enough to prove merely that it belongs. On the other hand, an accidental predicate is the hardest thing to [30] overthrow, because it affords the least material; for in stating an accident a man does not add how the predicate belongs; and accordingly, while in other cases it is possible to demolish what is said in two ways, by proving either that the predicate does not belong, or that it does not belong in the particular way stated, in the case of an accidental predicate the only way to demolish it is to prove that it does not belong [35] at all.

The commonplace arguments through which we shall be well supplied with lines of argument with regard to our several problems have now been enumerated at about sufficient length.

## BOOK VIII

1 · Next there fall to be discussed the problems of arrangement and method in putting questions. Any one who intends to frame questions must, first of all, select the ground from which he should make his attack; secondly, he must frame them [155<sup>b</sup>5] and arrange them one by one to himself; thirdly and lastly, he must proceed actually to put them to the other party. Now so far as the selection of his ground is concerned the problem is one alike for the philosopher and the dialectician; but how to go on to arrange his points and frame his questions concerns the dialectician only; for in every problem of that kind a reference to another party is involved. Not so with the [10] philosopher, and the man who is investigating by himself: the premisses of his reasoning, although true and familiar, may be refused by the answerer because they lie too near the original statement and so he foresees what will follow if he grants them; but for this the philosopher does not care. Indeed, he may possibly be even anxious to secure axioms as familiar and as near to the question in hand as possible; for these are the bases on which scientific deductions are built up. [15]

The sources from which one's commonplace rules should be drawn have already been described: we have now to discuss the arrangement and formation of questions and first to distinguish the propositions, other than the necessary ones, which have to be adopted. By necessary propositions are meant those through which the deduction is constructed. Those which are secured other than these are of four [20] kinds: they serve either inductively to secure the universal premiss being granted, or to lend weight to the argument, or to conceal the conclusion, or to render the argument more clear. Beside these there is no other proposition which need be secured: these are the ones whereby you should try to multiply and formulate your [25] questions. Those which are used to conceal the conclusion serve a contentious purpose; but inasmuch as an undertaking of this sort is always conducted against another person, we are obliged to employ them as well.

The necessary propositions through which the deduction is effected, ought not to be propounded directly in so many words. Rather one should keep as far away [30] from them as possible. Thus if one desires to secure an admission that the knowledge of contraries is one, one should claim it

not of contraries, but of opposites; for, if he grants this, one will then deduce that the knowledge of contraries is also the same, seeing that contraries are opposites; if he does not, one should secure the admission by induction, by formulating propositions to that effect [35] in the case of particular contraries. For one must secure the necessary propositions either by deduction or by induction, or else partly by one and partly by the other, although any propositions which are too obvious may be formulated in so many words. This is because the coming conclusion is less easily discerned at the greater [156<sup>a</sup>1] distance and in the process of induction, while at the same time, even if one cannot reach the required premisses in this way, it is still open to one to formulate them in so many words. The propositions, other than these, that were mentioned above, must be secured with a view to the latter. The way to employ them is as follows: [5] induction should proceed from individual cases to the universal and from the familiar to the unknown; and the objects of perception are more familiar, either without qualification or to most people. Concealment is obtained by securing through preliminary deductions the premisses through which the deduction of the original proposition is going to be constructed—and as many of them as possible. This is likely to be effected by deducing not only the necessary propositions but also [10] some of those which are required to establish them. Moreover, do not state the conclusions but deduce them later all together; for this is likely to keep the answerer at the greatest possible distance from the original proposition. Speaking generally, a man who desires to get information by a concealed method should so put his questions that when he has put his whole argument and has stated the conclusion, [15] people still ask ‘Well, but why is that?’ This result will be secured best of all by the method above described; for if one states only the final conclusion, it is unclear how it comes about; for the answerer does not foresee on what grounds it is based, because the previous deductions have not been fully articulated; while the deduction [20] of the conclusion is likely to be least articulated if we lay down not the assumptions on which it is based, but only those by which the deduction proceeds.

It is a useful rule, too, not to secure the axioms on which the deductions are based in their proper order, but alternately those that conduce to one conclusion and [25] those that conduce to another; for, if the appropriate ones are set side by side, the conclusion that will result from them is more obvious in advance.

One should also, wherever possible, secure the universal proposition

by a definition relating not to the terms themselves but to their co-ordinates; for people are deceived whenever the definition is taken in regard to a co-ordinate, into [30] thinking that they are not making the admission universally. E.g. supposing one had to secure the admission that the angry man desires vengeance on account of an apparent slight, and were to secure that anger is a desire for vengeance on account of an apparent slight, for clearly, if this were secured, we should have universally what we intend. If, on the other hand, people formulate propositions relating to the actual terms themselves, they often find that the answerer refuses to grant them [35] because on the actual term itself he is readier with his objection, e.g. that the angry man does not desire vengeance, because we become angry with our parents, but we do not desire vengeance on them. Very likely the objection is not valid; for upon some people it is vengeance enough to cause them pain and make them sorry; but still it gives a certain plausibility and air of reasonableness to the denial of the [156<sup>b</sup>1] proposition. In the case, however, of the definition of anger it is not so easy to find an objection.

Moreover, formulate your proposition as though you did so not for its own sake, but in order to get at something else; for people guard against granting what an opponent's case requires. Speaking generally, a questioner should leave it as far [5] as possible doubtful whether he wishes to secure an admission of the proposition or of its opposite; for if it is uncertain what the argument requires, people are more ready to say what they themselves think.

Moreover, try to secure admissions by means of likeness; for such admissions [10] are plausible, and the universal involved is less patent; e.g. that as knowledge and ignorance of contraries is the same, so too perception of contraries is the same; or vice versa, that since the perception is the same, so is the knowledge also. This argument resembles induction, but is not the same thing; for in induction it is the universal whose admission is secured from the particulars, whereas in arguments [15] from likeness, what is secured is not the universal under which all the like cases fall.

It is a good rule also, occasionally to bring an objection against oneself; for answerers are put off their guard against those who appear to be arguing impartially. It is useful too, to add that so and so is generally held or commonly said; [20] for people are shy of upsetting the received opinion unless they have some objection to urge; and at the same time they are cautious about upsetting such things because they themselves too find them useful. Moreover, do not be insistent, even though you

really require the point; for insistence always arouses the more opposition. Further, formulate your premiss as though it were an illustration; for people admit [25] the more readily a proposition made to serve some other purpose, and not required on its own account. Moreover, do not formulate the very proposition you need to secure, but rather something from which that necessarily follows; for people are more willing to admit the latter, because it is not so clear from this what the result will be, and if the one has been secured, the other has been secured also. Again, one should put last the point which one most wishes to have conceded; for people are [30] specially inclined to deny the first questions put to them, because most people in asking questions put first the points which they are most eager to secure. But in dealing with some people propositions of this sort should be put forward first; for ill-tempered men admit most readily what comes first, unless the conclusion that will result actually stares them in the face, while at the close of an argument they [35] show their ill-temper. Likewise also with those who consider themselves smart at answering; for when they have admitted what comes first they finally quibble to the effect that the conclusion does not follow from their admissions; yet they make admissions readily, confident in their own character, and imagining that they [157<sup>a</sup>1] cannot suffer any reverse. Moreover, it is well to expand the argument and insert things that it does not require at all, as do those who draw false geometrical figures; for in the mass of material the whereabouts of the falsity is obscured. For this reason also a questioner sometimes evades observation as he adds in a corner what, [5] if he formulated it by itself, would not be granted.

For concealment, then, the rules which should be followed are the above. Ornament is attained by induction and distinction of things closely akin. What sort of process induction is is obvious; as for distinction, an instance of the kind of thing meant is the distinction of one form of knowledge as better than another by being either more precise, or concerned with better objects; or the distinction of sciences [10] into speculative, practical, and productive. For everything of this kind lends additional ornament to the argument, though there is no necessity to say them, so far as the conclusion goes.

For clearness, examples and illustrations should be adduced—and let the [15] illustrations be appropriate and drawn from things that we know, as in Homer and not as in Choerilus; for them the proposition is likely to become clearer.



2 · In dialectical argument, deduction should be employed in reasoning against dialecticians rather than against the crowd; induction, on the other hand, is [20] most useful against the crowd. This point has been mentioned previously as well.<sup>39</sup> In induction, it is possible in some cases to ask the question in its universal form, but in others this is not easy, because there is no established general name that covers all the resemblances: in this case, when people need to secure the universal, they use [25] the phrase ‘in all cases of this sort’. But it is one of the very hardest things to distinguish which of the things adduced are of this sort, and which are not; and in this connexion people often mislead one another in their discussion, the one party asserting the likeness of things that are not alike, and the other disputing the likeness of things that are. One ought, therefore, to try oneself to coin a word to [30] cover all things of the given sort, so as to leave no opportunity either to the answerer to dispute, and say that the thing advanced does not answer to a like description, or to the questioner to suggest falsely that it does answer to a like description, for many things appear to answer to like descriptions that do not really do so.

If one has made an induction on the strength of several cases and yet the [35] answerer refuses to grant the universal proposition, then it is fair to demand his objection. But until one has oneself stated in what cases it is so, it is not fair to demand that he shall say in what cases it is not so; for one should make the induction [157<sup>b</sup>1] first, and then demand the objection. One ought, moreover, to claim that the objections should not be brought in reference to the actual subject of the proposition, unless that subject happens to be the one and only thing of the kind, as for instance two is the one prime number among the even numbers; for, unless he can say that this subject is unique of its kind, the objector ought to make his objection in regard to some other. People sometimes object to a universal proposition, and bring their objection not in regard to the thing itself, but in regard to some homonym of it; thus they argue that a man can very well have a colour or a foot or a [5] hand other than his own, for a painter may have a colour that is not his own, and a cook may have a foot that is not his own. To meet them, therefore, you should draw the distinction before putting your question in such cases; for so long as the ambiguity remains undetected, the objection to the proposition will seem valid. If, however, he checks the series of questions by an objection in regard not to some homonym, but to the actual thing asserted, the questioner should withdraw the [10] point objected to, and form the remainder into a universal proposition, until he secures what he requires;

e.g. in the case of forgetfulness and having forgotten; for people refuse to admit that the man who has lost his knowledge of a thing has forgotten it, because if the thing alters, he has lost knowledge of it, but he has not forgotten it. Accordingly the thing to do is to withdraw the part objected to, and [15] assert the remainder, e.g. that if a person has lost knowledge of a thing while it still remains, he then has forgotten it. One should similarly treat those who object to the statement that the greater the good, the greater the evil that is its opposite, for they allege that health, which is a less good thing than vigour, has a greater evil as its opposite; for disease is a greater evil than debility. In this case too, therefore, we [20] have to withdraw the point objected to; for when it has been withdrawn, the man is more likely to admit the proposition, e.g. that the greater good has the greater evil as its opposite, unless the one good involves the other as well, as vigour involves health. This should be done not only when he formulates an objection, but also if, without so doing, he refuses to admit the point because he foresees something of the [25] kind; for if the point objected to is withdrawn, he will be forced to admit the proposition because he cannot foresee in the rest of it any case where it does not hold true: if he refuses to admit it, then when asked for an objection he certainly will be unable to render one. Propositions that are partly false and partly true are of this type; for in the case of these it is possible by withdrawing a part to leave the rest [30] true. If, however, you formulate the proposition on the strength of many cases and he has no objection to bring, you may claim that he should admit it; for a dialectical proposition is one which thus holds in several instances and to which no objection is forthcoming.

Whenever it is possible to deduce the same conclusion either through or without a *reductio per impossibile*, if one is demonstrating and not arguing [35] dialectically it makes no difference which method of deduction is adopted, but in argument with another deduction *per impossibile* should be avoided. For where one has deduced without the *reductio per impossibile*, no dispute can arise; if, on the other hand, one deduces an impossible conclusion, unless its falsehood is too plainly [158<sup>a</sup>1] manifest, people deny that it is impossible, so that the questioners do not get what they want.

One should put forward propositions that hold true of several cases, and to which either no objection whatever appears or at least not any on the surface; for [5] when people cannot see any case in which it is not so, they admit it for true.

The conclusion should not be put in the form of a question; otherwise

if he rejects it, it looks as if the deduction has failed. For often, even if it is not put as a question but advanced as a consequence, people deny it, and then those who do not [10] see what follows from the previous admissions do not realize that those who deny it have been refuted; when, then, the one man merely asks it as a question without even saying that it follows, and the other denies it, it looks altogether as if the deduction has failed.

[15] Not every universal seems to be a dialectical proposition, e.g. 'What is man?' or 'In how many ways is the good used?' For a dialectical proposition must be of a form to which it is possible to reply 'Yes' or 'No', whereas to the aforesaid it is not possible. For this reason questions of this kind are not dialectical unless the questioner himself draws distinctions or divisions before expressing them, e.g. 'Is [20] the good used in this way, or in this?' For questions of this sort are easily answered by a Yes or a No. Hence one should endeavour to formulate propositions of this kind in this form. It is at the same time also perhaps fair to ask the other man how many uses of the good there are, whenever you have yourself distinguished and formulated them, and he will not admit them at all.

[25] Any one who keeps on asking one thing for a long time is a bad inquirer. For if he does so though the person questioned keeps on answering the questions, clearly he asks a large number of questions, or else asks the same question a large number of times: in the one case he merely babbles, in the other he fails to deduce; for every deduction rests on a small number of premisses. If, on the other hand, he does it because the person questioned does not answer the questions, he is at fault in not [30] taking him to task or breaking off the discussion.

3 · The same hypotheses may be both difficult to attack and easy to defend. Such are those things which stand first and those which stand last in the order of nature. For the former require definition, while the latter have to be arrived at through many steps if one wishes to secure a continuous proof from first principles, [35] or else the arguments wear the air of sophistry; for to demonstrate anything is impossible unless one begins with the appropriate principles, and connects inference with inference till the last are reached. Now to define first principles is just what answerers do not care to do, nor do they pay any attention if the questioner makes a definition; and yet until it is clear what it is that is proposed, it is not easy to tackle [158<sup>b</sup>1] it. This sort of thing happens

particularly in the case of the first principles; for while the other propositions are proved through these, these cannot be proved through anything else: we are obliged to get to know every item of that sort by a definition.

[5] Things that lie close to the first principle are also hard to tackle; for it is not possible to bring many arguments in regard to them, because of the small number of those steps, between the conclusion and the principle, whereby the succeeding propositions have to be proved. The hardest, however, of all definitions to treat in argument are those that employ names about which, in the first place, it is uncertain whether they are used in one way or several, and, further, it is not known whether [10] they are used literally or metaphorically by the definer. For because of their obscurity, it is impossible to argue; and because of the impossibility of saying whether this obscurity is due to their being used metaphorically, it is impossible to criticize them. [15]

In general, it is safe to suppose that, whenever any problem proves intractable, it either needs definition, or has either several uses or a metaphorical use, or it is not far removed from the first principles; or else the reason is<sup>40</sup> that we have yet to discover in the first place just this—in which of the aforesaid directions the source [20] of our difficulty lies: when we have made this clear, then obviously our business must be either to define or to distinguish, or to supply the intermediate premisses; for it is through these that the final conclusions are proved.

Many theses are not easy to argue about or tackle because the definition has not been correctly rendered: e.g. whether one thing has one contrary or many—here [25] when contraries have been properly defined, it is easy to argue whether it is possible for the same thing to have several contraries or not. Similarly also with other terms requiring definition. It appears also in mathematics that the difficulty in constructing a figure is sometimes due to a defect in definition; e.g. in proving that the line [30] which cuts the plane parallel to one side divides similarly both the line and the area. If the definition is given, the fact asserted becomes immediately clear; for the areas have the same fraction subtracted from them as have the sides and this is the definition of the same ratio. In general, the primary elements are very easy to prove, [35] if the definitions involved, e.g., the nature of a line or of a circle, are laid down (only the arguments that can be brought in regard to each of them are not many, because there are not many intermediate steps); if, on the other hand, the definitions of the principles are not laid down, it is difficult and may even prove quite impossible. It is [159<sup>a</sup>1] the same in

the case of dialectical arguments.

One must be aware then, whenever a thesis is hard to tackle, that one or other of the aforesaid things has happened to it. Whenever, on the other hand, it is a harder task to argue about the axiom or the proposition than about the thesis, a [5] doubt may arise whether such claims should be admitted or not; for if a man is going to refuse to admit it and claim that it should be argued for, he will be prescribing a harder undertaking than was originally proposed; if, on the other hand, he grants it, he will be convinced on the strength of what is less convincing. If, then, it is essential not to enhance the difficulty of the problem, he had better grant it; if, on the other hand, it is essential to deduce through premisses that are more familiar, he had [10] better refuse. In other words, one who is trying to learn ought not to grant it, unless it is more familiar; but one who is training should grant it, if he is merely satisfied of its truth. Clearly, then, the circumstances under which such admissions should be claimed are different for a questioner and for a teacher.

[15] **4** · As to the formulation, then, and arrangement of one's questions, about enough has been said.

With regard to the giving of answers, we must first define what is the business of a good answerer, as of a good questioner. The business of the questioner is so to develop the argument as to make the answerer utter the most implausible of the [20] necessary consequences of his thesis; while that of the answerer is to make it appear that it is not he who is responsible for the impossibility or paradox, but only his thesis; for one may, no doubt, distinguish between the mistake of taking up a wrong thesis to start with, and that of not maintaining it properly, when once taken up.

[25] **5** · Inasmuch as no rules are laid down for those who argue for the sake of training and of examination—for the aim of those engaged in teaching or learning is quite different from that of those engaged in a competition; as is the latter from that of those who discuss things together in the spirit of inquiry; for a learner should always state what he thinks (for no one tries to teach what is false); whereas in a [30] competition the business of the questioner is to appear by all means to produce an effect upon the other, while that of the answerer is to appear unaffected by him; on the other hand, in dialectical meetings held in the spirit not of a competition but of an examination and inquiry, there are as

yet no articulated rules about what the [35] answerer should aim at, and what kind of things he should and should not grant for the correct or incorrect defence of his position—inasmuch, then, as we have no tradition bequeathed to us by others, let us try to say something upon the matter for ourselves.

The thesis laid down by the answerer before facing the questioner's argument is bound of necessity to be either reputable or implausible or neither; and reputable [159<sup>b</sup>1] or implausible either without qualification or else with a restriction, e.g. to some given person, to the speaker, or to some one else. But the way in which it is reputable or implausible, whatever it be, makes no difference; for the right way to answer, i.e. to admit or to refuse to admit what has been asked, will be the same in either case. If, then, the thesis is implausible, the conclusion is bound to be reputable, whereas if [5] the former is reputable the latter will be implausible; for the conclusion which the questioner tries to draw is always the opposite of the thesis. If, on the other hand, what is laid down is neither implausible nor reputable, the conclusion will be of the same type as well. Now since a man who deduces correctly demonstrates his conclusion from premisses that are more reputable and more familiar, it is clear [10] that where the view laid down by him is implausible without qualification, the answerer ought not to grant either what does not seem to be the case without qualification, or what seems to be the case, but to a less degree than the conclusion. For if the thesis is implausible the conclusion will be reputable, so that the premisses secured by the questioner should all be reputable, and more reputable than this [15] proposed conclusion, if the less familiar is to be inferred through the more familiar. Consequently, if any of the questions put to him is not of this character, the answerer should not grant it. If, on the other hand, the thesis is reputable without qualification, clearly the conclusion will be implausible without qualification. Accordingly, the answerer should admit all views that seem to be the case and, of those that do not, all that are less implausible than the conclusion. For then he will be thought to have argued sufficiently well. Likewise, too, if the thesis is neither [20] implausible nor reputable; for then, too, anything that appears to be true should be granted, and, of the views that do not seem true, any that are more reputable than the conclusion; for in that case the result will be that the arguments will be more reputable. If, then, the view laid down by the answerer is reputable or implausible [25] without qualification, then the views that are accepted without qualification must be taken as the standard of comparison; whereas if the view laid down is not reputable or

implausible without qualification, but only to the answerer, then he must judge with reference to himself what seems or does not seem, and must grant or refuse to grant the point asked accordingly. If, again, the answerer is defending some one else's opinion, then clearly it will be the latter's judgement to which he must have regard in granting or denying the various points. This is why those who introduce others' opinions—e.g. that good and evil are the same thing, as Heraclitus [30] says—refuse to admit that contraries do not belong at the same time to the same thing; not because they do not themselves believe this, but because on Heraclitus' principles one has to say so. The same thing is done also by those who take on the defence of one another's theses; their aim being to speak as would the man who stated the thesis. [35]

6 · It is clear, then, what the aims of the answerer should be, whether the position he lays down is reputable either without qualification or to some definite person. Now every question asked is bound to be either reputable or implausible or neither, and is also bound to be either relevant to the argument or irrelevant; if then it seems to be true and is irrelevant, the answerer should grant it and remark that it [160<sup>a</sup>1] seems to be true; if it does not seem to be true and is irrelevant, he should grant it but add a comment that it does not seem to be true, in order to avoid the appearance of being a simpleton. If it is relevant and seems to be true, he should admit that it seems to be true but say that it lies too close to the original proposition, and that if it [5] is granted the problem proposed collapses. If the axiom is relevant but too implausible, the answerer, while admitting that if it is granted the conclusion sought follows, should yet protest that the proposition is too silly. If it is neither implausible nor reputable, then, if it is irrelevant to the argument, it may be granted without restriction; if, however, it is relevant, the answerer should add the comment [10] that, if it is granted, the original problem collapses. For then the answerer will not be held to be personally accountable for what happens to him, if he grants the several points with his eyes open, and the questioner will be able to draw his inference, seeing that all the premisses that are more reputable than the conclusion are granted him. Those who try to deduce from premisses more implausible than the conclusion clearly do not deduce correctly; hence, when men ask these things, they [15] ought not to be granted.

7 · The questioner should be met in a like manner also in the case of

terms used obscurely and in several ways. For the answerer, if he does not understand, is [20] always permitted to say 'I do not understand', and he is not compelled to reply 'Yes' or 'No' to a question which may mean different things. Clearly, then, in the first place, if what is said is not clear, he ought not to hesitate to say that he does not understand it; for often people encounter some difficulty from assenting to questions that are not clearly put. If he understands the question and yet it covers [25] many senses, then supposing what it says to be universally true or false, he should give it an unqualified assent or denial; if, on the other hand, it is partly true and partly false, he should add a comment that it bears different senses, and that in one it is true, in the other false; for if he leaves this distinction till later, it becomes uncertain whether originally he perceived the ambiguity. If he does not foresee the ambiguity, but assents to the question having in view the one sense of the words, [30] then, if the questioner takes it in the other sense, he should say, 'That was not what I had in view when I admitted it; I meant the other sense'—for if a name or account covers more than one thing, disputes easily arise. If, however, the question is both clear and simple, he should answer either 'Yes' or 'No'.

[35] **8** · Every deductive proposition either is one of the constituent elements in the deduction, or else goes to establish one of these (and you can always tell when it is secured in order to establish something else by the fact of a number of similar questions being put; for people for the most part secure the universal by means either of induction or of likeness); accordingly the particular propositions should all [160<sup>b</sup>1] be admitted, if they are true and reputable; but against the universal one should try to bring some objection; for to bring the argument to a standstill without an objection, either real or apparent, shows ill-temper. If, then, a man refuses to grant the universal when supported by many instances, although he has no objection, he [5] obviously shows ill-temper. If, moreover, he cannot even attempt a counter-proof that it is not true, far more likely is he to be thought ill-tempered. (Although even that is not enough; for we often hear arguments that are contrary to common opinions, whose solution is yet difficult, e.g. the argument of Zeno that it is impossible to move or to traverse the stadium; but still, this is no reason for omitting [10] to assert the opposites of these views.) If, then, a man refuses to admit the proposition without having either an objection or some counter-argument to bring against it, clearly he is ill-tempered, for ill-temper in argument consists in answering in ways other



than the above, so as to wreck the reasoning.

9 · Before maintaining either a thesis or a definition the answerer should try [15] his hand at attacking it by himself; for clearly his business is to oppose those positions from which questioners demolish what he has laid down.

He should beware of maintaining an implausible hypothesis: and this it may be in two ways; for it may be one which results in absurd statements (e.g. suppose anyone were to say that everything is in motion or that nothing is); and also there [20] are those which a bad character would choose, and which are opposed to men's wishes (e.g. that pleasure is the good, and that to do injustice is better than to suffer it). For people then hate him, supposing him to maintain them not for the sake of argument but because he really thinks them.

10 · When arguments reason to a false conclusion the right solution is to demolish the point on which the falsity depends; for the demolition of any random point is no solution, even if the point demolished is false. For the argument may [25] contain many falsehoods, e.g. suppose someone assumes that he who sits, writes and that Socrates is sitting; for from these it follows that Socrates is writing. Now we may demolish the proposition that Socrates is sitting, and still be no nearer a solution of the argument. 'Yet the axiom is false'. But it is not on that that the falsity of the argument depends; for supposing that anyone should happen to be [30] sitting and not writing, it would be impossible in such a case to apply the same solution. Accordingly, it is not this that needs to be demolished, but rather that he who sits, writes; for not everyone who sits writes. He, then, who has demolished the point on which the falsity depends, has given the solution of the argument [35] completely. Anyone who knows that it is on such and such a point that the argument depends, knows the solution of it, just as in the case of a figure falsely drawn. For it is not enough to object, even if the point demolished is a falsehood, but the reason of the falsity should also be demonstrated; for then it will be clear whether the man makes his objection with his eyes open or not.

There are four possible ways of preventing a man from working his argument [161<sup>a</sup>1] to a conclusion. It can be done either by demolishing the point on which the falsity that comes about depends, or by stating an objection directed against the questioner—for often when a solution has

not as a matter of fact been brought, yet the questioner is rendered thereby unable to pursue the argument any farther. Thirdly, one may object to the questions asked; for it may happen that what the questioner [5] wants does not follow from the questions he has asked because he has asked them badly, whereas if something additional is granted the conclusion comes about. If, then, the questioner is unable to pursue his argument farther, the objection will be directed against the questioner; if he can do so, then it will be against his questions. The fourth and worst kind of objection is that which is directed to the time allowed for discussion; for some people bring objections of a kind which would take longer to [10] answer than the length of the discussion in hand.

There are then, as we said, four ways of making objections; but of them the first alone is a solution: the others are just hindrances and stumbling-blocks to prevent the conclusions. [15]

11 · Criticism of an argument when taken in itself and when presented in the form of questions, is not the same. For often the failure to carry through the argument correctly in discussion is due to the person questioned, because he will not grant the steps of which a correct argument might have been made against his thesis; for it is not in the power of the one side only to effect properly a result that [20] depends on both alike. Accordingly it sometimes becomes necessary to attack the speaker and not his thesis, when the answerer lies in wait for the points that are contrary to the questioner and becomes abusive as well: when people lose their tempers in this way, their argument becomes contentious, not dialectical. Moreover, [25] since arguments of this kind are held not for the sake of instruction but for purposes of practice and examination, clearly one has to deduce not only true conclusions, but also false ones, and not always through true premisses, but sometimes through false as well. For often, when a true proposition is put forward, the dialectician is compelled to demolish it; and then false propositions have to be put forward. Sometimes also when a false proposition is put forward, it has to be demolished by [30] means of false propositions; for it is possible for a man to believe what is not the case more firmly than the truth. Accordingly, if the argument is made to depend on something that he holds, he will be persuaded rather than helped. He, however, who would rightly convert anyone to a different opinion should do so in a dialectical and [35] not in a contentious manner, just as a geometrician should reason geometrically, whether his conclusion is false or true (what

kind of deductions are dialectical has already been said).<sup>41</sup> The principle that a man who hinders the common business is a bad partner, clearly applies to an argument as well; for in arguments as well there is a common aim in view—except with mere contestants, for these cannot both [161<sup>b</sup>1] reach the same goal; for more than one cannot win. It makes no difference whether he effects this as answerer or as questioner; for both he who asks contentious questions is a bad dialectician, and also he who in answering fails to grant the obvious answer or to accept whatever question the questioner wishes to put. What [5] has been said, then, makes it clear that criticism is not to be passed in a like manner upon the argument in itself and upon the questioner; for it may very well be that the argument is bad, but that the questioner has argued with the answerer in the best possible way—for when men lose their tempers, it may perhaps be impossible to [10] make one's deductions just as one would wish: we have to do as we can.

Inasmuch as it is indeterminate when people are claiming the admission of contrary things, and when they are claiming what originally they set out to prove—for often when they are talking by themselves they say contrary things, and admit afterwards what they have previously denied; for which reason they often [15] assent, when questioned, to contrary things and to what originally had to be proved—the argument is sure to become vitiated. The responsibility, however, for this rests with the answerer, because he refuses to grant some things and grants others of that sort. It is, then, clear that criticism is not to be passed in a like manner upon questioners and upon their arguments.

In itself an argument is liable to five kinds of criticism. The first is when [20] neither the proposed conclusion nor indeed any conclusion at all is drawn from the questions asked, and when most, if not all, of the premisses on which the conclusion rests are false or implausible, when, moreover, neither withdrawals nor additions nor both together can bring the conclusion about. The second is if the deduction, [25] though constructed from the premisses, and in the manner, described above, is irrelevant to the thesis. The third is if certain additions would bring a deduction about but yet these additions would be weaker than those that were put as questions, and less reputable than the conclusion. Again, supposing certain withdrawals could effect the same; for sometimes people secure more premisses than are necessary, so that it is not through them that the deduction comes about. [30] Moreover, suppose the premisses are more implausible and less convincing than the conclusion, or if, though true, they require more labour to demonstrate than the

problem.

One must not demand that for every problem the deductions should be equally reputable and convincing; for it is a direct result of the nature of things that some [35] subjects of inquiry shall be easier and some harder, so that if a man concludes from opinions that are as reputable as the case admits, he has argued correctly. Clearly, then, the argument is not open to the same criticism when taken in relation to the proposed conclusion and when taken by itself. For there is nothing to prevent the argument being open to reproach in itself, and yet commendable in relation to the problem, or again, vice versa, being commendable in itself, and yet open to reproach [162<sup>a</sup>1] in relation to the problem, whenever there are many propositions both reputable and true whereby it could easily be proved. It is possible also that an argument, even though brought to a conclusion, may sometimes be worse than one which is not so concluded, whenever the premisses of the former are silly, while the problem is not [5] so; whereas the latter requires some additional premisses which are reputable and true, and moreover does not rest as an argument on these additions. With those which bring about a true conclusion by means of false premisses, it is not fair to find fault; for a false conclusion must of necessity always be deduced from false premisses, but a true conclusion may sometimes be deduced from *false* premisses; [10] as is clear from the *Analytics*.<sup>42</sup>

Whenever by the argument stated something is demonstrated, but that something is other than what is wanted and has no bearing whatever on the conclusion, then there is no deduction as to the latter; and if there appears to be, it will be a sophism, not a demonstration. A philosopheme is a demonstrative [15] deduction; an epichireme is a dialectical deduction; a sophism is a contentious deduction; an aporeme is a deduction that reasons dialectically to a contradiction.

If something were to be proved from premisses both of which seem true, but not to the same degree, it may very well be that what is proved seems more true than [20] either. If, on the other hand, the one seems true and the other neither, or if the one seems true the other does not, then, if they are equally balanced the conclusion will be also; if, on the other hand, the one preponderates, the conclusion too will follow suit.

It is also a fault in deduction when a man proves something through a long chain of steps, when he might employ fewer steps and those already included in his [25] argument: suppose him to be showing (e.g.) that one opinion is more properly so called from another, and suppose him to postulate that a thing-itself is most properly called that thing and that

there genuinely exists an object of opinion in itself, so that it is more properly called an object of opinion than the particular objects of opinion; now what is called such-and-such relative to what is more properly called so-and-so is more properly called such-and-such; and there exists a [30] genuine opinion-in-itself, which will be more precise than the particular opinions. Now it has been postulated both that a genuine opinion-in-itself exists, and that a thing-in-itself is most properly called that thing; therefore this opinion will be more precise. Wherein lies the viciousness of the reasoning? Simply in that it conceals the ground on which the argument depends.

[35] **12** · An argument is clear in one, and that the most ordinary, sense, if it is so brought to a conclusion as to make no further questions necessary; in another sense, and this is the type most usually advanced, when the propositions assumed necessitate the conclusion, and the argument is concluded through premisses that [162<sup>b</sup>1] are themselves conclusions; moreover, it is so also if it claims less than some very reputable views.<sup>43</sup>

An argument is called false in four senses: first, when it appears to be brought to a conclusion, and is not really so—what is called a contentious deduction. Again, [5] when it comes to a conclusion but not to the conclusion proposed—which happens principally in the case of *reductio ad impossibile*. Or when it comes to the proposed conclusion but not according to the mode of inquiry appropriate to the case, as happens when a non-medical argument is taken to be a medical one, or one which is [10] not geometrical for a geometrical argument, or one which is not dialectical for dialectical, whether the result reached is true or false. Again, if the conclusion is reached through false premisses: of this type the conclusion is sometimes false, sometimes true; for while a false conclusion is always the result of false premisses, a [15] true conclusion may be drawn from premisses that are *not* true, as was said above as well.

Falsity in argument is due to a mistake of the arguer rather than of the argument; yet it is not always the fault of the arguer either, but only when he is not aware of it; for we often accept in itself in preference to many true ones an argument which demolishes some true proposition, if it does so from premisses as far as [20] possible generally accepted. For an argument of that kind does demonstrate other truths; for one of the premisses laid down ought never to be there at all, and this will then be demonstrated. If, however, a true conclusion were to be reached through

premises that are false and utterly childish, the argument is worse than many arguments that lead to a false conclusion—though an argument which leads to a [25] false conclusion may also be of this type. Clearly then the first thing to ask in regard to the argument in itself is whether it reaches a conclusion; the second, whether the conclusion is true or false; the third, on what kind of premises does it depend. For if it depends on false but reputable premises, the argument is dialectical; if on true but implausible premises, it is bad; if they are both false and also entirely implausible, clearly it is bad, either without qualification or else in relation to the [30] particular matter in hand.

**13** · Of the ways in which a questioner may postulate the point at issue and postulate contraries the true account has been given in the *Analytics*<sup>44</sup>; but an account on the level of opinion must be given now.

People appear to postulate the point at issue in five ways: the first and most obvious being if any one postulates the actual point requiring to be proved; this is [35] easily detected when put in so many words; but it is more apt to escape detection in the case of synonyms, and where a name and an account mean the same thing. A second way occurs whenever anyone postulates universally something which he has [163<sup>a</sup>1] to demonstrate in a particular case: suppose (e.g.) he were trying to prove that the knowledge of contraries is one, and were to claim that the knowledge of opposites in general is one—for then he seems to be postulating, along with a number of other things, that which he ought to have proved by itself. A third way is if anyone were to [5] postulate in particular cases what he has undertaken to prove universally: e.g. if he undertook to show that the knowledge of contraries is always one, and postulated it of certain pairs of contraries; for he seems to be postulating independently and by itself what, together with a number of other things, he ought to have proved. Again, if he divides up the problem and postulates its parts (supposing e.g. that he had to prove that medicine is a science of what leads to health and to disease, and were to [10] claim first the one, then the other); or if he postulates the one or the other of a pair of statements that necessarily follow one other (e.g. if he had to prove that the diagonal is incommensurable with the side, and were to postulate that the side is incommensurable with the diagonal).

The ways in which people assume contraries are equal in number to those in which they postulate the point at issue. For it would happen, firstly, if any one were [15] to postulate opposites, affirmation and

negation; secondly, if he were to postulate the contrary terms of an antithesis, e.g. that the same thing is good and evil; thirdly, suppose anyone were to claim something universally and then proceed to postulate its contradictory in some particular case, e.g. if having assumed that the knowledge of contraries is one, he were to claim that the knowledge of what makes for health or for disease is different; or suppose him, after postulating the latter view, to try to secure universally the contradictory statement. Again, suppose a man postulates the [20] contrary of what necessarily comes about through the premisses laid down—even without postulating the opposites themselves but postulating two premisses such that the opposite contradiction will follow from them. The securing of contraries differs from postulating the point at issue in this way: in the latter case the mistake [25] lies in regard to the conclusion (for it is looking at the conclusion that we say that the point at issue has been postulated); whereas contrary views lie in the propositions, viz. in a certain relation which they bear to one another.

14 · The best way to secure training and practice in arguments of this kind is in the first place to get into the habit of converting the arguments. For in this way [30] we shall be better equipped for dealing with the proposition stated, and from a few cases we shall know thoroughly several arguments. For conversion is taking the reverse of the conclusion together with the remaining propositions asked and so demolishing one of those that were conceded; for it follows necessarily that if the [35] conclusion is untrue, some one of the propositions is demolished, seeing that, given all of them, the conclusion was bound to follow. In dealing with any thesis, be on the look-out for a line of argument both pro and con; and on discovering it at once set [163<sup>b1</sup>] about looking for the solution of it; for in this way you will soon find that you have trained yourself at the same time in both asking questions and answering them. If we cannot find any one else to argue with, we should argue with ourselves. Select, moreover, arguments relating to the same thesis and range them side by side; for [5] this produces a plentiful supply of arguments for carrying a point by force, and in refutation also it is of great service, whenever one is well stocked with arguments pro and con—for then you find yourself on your guard against contrary statements. Moreover, as contributing to knowledge and to philosophic wisdom the power of [10] discerning and holding in one view the results of either of two hypotheses is no mean instrument; for it then only remains to make a right choice of one of them. For a task of this kind a

certain natural ability is required: in fact real natural ability just is the power rightly to choose the true and shun the false. Men of natural ability can [15] do this; for by a right liking or disliking for whatever is proposed to them they rightly select what is best.

It is best to know thoroughly arguments upon those problems which are of most frequent occurrence, and particularly in regard to those theses which are primary; for in discussing these answerers frequently give up in despair. Moreover, [20] get a good stock of definitions; and have those of reputable and primary ideas at your fingertips; for it is through these that deductions are effected. You should try, moreover, to master the heads under which other<sup>45</sup> arguments mostly tend to fall. For just as in geometry it is useful to be practised in the elements, and in arithmetic [25] having the multiplication table up to ten at one's fingers' ends makes a great difference to one's knowledge of the multiples of other numbers too, likewise also in arguments it is a great advantage to be well up in regard to first principles, and to have a thorough knowledge of propositions by heart. For just as in a person with a trained memory, a memory of things themselves is immediately caused by the mere mention of their 'places', so these habits too will make a man readier in [30] reasoning, because he has his premisses classified before his mind's eye, each under its number. It is better to commit to memory a proposition of general application than an argument; for it is not very difficult to get a supply of first principles and hypotheses.

Moreover, you should get into the habit of turning one argument into several, [35] and conceal your procedure as darkly as you can: this kind of effect is best produced by keeping as far as possible away from topics akin to the subject of the argument. This can be done with arguments that are entirely universal, e.g. that there cannot [164<sup>a</sup>1] be one knowledge of more than one thing—for that is the case with both relative terms and contraries and co-ordinates.

Records of discussions should be made in a universal form, even though one has argued only some particular case; for this will enable one to turn a single argument into several. (A like rule applies in rhetoric as well to enthymemes.) For [5] yourself, however, you should as far as possible avoid universalizing your deductions. You should, moreover, always examine arguments to see whether they rest on principles of general application; for all particular arguments reason universally as well, and a particular demonstration always contains a universal demonstration, [10] because it is impossible to deduce at all without using universals.



You should display your training in inductive reasoning against a young man, in deductive against an expert. You should try, moreover, to secure from those skilled in deduction their premisses, from inductive reasoners their parallel cases; [15] for this is the thing in which they are respectively trained. In general, too, from your exercises in argumentation you should try to carry away either a deduction on some subject or a solution or a proposition or an objection, or whether some one put his question properly or improperly (whether it was yourself or some one else) and the point which made it the one or the other. For this is what gives one ability, and the object of training is to acquire ability, especially in regard to propositions and [164<sup>a</sup>1] objections. For it is the skilled propounder and objector who is, speaking generally, a dialectician. To formulate a proposition is to form a number of things into one (for the conclusion to which the argument leads must be taken generally, as a single thing), whereas to formulate an objection is to make one thing into many (for the [5] objector either distinguishes or demolishes, partly granting, partly denying the statements proposed).

Do not argue with every one, nor practise upon the man in the street; for there are some people with whom any argument is bound to degenerate. For against anyone who is ready to try all means in order to seem not to be beaten, it is indeed [10] fair to try all means of bringing about one's conclusion; but it is not good form. Therefore the best rule is, not lightly to engage with the man in the street, or bad argument is sure to result. For you see how in practising together people cannot refrain from contentious argument. [15]

It is best also to have ready-made arguments relating to those problems in which a very small stock will furnish us with arguments serviceable on a very large number of occasions. These are those that are universal, and those in regard to which<sup>46</sup> it is rather difficult to produce material from everyday experience.

**\*\***TEXT: J. Brunschwig, Budé Paris, 1967 (Books I–IV)  
W. D. Ross, OCT, Oxford, 1958 (Books V–VIII)

<sup>1</sup>Brunschwig excises this sentence.

<sup>2</sup>See II 7.

<sup>3</sup>Literally not ‘raised’ but ‘light’ (κοῦφος): here, as often, Greek and English ambiguities do not march together.

<sup>4</sup>Literally, ‘white and black’.

<sup>5</sup>Literally ‘garment’.

<sup>6</sup>This sentence is excised by Brunschwig.

<sup>7</sup>Literally: ‘the man who hopes for good things is hopeful (εὐελπὺς)’.

<sup>8</sup>Brunschwig excises this sentence.

<sup>9</sup>Reading πρῶτον.

<sup>10</sup>Reading τῶν ὑπὸ τι εἶδος τῆς κινήσεως ὄντων.

<sup>11</sup>See *Theaetetus* 181 D.

<sup>12</sup>See I 15.

<sup>13</sup>See 113<sup>b</sup>15–26.

<sup>14</sup>This sentence is excised by Brunschwig.

<sup>15</sup>Literally, ‘to-something and of-something and the rest’. No grammatical terms appear in the Greek: ‘double . . . takes a genitive’ (perhaps rather: ‘‘double’ takes a genitive’) renders τὸ διπλάσιον τινός—the double is of-something’.

<sup>16</sup>E.g. ‘Aristotle is in excess of Plato in wisdom’—the Greek verb ὑπερέχειν takes a genitive and a dative (and the Greek sentences Aristotle hints at here are perfectly natural, unlike the English sentences suggested by the translation).

<sup>17</sup>Brunschwig excises this sentence.

<sup>18</sup>Excised by Brunschwig.

<sup>19</sup>Frag. 81 Diels-Kranz.

<sup>20</sup>Some scholars place this paragraph after 129<sup>a</sup>16.

<sup>21</sup>Retaining τὸ μῆ.

<sup>22</sup>This paragraph, which is a doublet of the succeeding paragraph, was excised by Pacius.

<sup>23</sup>Reading τὸ βαδίζειν ... ἢ τὸ ἄνθρωπος.

<sup>24</sup>Greek sciences are female; i.e. ἐπιστήμη ('science') is a feminine noun.

<sup>25</sup>Reading τοιούτου.

<sup>26</sup>Reading καὶ τῆς τινὸς γῆς κατὰ τὴν γῆν.

<sup>27</sup>Reading τῆς φάσεως ἴδιον. ἥει γὰρ μὴ τῆς φάσεως, ἴδιονά εἴη ... (Wallies).

<sup>28</sup>See 114<sup>b</sup>6–15.

<sup>29</sup>Reading εἰ δ' ἐστὶν ἴδιον φρόνησις τοῦ ἐπιστήμην εἶναι καλοῦ οὐκ ἂν εἴη ἴδιον τοῦ ἐπιστήμην εἶναι αἰσχροῦ.

<sup>30</sup>Omitting μή (Verdenius).

<sup>31</sup>See 101<sup>b</sup>19.

<sup>32</sup>*Phaedrus* 245E.

<sup>33</sup>Excised by Düring.

<sup>34</sup>See 103<sup>a</sup>23.

<sup>35</sup>See 102<sup>a</sup>11.

<sup>36</sup>Some scholars see a reference to *Posterior Analytics* II 13.

<sup>37</sup>Reading φανῆ for φανερός ἦ.

<sup>38</sup>See 148<sup>a</sup>1 4ff.

<sup>39</sup>See 105<sup>a</sup>16.

<sup>40</sup>Reading ἦ διὰ.

<sup>41</sup>See 100<sup>a</sup>22.

<sup>42</sup>See *Prior Analytics* II 2.

<sup>43</sup>Reading ἐλλεῖπει σφόδρα ἐνδόξων.

<sup>44</sup>See *Prior Analytics* II 16.

<sup>45</sup>Reading οἱ ἄλλοι λόγοι.

<sup>46</sup>Reading πρὸς οὐς πορίζεσθαι.

# SOPHISTICAL REFUTATIONS\*\*

*W. A. Pickard-Cambridge*

[164<sup>a</sup>20] 1 · Let us now discuss sophistical refutations, i.e. what appear to be refutations but are really fallacies instead. We will begin in the natural order with the first.

That some deductions are genuine, while others seem to be so but are not, is [25] evident. This happens with arguments, as also elsewhere, through a certain likeness between the genuine and the sham. For physically some people are in a vigorous condition, while others merely seem to be so by blowing and rigging themselves out [164<sup>b</sup>20] like the tribal choruses; and some people are beautiful thanks to their beauty, while others seem to be so, by dint of embellishing themselves. So it is, too, with inanimate things; for of these, too, some are really silver and others gold, while others are not and merely seem to be such to our sense; e.g. things made of litharge and tin seem to [25] be of silver, while those made of yellow metal look golden. In the same way both deduction and refutation are sometimes genuine, sometimes not, though inexperience may make them appear so—for inexperienced people obtain only, as it were, a [165<sup>a</sup>1] distant view of these things. For a deduction rests on certain statements such that they involve necessarily the assertion of something other than what has been stated, through what has been stated; a refutation is a deduction to the contradictory of the given conclusion. Now some of them do not really achieve this, though they seem to [5] do so for a number of reasons; and of these the most prolific and usual is the argument that turns upon names. It is impossible in a discussion to bring in the actual things discussed: we use their names as symbols instead of them; and we suppose that what follows in the names, follows in the things as well, just as people [10] who calculate suppose in regard to their counters. But the two cases are not alike. For names are finite and so is the sum-total of accounts, while things are infinite in number. Inevitably, then, the same account and a single name signify several things. Accordingly just as, in counting, those who are not clever in manipulating [15] their counters are taken in by the experts, in the

same way in arguments too those who are not well acquainted with the force of names misreason both in their own discussions and when they listen to others. For this reason, then, and for others to be mentioned later, there are both deductions and refutations that appear to be genuine but are not really so. Now for some people it is better worth while to seem to [20] be wise, than to be wise without seeming to be (for the art of the sophist is the semblance of wisdom without the reality, and the sophist is one who makes money from an apparent but unreal wisdom); for them, then, it is clearly necessary to seem to accomplish the task of a wise man rather than to accomplish it without seeming to do so. To reduce it to a single point of contrast, it is the business of one who knows [25] a thing, himself to avoid falsities in the subjects which he knows and to be able to show up the man who makes them; and of these accomplishments the one depends on the faculty to produce an argument, and the other upon the faculty to exact one. Those, then, who would be sophists are bound to study the class of arguments aforesaid; for it is worth their while; for a faculty of this kind will make a man seem [30] to be wise, and this is the purpose they actually have in view.

Clearly, then, there exists a class of arguments of this kind, and it is at this kind of ability that those aim whom we call sophists. Let us now go on to discuss how many kinds there are of sophistical arguments, and how many in number are the [35] elements of which this faculty is composed, and how many branches there actually are of this inquiry, and the other factors that contribute to this art.

2 · Of arguments used in discussion there are four classes: didactic, dialectical, examinational, and contentious arguments. Didactic arguments are those that [165<sup>b</sup>1] deduce from the principles appropriate to each subject and not from the opinions held by the answerer (for the learner must be convinced); dialectical arguments are those that deduce from reputable premisses, to the contradictory of a given thesis; examinational arguments are those that deduce from premisses which are accepted [5] by the answerer and which any one who claims to possess knowledge of the subject is bound to know (in what manner, has been explained elsewhere);<sup>1</sup> contentious arguments are those that deduce or appear to deduce to a conclusion from premisses that appear to be reputable but are not so. The subject of demonstrative arguments has been discussed in the *Analytics*, while that of dialectic arguments and [10] examinational arguments has been discussed elsewhere:<sup>2</sup> let us now

proceed to speak of the arguments used in competitions and contests.

3 · First we must grasp the number of aims entertained by those who argue as competitors and rivals. These are five in number: refutation, falsity, paradox, solecism, and fifthly to reduce the opponent in the discussion to babbling (i.e. to [15] constrain him to repeat himself a number of times); or it is to produce the appearance of each of these things without the reality. For they choose if possible plainly to refute the other party, or as the second best to show that he is saying something false, or as a third best to lead him into paradox, or fourthly to reduce him to solecism, i.e. to make the answerer, in consequence of the argument, use [20] some barbarous mode of expression; or, as a last resort, to make him repeat himself.

4 · There are two styles of refutation; for some depend on the language used, while some are independent of language. Those ways of producing the illusion [25] which depend on language are six in number: they are homonymy, ambiguity, combination, division, accent, form of expression. Of this we may assure ourselves both by induction and by deduction—among others, a deduction showing that this is the number of ways in which we might fail to mean the same thing by the same [30] names or accounts. Arguments such as the following depend upon homonymy. ‘Those who know grasp things; for it is those who know their letters who grasp what is dictated to them.’<sup>3</sup> For to grasp is homonymous; it is to understand by the use of knowledge, and also to acquire knowledge. Again, ‘Evils are good; for what must be [35] is good, and evils must be.’ For what must be has a double meaning: it means what is inevitable, as often is the case with evils (for evil of some kind is inevitable), while on the other hand we say of good things as well that they must be. Moreover, ‘The same man is both seated and standing and he is both sick and in health; for it is he who stood up who is standing, and he who was recovering who is in [166<sup>a</sup>1] health; but it is the seated man who stood up, and the sick man who was recovering.’ For ‘The sick man does so and so’, or ‘has so and so done to him’ is not single in meaning: sometimes it means the man who is sick now, sometimes the man who was sick formerly. Of course, the man who was recovering was the sick man, who really [5] was sick at the time; but the man who is in health is not sick at the same time: he is the sick man in the sense not that he is sick now, but that he was sick formerly. Examples such as the

following depend upon ambiguity: 'I wish that you the enemy may capture.' And 'He who knows that, that knows'; for by this phrase one may signify as the knower either him who knows or that which is known. Also, 'There [10] must be sight of what one sees; one sees the pillar; *ergo* the pillar has sight'. Also, 'What you profess to be, that you profess to be; you profess a stone to be; *ergo* you profess to be a stone.' Also, 'Speaking of the silent is possible'; for 'speaking of the silent' also has a double meaning: it may mean that the speaker is silent or that the [15] things of which he speaks are so. There are three varieties of these homonymies and ambiguities: one when either the account or the name properly signifies more than one thing, e.g. mole and bank; one when by custom we use them so; thirdly when words that have a simple sense taken alone have more than one meaning in [20] combination; e.g. 'knowing letters'. For each word, both 'knowing' and 'letters', may have a single meaning; but both together have more than one—either that the letters themselves have knowledge or that some one else has it of them.

Ambiguity and homonymy, then, take these forms. Upon combination there depend instances such as the following: 'A man can walk while sitting, and can write [25] while not writing'. For the meaning is not the same if one divides the words and if one combines them in saying that walking while sitting is possible. The same applies to the latter phrase, too, if one combines the words 'to write while not writing'; for then it means that he has the power to write and not to write at once; whereas if one does not combine them, it means that when he is not writing he has the power to write. Also, 'He knows now if he has learnt his letters.'<sup>4</sup> Moreover, 'One single thing [30] if you can carry many you can carry too'.

Upon division depend the propositions that 5 is 2 and 3, and even and odd, and that the greater is equal (for it is that amount and more besides). For the same phrase would not be thought always to have the same meaning when divided and [35] when combined, e.g. 'I made thee a slave free', and 'God-like Achilles left fifty a hundred men'.

An argument depending upon accent is not easy to construct in unwritten [166b1] discussion; in written discussions and in poetry it is easier. Thus (e.g.) some people emend Homer against those who criticize as absurd his expression τὸ μὲν οὐ καταπύθεται ὄμβρῳ. For they solve the difficulty by a change of accent, pronouncing [5] the \$\$\$ου with an acute accent.<sup>5</sup> Also, in the passage about Agamemnon's dream, they say that Zeus did not himself say 'We grant him the fulfilment of his prayer',<sup>6</sup> but that he bade the dream grant it. Instances such as these, then, turn



upon the accentuation.

Others come about owing to the form of expression used, when what is really [10] different is expressed in the same form, e.g. a masculine thing by a feminine termination, or a feminine thing by a masculine, or a neuter by either a masculine or a feminine; or, again, when a quality is expressed by a termination proper to quantity or vice versa, or what is active by a passive word, or a state by an active word, and so forth with the other divisions previously<sup>7</sup> laid down. For it is possible to use an expression to denote what does not belong to the class of actions at all as [15] though it did so belong. Thus (e.g.) ‘flourishing’ is a word which in the form of its expression is like ‘cutting’ or ‘building’; yet the one denotes a certain quality—i.e. a certain condition—while the other denotes a certain action. In the same manner also in the other instances.

Refutations, then, that depend upon language are drawn from these commonplace [20] rules. Of fallacies that are independent of language there are seven kinds: one that which depends upon accident; secondly the use of an expression without qualification or not without qualification but with some qualification of respect, or place, or time, or relation; thirdly that which depends upon ignorance of what refutation is; fourthly that which depends upon the consequent; fifthly that which [25] depends upon assuming the point at issue; sixthly stating as cause what is not the cause; seventhly the making of more than one question into one.

5 · Fallacies, then, that depend on accident occur whenever any attribute is claimed to belong in a like manner to a thing and to its accident. For since the same [30] thing has many accidents there is no necessity that all the same attributes should belong to all of a thing’s predicates and to their subject as well. Thus (e.g.), if Coriscus is different from a man, he is different from himself: for he is a man; or if he is different from Socrates, and Socrates is a man, then, they say, you have [35] admitted that Coriscus is different from a man, because it is an accident of the person from whom you said that he is different that he is a man.

Those that depend on whether an expression is used without qualification or in a certain respect and not strictly, occur whenever an expression used in a particular [167<sup>a</sup>1] sense is taken as though it were used without qualification, e.g. ‘If what is not is an object of opinion, then what is not is’; for it is not the same thing to be something and to be without qualification. Or again, ‘What is, is not, if it is not a particular

kind of being, e.g. if it is not a man.' For it is not the same thing not to be something [5] and not to be without qualification: it looks as if it were, because of the closeness of the expression, i.e. because to be something is but little different from to be, and not to be something from not to be. Likewise also with any argument that turns upon the point whether an expression is used in a certain respect or used without qualification. Thus e.g. 'Suppose an Indian to be black all over, but white in respect of his teeth; then he is both white and not white.' Or if both characters belong in a particular respect, then, they say, contrary attributes belong at the same time. This [10] kind of thing is in some cases easily seen by anyone, e.g. suppose a man were to assume that the Ethiopian is black, and were then to ask whether he is white in respect of his teeth; thus if he is white in that respect, he might think, as he ended his questioning reductively, that he had argued that he was both black and not black. But in some cases it often passes undetected, viz. in all cases where, whenever [15] something is said to hold in a certain respect, it would seem to follow that it holds without qualification as well; and also in cases where it is not easy to see which of the attributes ought to be rendered strictly. A situation of this kind arises, where both the opposite attributes belong alike; for then it seems that one must agree that both or neither belongs without qualification: e.g. if a thing is half white and half [20] black, is it white or black?

Those which arise because it has not been defined what a deduction is and what a refutation is,<sup>8</sup> come about because something is left out in their definition. For to refute is to contradict one and the same attribute—not the name, but the object and one<sup>9</sup> that is not synonymous but the same—and to confute it from the [25] propositions granted, necessarily, without including in the reckoning the original point to be proved, in the same respect and relation and manner and time in which it was asserted. (A false assertion about anything has to be defined in the same way.) Some people, however, omit some one of the said conditions and give a merely apparent refutation, showing (e.g.) that the same thing is both double and not [30] double—for two is double of one, but not double of three. Or, it may be, they show that it is both double and not double of the same thing, but not that it is so in the same respect—for it is double in length but not double in breadth. Or, it may be, they show it to be both double and not double of the same thing and in the same respect and manner, but not that it is so at the same time; and therefore their refutation is merely apparent. One might force this fallacy into the group dependent [35] on language.

Those that depend on the assumption of the point at issue, occur in the same way, and in as many ways, as it is possible to postulate the point at issue; they appear to refute because men lack the power to keep their eyes at once upon what is the same and what is different.

The refutation which depends upon the consequent arises because people [167<sup>b</sup>1] suppose that the relation of consequence is convertible. For whenever, if this is the case, that necessarily is the case, they then suppose also that if the latter is the case, the former necessarily is the case. This is also the source of the deceptions that attend opinions based on sense-perception. For people often supposed bile to be honey because honey is attended by a yellow colour; and since after rain the ground [5] is wet, we suppose that if the ground is wet, it has been raining; whereas that does not necessarily follow. In rhetoric demonstrations from signs are based on consequences. For when orators wish to show that a man is an adulterer, they take hold of [10] some consequence—that the man is smartly dressed, or that he is observed to wander about at night. There are, however, many people of whom these things are true, while the charge in question is untrue. It happens like this also in deductive reasoning; e.g. Melissus' argument that the universe is infinite, assumes that the universe has not come to be (for from what is not nothing could possibly come to be) and that what has come to be has done so from a first beginning. If, therefore, the [15] universe has not come to be, it has no first beginning, and is therefore infinite. But this does not necessarily follow; for if what has come to be always has a first beginning, it does not follow that what has a first beginning has come to be; any more than it follows that if a man in a fever is hot, a man who is hot must be in a fever. [20]

The refutation which depends upon treating as cause what is not a cause, occurs whenever what is not a cause is inserted in the argument, as though the refutation depended upon it. This kind of thing happens in deductions *ad impossibile*; for in these we are bound to demolish one of the premisses. If, then, it is reckoned in among the questions that are necessary to establish the resulting [25] impossibility, it will often be thought that the refutation depends upon it. E.g. the soul and life are not the same; for if coming-to-be is contrary to perishing, then a particular form of perishing will have a particular form of coming-to-be as its contrary: now death is a particular form of perishing and is contrary to life; life, therefore, is a coming-to-be, and to live is to come-to-be. But this is impossible; [30] accordingly, the soul and life are not the same. Now this has not been deduced; for the impossibility results even if one does

not say that life is the same as the soul, but merely says that life is contrary to death, which is a form of perishing, and that perishing has coming-to-be as its contrary. Arguments of that kind, then, though not non-deductive without qualification, are non-deductive in relation to the proposed conclusion. And the questioners themselves often fail quite as much to see [35] a point of that kind.

Such, then, are the arguments that depend upon the consequent and upon false cause. Those that depend upon the making of two questions into one occur whenever the plurality is undetected and a single answer is returned as if to a single question. [168<sup>a</sup>1] Now, in some cases, it is easy to see that there is more than one, and that an answer<sup>10</sup> is not to be given, e.g. ‘Does the earth consist of sea, or the sky?’ But in some cases it is less easy, and then people treat the question as one, and either confess their defeat by failing to answer the question, or are exposed to an apparent refutation. Thus ‘Is [5] he and is he a man?’ Then if any one hits him and him, he will strike a man, not men. Or again, where some are good and some bad, are they all good or not good? For whichever he says, it is possible that he might be thought to expose himself to an apparent refutation or to make an apparently false statement; for to [10] say that something is good which is not good, or not good which is good, is to make a false statement. Sometimes, however, additional premisses may actually give rise to a genuine refutation; e.g. suppose a man were to grant that one thing and a number of things can alike be called white and naked and blind. For if a thing that cannot see though nature designed it to see is blind, then things that cannot see though [15] nature designed them to do so will be blind. Whenever, then, one thing can see while another cannot, they will either both be able to see or else both be blind; which is impossible.

6 · We should either divide apparent proofs and refutations as above, or else refer them all to ignorance of what refutation is, and make that our starting-point; [20] for it is possible to analyse all the aforesaid modes of fallacy into breaches of the definition of a refutation. In the first place, we may see if they are non-deductive; for the conclusion ought to result from the premisses laid down, so that we state it necessarily and do not merely seem to. Next we should also take the definition bit by bit. For of the fallacies that consist in language, some depend upon a double [25] meaning, e.g. homonymy and the account<sup>11</sup> and similarity of form (for we habitually speak of everything as though it were a certain ‘this’—while

fallacies of combination and division and accent arise because the account or the name as altered is not the same. But this too should be the same, just as the thing should be, if a refutation or deduction is to be effected; e.g. if the point concerns a doublet, then [30] you should deduce about a doublet, not about a cloak. For the former conclusion also would be true, but it has not been deduced; we need a further question to show that doublet means the same thing, in order to satisfy any one who asks the reason why.

Fallacies that depend on accident are clear once deduction has been defined. [35] For the same definition ought to hold good of refutation too, except that a mention of the contradictory is here added; for a refutation is a deduction of the contradictory. If, then, there is no deduction as regards an accident of anything, there is no refutation. For supposing, when these things are the case, that must necessarily be, and that is white, there is no necessity for it to be white on account of the deduction. So, if the triangle has its angles equal to two right-angles, and it happens to be a figure, or a primitive or a principle, it is not proved that a figure or a [168<sup>b</sup>1] principle or a primitive has this character. For the demonstration proves the point about it not *qua* figure or *qua* primitive, but *qua* triangle. Likewise also in other cases. If, then, a refutation is a sort of deduction, an argument depending on an [5] accident will not be a refutation. It is, however, just in this that the experts and men of science generally suffer refutation at the hand of the unscientific; for the latter meet the scientists with deductions depending on accidents; and the scientists for lack of the power to draw distinctions either say 'Yes' to their questions, or else are thought to have said 'Yes', although they have not.<sup>12</sup> [10]

Those that depend upon whether something is said in a certain respect only or said without qualification occur because the affirmation and the denial are not concerned with the same point. For of white in a certain respect the negation is not white in a certain respect, while of white without qualification it is not white, without qualification. If, then, a man treats the admission that a thing is white in a certain respect as though it were said to be white without qualification, he does not effect a refutation, but merely appears to do so owing to ignorance of what [15] refutation is.

The clearest cases of all, however, are those that were previously described as depending upon the definition of a refutation; and this is also why they were given their name.<sup>13</sup> For the appearance of a refutation is produced because of the omission in the definition, and if we divide

fallacies in the above manner, we ought to set [20] ‘defect in definition’ as a common mark upon them all.

Those that depend upon the assumption of the original point and upon stating as the cause what is not the cause, are clear through the definition. For the conclusion ought to come about because these things are so, and this does not happen where the premisses are not causes of it; and again it should come about without taking into account the original point, and this is not the case with those [25] arguments which depend upon postulating the original point.

Those that depend upon the consequent are a branch of accident; for the consequent is an accident, only it differs from the accident in this, that you may secure an admission of the accident in the case of one thing only (e.g. the identity of a yellow thing and honey and of a white thing and a swan), whereas the consequent [30] always involves more than one thing; for we claim that things that are the same as one and the same thing are also the same as one another, and this is the ground of a refutation dependent on the consequent. (But this is not always true, e.g. suppose that they are the same accidentally; for both snow and the swan are the same as something white.) Or again, as in Melissus’ argument, a man assumes that to have [35] been generated and to have a beginning are the same thing, or to become equal and to assume the same magnitude. For because what has been generated has a beginning, he claims also that what has a beginning has been generated, and argues as though both what has been generated and what is finite were the same because each has a beginning. Likewise also in the case of things that are made equal he [169a1] assumes that if things that assume one and the same magnitude become equal, then also things that become equal assume one magnitude: i.e. he assumes the consequent. Inasmuch, then, as a refutation depending on accident consists of ignorance of what a refutation is, clearly so also does a refutation depending on the [5] consequent. We shall have further to examine this in another way as well.<sup>14</sup>

Those fallacies that depend upon the making of several questions into one consist in our failure to articulate the account of a proposition. For a proposition predicates a single thing of a single thing. For the same definition applies to one single thing only and to the thing without qualification, e.g. to man and to one single [10] man only; and likewise also in other cases. If, then, a single proposition is one which claims a single thing of a single thing, a proposition, without qualification, will be the putting of a question of that kind. Now since a deduction starts from

propositions and a refutation is a deduction, a refutation, too, will start from propositions. If, then, a proposition predicates a single thing of a single thing, it is obvious that this fallacy too consists in ignorance of what a refutation is; for in it [15] what is not a proposition appears to be one. If, then, the answerer has returned an answer as though to a single question, there will be a refutation; while if he has returned one not really but apparently, there will be an apparent refutation. All the types of fallacy,<sup>15</sup> then, fall under ignorance of what a refutation is, those dependent [20] on language because the contradiction, which is the proper mark of a refutation, is merely apparent, and the rest because of the definition of a deduction.

7 · The error comes about in the case of arguments that depend on homonymy and the account<sup>16</sup> because we are unable to distinguish the various senses (for some terms it is not easy to distinguish, e.g. one, being, and sameness), [25] while in those that depend on combination and division, it is because we suppose that it makes no difference whether the phrase is combined or divided, as is indeed the case with most phrases. Likewise also with those that depend on accent; for the lowering or raising of the pitch upon a phrase seems not to alter its meaning—with [30] any phrase, or not with many. With those that depend on the form it is because of the likeness of expression. For it is hard to distinguish what kind of things are signified by the same and what by different kinds of expression (for a man who can do this is practically next door to the understanding of the truth, and knows best how to assent) because we suppose every predicate of anything to be an individual [35] thing, and we understand it as being one thing; for it is to that which is one and to substances that individuality and being seem especially to belong. For this reason, too, this type of fallacy is to be ranked among those that depend on language; in the first place, because the error is effected the more readily when we are inquiring into a problem in company with others than when we do so by ourselves (for an inquiry with another person is carried on by means of speech, whereas an inquiry by oneself is carried on quite as much by means of the object itself); secondly a man is liable to err, even when inquiring by himself, when he takes speech as the basis of his inquiry; [169<sup>b</sup>1] moreover the error arises out of the likeness, and the likeness arises out of the language. With those fallacies that depend upon accident, error comes about because we cannot distinguish what is the same and what is different, what is one and what many, or what kinds of predicate have all the same accidents as their [5] subject.

Likewise also with those that depend on the consequent; for the consequent is a branch of accident. Moreover, in many cases it seems and it is claimed that if this is inseparable from that, so also is that from this. With those that depend upon deficiency in the account of a refutation, and with those that depend upon the [10] difference between a qualified and an unqualified statement, the error consists in the smallness of the difference involved; for we treat the limitation to the particular thing or respect or manner or time as adding nothing to the meaning, and so grant the statement universally. Likewise also in the case of those that assume the original point, and those of false cause, and all that treat a number of questions as one; for in all of them the error lies in the smallness of the difference; for our failure to be quite [15] precise in our definition of propositions and of deductions is due to the aforesaid reason.

8 · Since we know on how many points apparent deductions depend, we know also on how many sophistical deductions and refutations may depend. By a sophistical refutation and deduction I mean not only a deduction or refutation [20] which appears to be valid but is not, but also one which, though it is valid, only appears to be appropriate to the thing in question. These are those which fail to refute in respect of the object and which prove the answerer to be ignorant, which was the function of the art of examination. Now the art of examining is a branch of dialectic; and this may deduce a false conclusion because of the ignorance of the [25] answerer. Sophistic refutations on the other hand, even though they deduce the contradictory of his thesis, do not make clear whether he is ignorant; for even men of knowledge are entangled by these arguments.

That we know them by the same line of inquiry is clear; for the same [30] considerations which make it appear to an audience that the conclusion was deduced by way of the questions, would make the answerer think so as well, so that false deductions will occur through all or some of these means; for what a man has not been asked but thinks he has granted, he would also grant if he were asked. Of course, in some cases the moment we add the missing question, we also show up the [35] falsity, e.g. in fallacies that depend on language and on solecism. If then fallacious arguments for the contradictory of a thesis depend on their appearing to refute, it is clear that the considerations on which both deductions of false conclusions and apparent refutation depend must be the same in number. Now an apparent refutation depends upon the elements involved in a genuine one; for the failure of one or other of



these must make the refutation merely apparent, e.g. that which [170<sup>a</sup>1] depends on the failure of the conclusion to follow from the argument (the argument *ad impossibile*) and that which treats two questions as one and so depends upon a flaw in the proposition, and that which depends on the substitution of an accident for an essential attribute, and—a branch of the last—that which depends upon the [5] consequent; moreover, the conclusion may follow not in fact but only verbally; then, instead of proving the contradictory universally and in the same respect and relation and manner, the fallacy may be dependent on some limit of extent or on one or other of these qualifications; moreover, there is the assumption of the original point, in violation of the principle of not reckoning in the original point. Thus we should have [10] the number of considerations on which fallacies depend; for they could not depend on more, but all will depend on the points aforesaid.

A sophistical refutation is a refutation not without qualification but relatively to someone; and so is a deduction, in the same way. For unless that which depends upon homonymy assumes that the term has a single meaning, and that which [15] depends on similarity of form assumes that terms signify nothing but individuals, and the rest in the same way, they will be neither refutations nor deductions, either without qualification or relatively to the answerer; whereas if they do assume these things, they will be, relatively to the answerer; but they will not be without qualification; for they have not secured a statement that does have a single meaning, but only one that appears to have, and that only from this particular man.

[20] 9 · The number of considerations on which depend the refutations of those who are refuted, we ought not to try to grasp without a knowledge of everything that is. This, however, is not the province of any single study; for possibly the sciences are infinite in number, so that obviously demonstrations may be infinite too. Now refutations may be true as well as false; for whenever it is possible to demonstrate something, it is also possible to refute the man who maintains the contradictory of [25] the truth; e.g. if a man has stated that the diagonal is commensurate with the side of the square, one might refute him by demonstrating that it is incommensurate. Accordingly, we shall have to have scientific knowledge of everything; for some refutations depend upon the principles of geometry and the conclusions that follow from these, others upon those of medicine, and others upon those of the other

[30] sciences. For the matter of that, false refutations likewise belong to the number of the infinite; for in respect of every art there is false deduction, e.g. in respect of geometry there is a geometrical one, and in respect of medicine a medical. By in respect of the art, I mean in respect of its principles. Clearly, then, it is not of all refutations, but only of those that depend upon dialectic that we need to grasp the [35] commonplace rules; for these are common to every art and faculty. And as regards the refutation that is in respect of one or other of the particular sciences it is the task of that particular scientist to examine whether it is merely apparent without being real, and, if it is real, what is the reason for it; whereas it is the business of dialecticians so to examine the refutation that proceeds from common principles and falls under no particular study. For if we grasp the starting-points of the reputable deductions on any subject we grasp those of the refutations. For a [170<sup>b</sup>1] refutation is a deduction of the contradictory, so that either one or two deductions of the contradictory constitute a refutation. We grasp, then, the number of considerations on which all such depend; and if we grasp this, we grasp their solutions as well; for the objections to these are the solutions of them. We also grasp the number of considerations on which those refutations depend, that are merely apparent—[5] apparent, I mean, not to everybody, but to people of a certain stamp; for it is an indefinite task if one is to inquire how many are the considerations that make them apparent to the man in the street. Accordingly it is clear that the dialectician's business is to be able to grasp on how many considerations depends the formation, through common principles, of a refutation that is either real or apparent, i.e. either [10] dialectical or apparently dialectical, or suitable for an examination.

10 · It is no true distinction between arguments which some people draw when they say that some arguments are directed against the word, and others against the thought; for it is absurd to suppose that some arguments are directed against the word and others against the thought, and that they are not the same. For [15] what is failure to direct an argument against the thought except what occurs whenever a man does not use the word in the sense about which the person being questioned thought he was being questioned when he made the concession? And this is the same thing as to direct the argument against the word. On the other hand, it is directed against the thought whenever a man uses the word in the sense which the answerer had in mind when he made the concession. If now anyone (i.e. both the questioner and the person questioned), in

dealing with a word with more than one [20] meaning, were to suppose it to have one meaning—as e.g. it may be that being and one have many meanings, and yet both the answerer answers and the questioner puts his question supposing it to be one, and the argument is to the effect that all things are one—will this discussion be directed any more against the word than against the thought of the person questioned? If, on the other hand, someone [25] supposes the word to have many meanings, it is clear that such a discussion will not be directed against the thought. For direction against the word and against the thought applies primarily to those arguments which have several meanings, but secondarily to any argument whatsoever; for the fact of being directed against the thought depends not on the argument, but on the special attitude of the answerer towards the points he concedes. Next, all of them may be directed to the word. For [30] to be directed against the word is in this doctrine not to be directed against the thought. For if not all are directed against either word or thought, there will be certain other arguments directed neither against the word nor against the thought, whereas they say that all must be one or the other, and divide them all as directed either against the word or against the thought, while others (they say) there are none. But in point of fact those that depend on the word are a branch of those deductions that depend on a multiplicity of uses. For the absurd statement has [35] actually been made that the description ‘dependent on the word’ describes all the arguments that depend on language; whereas some of these are fallacies not because the answerer adopts a particular attitude towards them, but because the argument itself involves the asking of a question such as bears more than one use.

It is altogether absurd to discuss refutation without first discussing deduction; [171<sup>a</sup>1] for a refutation is a deduction, so that one ought to discuss deduction before describing false refutation; for a refutation of that kind is a merely apparent [5] deduction of the contradictory of a thesis. Accordingly, the reason of the falsity will be either in the deduction or in the contradiction (for mention of the contradiction must be added), while sometimes it is in both, if the refutation is merely apparent. In the argument that speaking of the silent is possible it lies in the contradiction, not in the deduction; in the argument that one can give what one does not possess, it lies [10] in both; in the argument that Homer’s poem is a figure through its being a cycle it lies in the deduction. An argument that does not fail in either respect is a true deduction.

But, to return to the point whence our argument digressed, are mathematical reasonings directed against the thought, or not? And if any

one thinks ‘triangle’ to be a word with many meanings, and granted it in some different sense from the [15] figure which was proved to contain two right angles, has the questioner here directed his argument against the thought of the former or not?

Moreover, if the name bears many senses, while the answerer does not understand or suppose it to have them, surely the questioner here has directed his argument against his thought. Or how else ought he to put his question except by suggesting a distinction—suppose one’s question to be ‘Is speaking of the silent [20] possible or not?’ or ‘Is the answer “No” in one sense, but “Yes” in another?’ If, then, any one were to answer that it was not possible in any sense and the other were to argue that it was, has not his argument been directed against the thought of the answerer? Yet his argument is supposed to be one of those that depend on the word. There is not, then, any definite kind of arguments that is directed against the thought. Some arguments are, indeed, directed against the word; but these do not [25] include all apparent refutations, let alone all refutations. For there are also apparent refutations which do not depend upon language, e.g. those that depend upon accident, and others.

If anyone requires that one should actually draw the distinction, and say, ‘By “speaking of the silent” I mean, in one sense this and in the other sense that’, surely [30] to require *this* is in the first place absurd (for sometimes the question does not seem to have several uses, and you cannot possibly draw a distinction which you do not think to be there); in the second place, what else but this will *didactic* argument be? For it will make manifest the state of the case to one who has never considered, and does not know or suppose that there is any other use. For what is there to prevent the same thing also happening to us in cases where there is no<sup>17</sup> double use? ‘Are the [35] units in four equal to the twos? Observe that some twos<sup>18</sup> are contained in one way, some in another.’ Also, ‘Is the knowledge of contraries one or not? Observe that some contraries are known, while others are unknown.’ Thus the man who makes [171<sup>b</sup>1] this requirement seems to be unaware of the difference between didactic and dialectical argument, and of the fact that while he who argues didactically should not ask questions but make things clear himself, the other should merely ask questions.

**11** · Moreover, to require a ‘Yes’ or ‘No’ answer is the business not of a man who is proving something, but of one who is holding an examination. For the art of examining is a branch of dialectic and has in

view not the man who has knowledge, [5] but the ignorant pretender. Now the man who regards the common principles with their application to the particular matter in hand is a dialectician, while the man who only appears to do this is a sophist. Now one form of contentious and sophistical deduction is a merely apparent deduction, on subjects on which dialectic is the proper method of examination, even if its conclusion is true (for it misleads us in [10] regard to the cause); also there are those fallacies which do not belong to the line of inquiry proper to the particular subject, but seem to belong to the art in question. For false diagrams of geometrical figures are not contentious (for the fallacies belong to the subject of the art)—any more than is any false diagram illustrating a truth—e.g. Hippocrates' figure of the squaring of the circle by means of the lunules. [15] But Bryson's method of squaring the circle, even if the circle is thereby squared, is still sophistical because it does not conform to the subject in hand. So, then, any merely apparent deduction about these things is a contentious argument, and any deduction that merely appears to conform to the subject in hand, even if it is a genuine deduction, is a contentious argument; for it is merely apparent in its [20] conformity to the subject-matter, so that it is deceptive and unfair. For just as unfairness in a contest is a definite type of fault, and is a kind of foul fighting, so the art of contentious reasoning is foul fighting in disputation; for in the former case those who are resolved to win at all costs snatch at everything, and so in the latter case do contentious reasoners. Those, then, who do this in order to win the mere [25] victory are thought to be contentious and quarrelsome persons, while those who do it to win a reputation with a view to making money are sophistical. For sophistry is, as we said, a kind of art of money-making from a merely apparent wisdom, and this is why they aim at a merely apparent demonstration; and quarrelsome persons and sophists both employ the same arguments, but not with the same motives; and the [30] same argument will be sophistical and contentious, but not in the same respect; rather, it will be contentious in so far as its aim is an apparent victory, while in so far as its aim is an apparent wisdom, it will be sophistical—for the art of sophistry is a certain appearance of wisdom without the reality. The contentious arguer stands in somewhat the same relation to the dialectician as the drawer of false diagrams to [35] the geometrician; for he argues fallaciously from the same principles as the dialectician, just as the drawer of a false diagram uses the same principles as the geometrician. But whereas the latter is not a contentious reasoner, because he bases his false diagram on the principles and conclusions that

fall under the art of geometry, the argument which is subordinate to the principles of dialectic will yet [172<sup>a</sup>1] clearly be contentious as regards other subjects. Thus, e.g., though the squaring of the circle by means of the lunules is not contentious, Bryson's solution is contentious; and the former argument cannot be adapted to any subject except geometry, because it proceeds from principles that are proper to geometry, whereas [5] the latter can be adapted as an argument against the many people who do not know what is or is not possible in each particular context—for it will apply to them all. Or there is the method whereby Antiphon squared the circle. Or again, an argument which denied that it was better to take a walk after dinner, because of Zeno's argument, would not be a proper argument for a doctor, because Zeno's argument is [10] of general application. If, then, the relation of the contentious arguer to the dialectician were exactly like that of the drawer of false diagrams to the geometrician, a contentious argument upon the aforesaid subjects could not have existed. But, as it is, the dialectical argument is not concerned with any definite genus, nor does it prove anything, nor is it of the same type as a universal argument. For all beings are not contained in any one kind, nor, if they were, could they possibly fall [15] under the same principles. Accordingly, no art that is a method of proving the nature of anything proceeds by asking questions; for it does not permit a man to grant whichever he likes of the two alternatives in the question; for they will not both of them yield a deduction. Dialectic, on the other hand, does proceed by questioning, whereas if it were concerned to prove things, it would have refrained from putting questions, even if not about everything, at least about the primitives [20] and the appropriate principles. For suppose the answerer not to grant these, it would then no longer have had any grounds from which to argue any longer against the objection. Dialectic is at the same time a mode of examination as well. For the art of examination is not an accomplishment of the same kind as geometry, but one which a man may possess, even though he has not knowledge. For it is possible even for one without knowledge to hold an examination of one who is without knowledge, if the latter grants him points taken not from things that he knows or from the proper [25] principles but from the consequences which a man may know without knowing the art in question (but which if he does not know, he is bound to be ignorant of the art). So then clearly the art of examining does not consist in knowledge of any definite subject. For this reason, too, it deals with everything; for every art employs certain [30] common principles too. Hence everybody, including even amateurs, makes use in a way of

dialectic and the practice of examining; for all undertake to some extent a test of those who profess to know things. What serves them here is the general principles; for they know these themselves just as well as the scientist, even if in what they say they seem to go wildly astray. All, then, are engaged in refutation; for they take a hand as amateurs in the same task with which dialectic is concerned [35] professionally; and he is a dialectician who examines by the help of a theory of deduction. Now there are many identical principles which are true of everything, though they are not such as to constitute a particular nature, i.e. a particular kind of being, but are like negations, while other principles are not of this kind but are proper; accordingly it is possible from these general principles to hold an examination on everything, and that there should be a definite art of so doing, and, [172<sup>b</sup>1] moreover, an art which is not of the same kind as those which prove. This is why the contentious reasoner does not stand in the same condition in all respects as the drawer of a false diagram; for the contentious reasoner will not argue fallaciously from any definite class of principles, but will deal with every class.

[5] These, then, are the types of sophistical refutations; and that it belongs to the dialectician to study these, and to be able to effect them, is not difficult to see; for the investigation of propositions comprises the whole of this study.

12 · So much, then, for apparent refutations. As for showing that the answerer is saying something false, and drawing his argument into something [10] implausible—for this was the second item of the sophist's programme—in the first place, then, this is best brought about by a certain manner of inquiring and through the question. For to put the question without framing it with reference<sup>19</sup> to any definite subject is a good bait for these purposes; for people are more inclined to make mistakes when they talk at large, and they talk at large when they have no [15] definite subject before them. Also the putting of several questions, even though the position against which one is arguing is definite, and the requirement that he shall say only what he thinks, create abundant opportunity for drawing him into implausibility or falsity, and also, whether to any of these questions he replies 'Yes' or replies 'No', for leading<sup>20</sup> him on to statements against which one is well off for a line of attack. Nowadays, however, men are less able to play foul by these means [20] than they were formerly; for people rejoin with the question, 'What has that to do with the original subject?' It is, too, an elementary rule for

eliciting some falsity or implausibility that one should never put a thesis directly, but say that one puts it from the wish for information; for the pretext gives room for an attack.

A rule specially appropriate for showing up a falsity is the sophistic rule that [25] one should draw the answerer on to the kind of statements against which one is well supplied with arguments: this can be done both properly and improperly, as was said before.<sup>21</sup>

Again, to draw a paradoxical statement, look and see to what school the person arguing with you belongs, and then question him as to some point wherein their [30] doctrine is paradoxical to most people; for with every school there is some point of that kind. It is an elementary rule in these matters to have a collection of the theses of the various schools among your propositions. The solution appropriate here, too, is to show that the paradox does not come about because of the argument: whereas this is what your opponent always really wants. [35]

Moreover, argue from men's wishes and their professed opinions. For people do not wish the same things as they say they wish: they say what will look best, whereas they wish what appears to be to their interest; e.g. they say that a man ought to die nobly rather than to live in pleasure, and to live in honest poverty rather [173<sup>a</sup>1] than in dishonourable riches; but they wish the opposite. Accordingly, a man who speaks according to his wishes must be led into stating his professed opinions, while he who speaks according to these must be led into admitting those that are hidden away; for in either case they are bound to introduce a paradox; for they will speak [5] contrary either to their professed or to their hidden opinions.

The widest range of commonplace argument for leading men into paradoxical statement is that which depends on the standards of nature and of convention: it is thus that both Callicles is portrayed as arguing in the *Gorgias*, and that all the men of old supposed the result to come about; for nature (they said) and convention are [10] opposites, and justice is a fine thing by a conventional standard, but not by that of nature. Accordingly, the man whose statement agrees with the standard of nature you should meet by the standard of convention, but the man who agrees with convention by leading him to the facts of nature; for in both ways paradoxical [15] statements will be made. In their view the standard of nature was the truth, while that of convention was the opinion held by the majority. So that it is clear that they, too, used to try either to refute the answerer or to make him make paradoxical statements, just as the men of to-day do as well.



[20] Some questions are such that in both forms the answer is implausible; e.g. ‘Ought one to obey the wise or one’s father?’ and ‘Ought one to do what is expedient or what is just?’ and ‘Is it preferable to suffer injustice or to do an injury?’ You should lead people, then, into views opposite to the majority and to the wise: if anyone speaks as do the expert reasoners, lead him into opposition to the majority, [25] while if he speaks as do the majority, then into opposition to the wise. For some say that of necessity the happy man is just, whereas it is implausible to the many that a king should not be happy. To lead a man into implausibility of this sort is the same as to lead him into the opposition of the standards of nature and convention; for convention represents the opinion of the majority, whereas the wise speak according [30] to the standard of nature and the truth.

**13** · Paradoxes, then, you should seek to elicit by means of these commonplace rules. Now as for making any one babble, we have already said what we mean by to babble.<sup>22</sup> This is the object in view in all arguments of the following kind: if it [35] is all the same to state a word and to state its account, double and double of half are the same; if then double is double of half, it will be double of half of half. And if, instead of ‘double’, double of half is again put, then the same expression will be repeated three times, double of half of half of half. Also ‘Desire is of the pleasant, isn’t it?’ But desire is appetite for the pleasant; accordingly, desire is appetite for the pleasant for the pleasant.

[173<sup>b</sup>1] All arguments of this kind occur in dealing with any relative terms which not only have relative genera, but are also themselves relative, and are rendered in relation to one and the same thing (as e.g. appetite is appetite for something, and desire is desire for something, and double is double of something, i.e. double of [5] half); also in dealing with any terms which, though they are not relative terms at all, yet have their substance, viz. the things of which they are the states or affections or what not, indicated as well in their definition, they being predicated of these things. Thus e.g. odd is a number containing a middle; but there are odd numbers; therefore [10] there are numbers numbers containing a middle. Also, if snubness is a concavity of the nose, and there are snub noses, there are concave noses noses.

People sometimes appear to produce this result, without really producing it, because they do not add the question whether double, just by itself, has any meaning or not, and if so, whether it has the same

meaning, or a different one; but [15] they draw their conclusion straight away. Still it seems, inasmuch as the word is the same, to have the same meaning as well.

14 · We have said before what kind of thing solecism is.<sup>23</sup> It is possible both to commit it, and to seem to do so without doing so, and to do so without seeming to do so. Suppose, as Protagoras used to say, that μῆνις ('wrath') and πῆληξ ('helmet') are masculine: according to him a man who calls wrath a 'destrucess' (οὐλομένην) [20] commits a solecism, though he does not seem to do so to other people, whereas he who calls it a 'destructor' (οὐλόμενον) commits no solecism though he seems to do so. It is clear, then, that one could produce this affect by art as well; and for this reason many arguments seem to deduce a solecism which do not really do so, as happens in the case of refutations. [25]

Almost all apparent solecisms depend upon occasions when the inflection denotes neither a masculine nor a feminine object but a neuter. For 'he' signifies a masculine, and 'she' a feminine; but 'this', though meant to signify a neuter, often also signifies one or other of the former: e.g. 'What is this?' —Calliope, a log, [30] Coriscus. Now in the masculine and feminine the inflections are all different, whereas in the neuter some are and some are not. Often, then, when 'this' has been granted, people reason as if 'him' had been said; and likewise also they substitute one inflection for another. The fallacy comes about because 'this' is a common form [35] of several inflections; for 'this' signifies sometimes 'he' and sometimes 'him'. It should signify them alternately: when combined with 'is' it should be 'he', while with 'being' it should be 'him': e.g. 'He is', 'being him'. It happens in the same way in the case of feminine names as well, and in the case of the so-called 'chattels' that have feminine or masculine designations. For only those names which end in ο and ν, [174<sup>a</sup>1] have the designation proper to a chattel, e.g. ζύλον, σχοινίον; those which do not end so have that of a masculine or feminine object, though some of them we apply to chattels: e.g. ἄσκος is a masculine name, and κλίνη a feminine. For this reason in cases of this kind as well there will be a difference of the same sort between 'is' and [5] 'being'. Also, solecism resembles in a certain way those refutations which are said to depend on the like expression of unlike things. For, just as there we come upon a material solecism, so here we come upon a verbal; for man is both an object and also a word, and so is white.

It is clear, then, that for solecisms we must try to construct our

argument out of [10] the aforesaid inflections.

These, then, are the types of contentious arguments, and the subdivisions of those types, and the methods for conducting them aforesaid. But it makes no little difference if the materials for putting the question are arranged in a certain manner with a view to concealment, as in the case of dialectical arguments. Following then [15] upon what we have said, this must be discussed first.

**15** · With a view then to refutation, one resource is length—for it is difficult to keep several things in view at once; and to secure length the elementary rules that have been stated before should be employed. Another resource is speed; for when people are left behind they look ahead less. Moreover, there is anger and contentiousness; for when agitated everybody is less able to take care of himself. [20] Elementary rules for producing anger are to make a show of the wish to play foul, and to be altogether shameless. Moreover there is the putting of one's questions alternately, whether one has more than one argument leading to the same conclusion, or whether one has arguments to show both that something is so, and [25] that it is not so; for the result is that he has to be on his guard at the same time either against more than one line, or against contrary lines, of argument. In general, all the methods described before<sup>24</sup> of producing concealment are useful also for purposes of contentious argument; for the object of concealment is to avoid detection, and the object of this is to deceive.

[30] To counter those who refuse to grant whatever they suppose to help one's argument, one should put the question negatively, as though desirous of the opposite answer, or at any rate as though one put the question without prejudice; for when it is obscure what answer one wants to secure, people are less refractory. Also when, in dealing with particulars, a man grants the individual case, when the induction is [35] done you should often not put the universal as a question, but take it for granted and use it; for sometimes people themselves suppose that they have granted it, and also appear to the audience to have done so—for they remember the induction and assume that the questions could not have been put for nothing. In cases where there is no term to indicate the universal, still you should avail yourself of the resemblance to suit your purpose; for resemblance often escapes detection. Also, with a view to obtaining the proposition, you ought to put it in your question side by side with its [174<sup>b</sup>1] contrary. E.g. if it were necessary to secure the

admission that a man should obey his father in everything, ask ‘Should a man obey his parents in everything, or disobey them in everything?’; and ‘Should one agree that many times many is many or few?’ (for then, if compelled to choose, one will be more inclined to think it [5] many). For the placing of their contraries close beside them makes things look smaller and bigger, and worse and better to men.

A strong appearance of having been refuted is often produced by the most highly sophistical of all the unfair tricks of questioners, when without deducing [10] anything, instead of putting their final proposition as a question, they state it as a conclusion, as though they had deduced it —‘Therefore so-and-so is not true’.

It is also a sophistical trick, when a paradox has been laid down, to require, when the accepted view has been originally proposed that the answerer shall answer what he thinks about it, and to put one’s question on matters of that kind in the form [15] ‘Do you think that . . . ?’ For then, if the question is taken as one of the premisses of one’s argument, either a refutation or a paradox is bound to result: if he grants the view, a refutation; if he refuses to grant it or even to admit it is accepted, an implausibility; if he refuses to grant it, but admits that it is accepted, something very like a refutation results.

Moreover, just as in rhetorical arguments, so also in those aimed at refutation, [20] you should examine the discrepancies of the answerer’s position either with his own statements, or with those of persons whom he admits to say and do aright, and also with those of people who are supposed to bear that kind of character, or who are like them, or with those of the majority or of all men. Also just as answerers, too, often, when they are in process of being refuted draw a distinction, if their refutation is just about to take place, so questioners also should resort to this from time to time to [25] counter objectors, pointing out, supposing that against one sense of the words the objection holds, but not against the other, that they have taken it in the latter sense, as e.g. Cleophon does in the *Mandrobulus*<sup>25</sup> They should also break off their argument and cut short their other lines of attack, while in answering, if a man perceives this being done beforehand, he should put in his objection and have his say first. One should also lead attacks sometimes against positions other than the one [30] stated, excluding it if one cannot find lines of attack against the view laid down, as Lycophron did when set to deliver a eulogy upon the lyre. To counter those who demand ‘Against what are you directing your effort?,’ since one is thought bound to state the reason, while, on the other hand, some ways of stating it make the defence too

easy, you should state as your aim only the general result that always [35] happens in refutations, namely the contradiction of his thesis—viz. that your effort is to deny what he has affirmed, or to affirm what he denied: don't say that you are trying to show that the knowledge of contraries is, or is not, the same.<sup>26</sup> One must not ask one's conclusion in the form of a proposition. Some things should not even be put as questions at all but used as though granted.

**16** · We have now dealt with the sources of questions, and the methods of [175a1] questioning in contentious disputations; next we have to speak of answering, and of how solutions should be made, and of what requires them, and of what use is served by arguments of this kind.

The use of them, then, is, for philosophy, two-fold. For in the first place, since [5] for the most part they depend upon the expression, they put us in a better condition for seeing in how many ways any term is used, and what kind of resemblances and what kind of differences occur between things and between their names. In the second place they are useful for one's own personal researches; for the man who is [10] easily committed to a fallacy by someone else, and does not perceive it, is likely to incur this fate himself also on many occasions. Thirdly and lastly, they further contribute to one's reputation, viz. the reputation of being well trained in everything, and not inexperienced in anything; for that a party to arguments should find fault with them and yet cannot definitely point out their weakness, creates a [15] suspicion, making it seem as though it were not the truth of the matter but inexperience that put him out of temper.

Answerers may clearly see how to meet arguments of this kind, if our previous account was right of the sources whence fallacies came, and if we adequately distinguished the forms of dishonesty in putting questions. But it is not the same [20] thing to take an argument in one's hand and then to see and solve its faults, as it is to be able to meet it quickly while being subjected to questions; for what we know, we often do not know in a different context. Moreover, just as in other things speed or slowness is enhanced by training, so it is with arguments too, so that supposing we [25] are unpractised, even though a point is clear to us, we are often too late for the right moment. Sometimes too it happens as with diagrams; for there we can sometimes analyse the figure, but not construct it again: so too in refutations, though we know [30] on what the connexion of the argument depends, we still are at a loss to split the argument apart.

17 · First then, just as we say that we ought sometimes to choose to deduce something in a reputable fashion rather than in truth, so also we have sometimes to solve arguments rather in a reputable fashion than according to the truth. For it is a general rule in fighting contentious persons, to treat them not as refuting, but as [35] merely appearing to refute; for we say that they don't really *deduce* anything, so that our object in correcting them must be to dispel the appearance of it. For if refutation is a non-homonymous contradiction arrived at from certain premisses, there will be no need to draw distinctions against ambiguity and homonymy; for they do not effect a deduction. The only motive for drawing further distinctions is that the conclusion reached looks like a refutation. What, then, we have to beware of, is not being refuted, but seeming to be, because of course the asking of [175<sup>b</sup>1] ambiguities and of questions that turn upon homonymy, and all the other tricks of that kind, both conceal a genuine refutation and make it uncertain who is refuted and who is not. For since one has the right at the end, when the conclusion is drawn, to say that he has not denied what one has stated except homonymously, no matter [5] how precisely he may have addressed his argument to the very same point as oneself, it is not clear whether one has been refuted; for it is not clear whether at the moment one is speaking the truth. If, on the other hand, one had drawn a distinction, and questioned him on the homonymy or the ambiguity, the refutation would not have been a matter of uncertainty. Also what contentious arguers (less so nowadays than formerly) aim at would have been achieved, namely that the person [10] questioned should answer either 'Yes' or 'No'; whereas nowadays the improper forms in which questioners put their questions compel the party questioned to add something to his answer in correction of the faultiness of the proposition as put; for certainly, if the questioner distinguishes his meaning adequately, the answerer is bound to reply either 'Yes' or 'No'.

[15] If anyone is going to suppose that an argument which turns upon homonymy is a refutation, it will be impossible for an answerer to escape being refuted in a sense; for in the case of visible objects one is bound of necessity to deny the term he has asserted, and to assert what he has denied. For the remedy which some people have for this is quite unavailing. They say, not that Coriscus is both musical and [20] unmusical, but that *this* Coriscus is musical and *this* Coriscus unmusical. But this will not do, for to say that *this* Coriscus is unmusical, or musical, and to say *this* Coriscus is so, is to use the same expression; and this he is both affirming and denying at once. 'But perhaps they do not mean the

same'. Well, nor did the name in the former case: so where is the difference? If, however, he is to use in the one case [25] the simple title Coriscus, while in the other he is to add the prefix one or this, he commits an absurdity; for the latter is no more applicable to the one than to the other; for to whichever he adds it, it makes no difference.

All the same, since if a man does not distinguish the senses of an ambiguity, it is not clear whether he has been refuted or has not been refuted, and since in arguments the right to distinguish them is granted, it is evident that to grant the [30] question without drawing any distinction and without qualification is a mistake, so that the *argument*—even if not the man himself—looks as though it has been refuted. It often happens, however, that, though they see the ambiguity, people hesitate to draw such distinctions, because of the dense crowd of persons who propose questions of the kind, in order that they may not be thought to be [35] ill-tempered at every turn; then again, though they would never have supposed that that was the point on which the argument turned, they often find themselves faced by a paradox. Accordingly, since the right of drawing the distinction is granted, one should not hesitate, as has been said before.<sup>27</sup>

If people never made two questions into one question, the fallacy that turns upon homonymy and ambiguity would not have come about, but either genuine refutation or none. For what is the difference between asking whether Callias and Themistocles are musical, and what one might have asked if the pair of them, [176<sup>a</sup>1] though different, had had its own single name? For if the term applied means more than one thing, he has asked more than one question. If then it is not right to demand to be given without qualification a single answer to two questions, it is evident that it is not proper to give an unqualified answer to any homonymous [5] question, not even if the predicate is true of all the subjects, as some claim that one should. For this is exactly as though he had asked 'Are Coriscus and Callias at home or not at home?', supposing them to be both in or both out; for in both cases there is a number of propositions; for though the simple answer is true, that does not make the question one. For it is possible for it to be true to say 'Yes' or 'No' without [10] qualification to countless different questions; but still one should not answer them with a single answer; for that is the death of argument. Rather, it is as though different things had actually had the same name applied to them. If then, one should not give a single answer to two questions, it is evident that we should not say 'Yes' or 'No' in the case of homonyms; for the remark is simply a remark, not an [15] answer at all,

although among disputants such remarks are demanded, because they do not see what the consequence is.

As we said, then, inasmuch as some things seem to be refutations though they are not, in the same way also some things will seem to be solutions, though they are [20] not. Now these, we say, must sometimes be advanced rather than the true solutions in contentious reasonings and in meeting ambiguity. The proper answer in saying what one thinks is to say 'Granted'; for in that way the likelihood of being refuted on a side issue is minimized. If, on the other hand, one is compelled to say something [25] paradoxical, one should then be most careful to add that it seems so; for in that way one avoids the impression of being either refuted or paradoxical. Since it is clear what is meant by postulating the point at issue, and people think that they must at all costs overthrow the premisses that lie near the conclusion, and that some must not be conceded because he is postulating the point at issue, so whenever any one [30] claims from us a point such as is bound to follow as a consequence from our thesis, but is false or paradoxical, we must plead the same; for the necessary consequences are generally held to be a part of the thesis itself. Moreover, whenever the universal has been secured not under a definite name, but by a comparison of instances, one should say that the questioner assumes it not in the sense in which it was granted nor [35] in which he proposed it; for this too is a point upon which a refutation often depends.

If one is debarred from these defences one must pass to the argument that the conclusion has not been properly proved, approaching it in the light of the given classification.<sup>28</sup>

In the case, then, of names that are used literally one is bound to answer either without qualification or by drawing a distinction: it is the tacit understandings implied in our statements, e.g. in answer to questions that are not put clearly but [176<sup>b</sup>1] truncatedly, upon which refutation depends. For example, 'Is what belongs to Athenians the property of Athenians?' Yes. 'And so it is likewise in other cases. But man belongs to the animal kingdom, doesn't he?' Yes. 'Then man is the property of the animal kingdom'. For we say that man belongs to the animal kingdom because [5] he is an animal, just as we say that Lysander belongs to the Spartans, because he is a Spartan. It is evident, then, that where what is put forward is not clear, one must grant it without qualification.

Whenever of two things it seems that if the one is true the other is true of necessity, whereas, if the other is true, the first is not true of



necessity, one should, if asked which of them is true, grant the smaller one; for the larger the number of [10] premisses, the harder it is to deduce a conclusion from them. If, again, he tries to secure that one thing has a contrary while another has not, then if what he says is true, you should say that each has a contrary, only for the one there is no established name.

Since, again, in regard to some of the views they express, most people would say that anyone who did not admit them was telling a falsehood, while they would [15] not say this in regard to some, e.g. to any matters whereon opinion is divided (for most people have no distinct view whether the soul of animals is destructible or immortal), accordingly wherever it is uncertain in which of two senses the premiss proposed is usually meant—whether as maxims are (for people call both true [20] opinions and general assertions maxims), or like ‘the diagonal of a square is incommensurate with its side’; and moreover<sup>29</sup> whenever opinions are divided as to the truth, we then have subjects of which it is very easy to change the terminology undetected. For because of the uncertainty in which of the two senses the premiss contains the truth, one will not be thought to be playing any trick, while because of the division of opinion, one will not be thought to be telling a falsehood; for the [25] change will make the position irrefutable.

Moreover, whenever one foresees any question coming, one should put in one’s objection and have one’s say beforehand; for by doing so one is likely to embarrass the questioner most effectually.

**18** · Inasmuch as a proper solution is an exposure of a false deduction, showing on what kind of question the falsity depends, and since false deduction has [30] a double use—for it is used either if a false conclusion has been deduced, or if there is only an apparent deduction and no real one—there must be both the kind of solution just described, and also the correction of a merely apparent deduction, so as to show upon which of the questions the appearance depends. Thus it comes about [35] that one solves arguments that are properly deduced by demolishing them, whereas one solves merely apparent arguments by drawing distinctions. Again, inasmuch as of arguments that are properly deduced some have a true and others a false conclusion, those that are false in respect of their conclusion it is possible to solve in two ways; for it is possible both by demolishing one of the premisses asked, and by [177<sup>a</sup>1] proving that the conclusion is not the real state of the case; those,

on the other hand, that are false in respect of their propositions can be solved only by a demolition of one of them; for the conclusion is true. So that those who wish to solve an argument should in the first place look and see if it is deduced or is not deduced; and next, whether the conclusion is true or false, in order that we may effect the solution [5] either by drawing some distinction or by demolishing something, and demolishing it either in this way or in that, as was laid down before. There is a very great deal of difference between solving an argument when being subjected to questions and when not; for to foresee traps is difficult, whereas to see them at one's leisure is easier.

19 · Of the refutations, then, that depend upon homonymy and ambiguity [10] some contain some question with more than one meaning, while others contain a conclusion bearing a number of uses: e.g. in the argument that speaking of the silent is possible, the conclusion has a double meaning, while in the argument that he who knows does not understand what he knows one of the questions contains an ambiguity. Also that which has a double use is true in one context but not in another; it means something that is and something that is not. [15]

Whenever, then, the many senses lie in the conclusion no refutation takes place unless he secures as well the contradiction of the conclusion he means to prove; e.g. in the argument that seeing of the blind is possible; for without the contradiction there was no refutation. Whenever, on the other hand, the many senses lie in the questions, there is no necessity to begin by denying the double premiss; for this was not the goal of the argument but only its support. At the start, then, one should reply [20] with regard to an ambiguity, whether of a word or of a phrase, in this manner, that in one sense it is so, and in another not so, as e.g. that speaking of the silent is in one sense possible but in another not possible; also that in one sense one should do what must be done, but not in another (for what must be done bears a number of uses). If, however, the ambiguity escapes one, one should correct it at the end by making an addition to the question: 'Is speaking of the silent possible?' 'No, but to speak of this [25] man while he is silent is possible'. Also, in cases which contain the ambiguity in their premisses, one should reply in like manner: 'Do people then not understand what they know?' 'Yes, but not those who know it in the manner described'; for it is not the same thing to say that those who know cannot understand what they know, and to say that those who know something in this particular manner cannot do so. In

[30] general, too, even if he deduces without qualification, one should contend that what he has negated is not the fact which one has asserted but only its name; and that therefore there is no refutation.

20 · It is evident also how one should solve those refutations that depend upon division and combination; for if the expression means something different when divided and when combined, as soon as one's opponent draws his conclusion [35] one should take the expression in the contrary way. All such arguments as the following depend upon the combination or division of the words: 'Was he being beaten with that with which you saw him being beaten?' and 'Did you see him being beaten with that with which he was being beaten?' This has also in it an element of [177<sup>b1</sup>] ambiguity in the questions, but it really depends upon combination. For what depends upon the division of the words is not really a double meaning (for the expression when divided is not the same)—except in the way that ὄρος and ὁ πός,<sup>30</sup> said with the accent, mean something different. In writing, indeed, a word is the [5] same whenever it is written with the same letters and in the same manner—and even there people nowadays put marks at the side to show the pronunciation—but the spoken words are not the same. Accordingly an expression that depends upon division is not an ambiguous one. It is evident also that not all refutations depend upon ambiguity as some people say they do.

[10] The answerer, then, must divide the expression; for to see a man being beaten with my eyes is not the same as to say I saw a man being beaten with my eyes. Also there is the argument of Euthydemus proving —'Then you know now in Sicily that there are triremes in Piraeus?'; and again, 'Can a good man who is a cobbler be [15] bad?—But a good man may be a bad cobbler; therefore a good cobbler will be bad'. Again, 'Things the knowledge of which is good, are good things to learn, aren't they?—But knowledge of evil is good; therefore evil is a good thing to know. —But evil is both evil and a thing to learn, so that evil is an evil thing to learn—but [20] knowledge of evils is good'. Again, 'Is it true to say in the present moment that you are born?—Then you are born in the present moment'. Or does the expression as divided have a different meaning? for it is true to say now that you are born, but not 'You are born now'. Again, 'Could you do what you can, and as you can?—But when not harping, you have the power to harp; therefore you could harp when not [25] harping'. But he has not the power to do this—to harp

while not harping; but when he is not doing it, he has the power to do it.

Some people solve this in another way. For, they say, if he has granted that he can do anything in the way he can, still it does not follow that he can harp when not harping; for it has not been granted that he will do anything in every way in which [30] he can; and it is not the same thing to do a thing in the way he can and to do it in every way in which he can. But evidently they do not solve it properly; for of arguments that depend upon the same point the solution is the same, whereas this will not fit all cases of the kind nor yet all ways of putting the questions: it is valid against the questioner, but not against his argument.

**21** · Accentuation gives rise to no arguments, either as written or as spoken, [35] except perhaps some few that might come about; e.g. the following argument. ‘Is οὐ καταλύεις a house?’ ‘Yes.’ ‘Is then οὐ καταλύεις the negation of καταλύεις?’ ‘Yes’. ‘But you said that οὐ καταλύεις is a house; therefore the house is a negation.’ How [178<sup>a</sup>1] one should solve this, is clear: for the word does not mean the same when spoken with an acuter and when spoken with a graver accent.

**22** · It is clear also how one must meet those fallacies that depend on the identical expression of things that are not identical, seeing that we are in possession [5] of the kinds of predications. For the one man, say, has granted, when asked, that a term denoting a substance does not belong as an attribute, while the other has proved that some attribute belongs which is in the category of relation or of quantity, but is thought to denote a substance because of its expression; e.g. in the following argument: ‘Is it possible to be doing and to have done the same thing at the same time?’ ‘No’. ‘But it is surely possible to be seeing and to have seen the same [10] thing at the same time and in the same respect’. ‘Is any mode of passivity a mode of activity?’ ‘No’. ‘But “he is cut”, “he is burnt”, “he is struck by some sensible object” are alike in expression and all denote some form of passivity? And again “to say”, “to run”, “to see” are like one another in expression; but to see is surely a form [15] of being struck by a sensible object; therefore it is at the same time a form of passivity and of activity’. Now if in that case anyone, after granting that it is not possible to do and to have done the same thing at the same time, were to say that it is possible to see and to have seen, still he has not yet been refuted, if he says that to see is not a form of doing but of passivity;

for this question is required as well, though he is supposed by the listener to have already granted it, when he granted [20] that to cut is to do something, and to have cut to have done something, and so on with the other things that have a like expression. For the listener adds the rest by himself, thinking the meaning to be alike; whereas really the meaning is not alike, though it appears to be so because of the expression. The same thing happens here as happens in cases of homonymy; for in dealing with homonyms the tyro in [25] argument supposes that the fact and not the name which he affirmed has been denied; whereas there still wants the question whether in mentioning the homonym he had a single thing in view—for if he grants that that was so, the refutation will be effected.

Like the above are also the following arguments. It is asked if a man has lost what he once had and afterwards has not—for a man will no longer have ten dice [30] even though he has only lost one. No: rather it is that he has lost what he had before and has not now; but there is no necessity for him to have lost as much or<sup>31</sup> as many things as he has not now. So then, he asks the questions as to what he has, and draws the conclusion as to what number—for ten is a number. If then he had asked to begin with, whether a man no longer having the number of things he once had has [35] lost that number, no one would have granted it, but would have said ‘Either that number or some of them’. Also there is the argument that a man may give what he has not got; for he has not got only one die. But he has given, not what he had not got, but in a manner in which he had not got it, viz. just the one. For the word ‘only’ does not signify a particular substance or quality or quantity, but a manner of [178<sup>b</sup>1] relation, i.e. that it is not coupled with any other. It is therefore just as if he had asked ‘Could a man give what he has not got?’ and, on being given the answer ‘No’, were to ask if a man could give a thing quickly when he had not got it quickly, and, on this being granted, were to deduce that a man could give what he had not got. It is quite evident that he has not deduced his point; for to give quickly is not to give a [5] thing, but to give in a certain manner; and a man could certainly give a thing in a manner in which he has not got it, e.g. he might have got it with pleasure and give it with pain.

Like these are also all arguments of the following kind: Could a man strike a blow with a hand which he has not got, or see with an eye which he has not [10] got?—For he has not got only one eye. Some people solve this case by saying that a man who has more than one eye, or more than one of anything else, also has only one. Others solve it as they solve the argument that what a man has, he has received; for this man gave only

one vote; and the other, they say, has only one vote from him. Others, again, proceed by demolishing straightaway the proposition asked, and [15] admitting that it is quite possible to have what one has not received; e.g. to have received sweet wine, but then, owing to its going bad in the course of receipt, to have it sour. But, as was said also above, all these persons direct their solutions against the man, not against his argument. For if this were a solution, then, suppose anyone to grant the opposite, he could find no solution, just as happens in other cases; e.g. suppose the solution to be 'So-and-so is partly so and partly not', then, if you grant it [20] without any qualification, the conclusion follows. If, on the other hand, the conclusion does not follow, then that could not be the solution; and what we say in regard to the foregoing examples is that, even if all the premisses are granted, still no deduction is effected.

Moreover, the following too belong to this group of arguments. 'If something is [25] in writing did some one write it?—But it is now in writing that you are seated—a false statement, though it was true at the time when it was written; therefore the statement that was written is at the same time false and true'. But this is fallacious; for the falsity or truth of a statement or opinion indicates not a substance but a quality (for the same account applies to the case of an opinion as well). Again, 'Is [30] what a learner learns what he learns?—But suppose some one learns what is slow fast'. Then his words denote not what the learner learns but how he learns it. Also, 'Does a man tread upon what he walks through?—But he walks through a whole day'. But the words denote not what he walks through, but when he walks—just as when anyone uses the words 'to drink a cup' he denotes not what he drinks, but what he drinks from. Also, 'Is it either by learning or by discovery that a man knows what [35] he knows?—But if of a pair of things he has discovered one and learned the other, the pair is not known to him by either method'. But it holds of each thing, not of everything. Again, there is the argument that there is a third man distinct from man and from individual men. But 'man', and indeed every general predicate, signifies not an individual, but some quality, or quantity or relation, or something of that sort. Likewise also in the case of 'Coriscus' and 'Coriscus the musician'—are they [179<sup>a</sup>1] the same or different? For the one signifies an individual and the other a quality, so that it cannot be isolated; though it is not isolation which creates the third man, but the admission that it is an individual. For what man is cannot be an individual, as Callias is. Nor does it make any difference if one says that the element he has [5] isolated is not an individual but a quality; for there will still be the one beside the many,

e.g. 'Man'. It is evident then that one must not grant that what is a common predicate applying to a class universally is an individual, but must say that it signifies either a quality, or a relation, or a quantity, or something of that kind. [10]

**23** · It is a general rule in dealing with arguments that depend on language that the solution always follows the opposite of the point on which the argument turns: e.g. if the argument depends upon combination, then the solution consists in division; if upon division, then in combination. Again, if it depends on an acute accent, the solution is a grave accent; if on a grave accent, it is an acute. If it [15] depends on homonymy, one can solve it by using the opposite word; e.g. if you find yourself calling something inanimate, despite your previous denial that it was so, show in what sense it is animate; if you have declared it to be inanimate and he has deduced that it is animate, say how it is inanimate. Likewise also in the case of ambiguity. If the argument depends on likeness of expression, the opposite will be [20] the solution. 'Could a man give what he has not got?' No, not what he has not got; but he could give it in a way in which he has not got it, e.g. one die by itself. 'Does a man know either by learning or by discovery each thing that he knows, singly?' Yes, but not the things that he knows. Also a man treads, perhaps, on anything he walks through, but not on the time he walks through. Likewise also in the case of the other examples. [25]

**24** · In dealing with arguments that depend on accident, one and the same solution meets all cases. For since it is indeterminate when an attribute should be ascribed to an object, in cases where it belongs to its accident, and since in some cases it is agreed and people admit that it belongs, while in others they deny that it need belong, we should therefore, as soon as the conclusion has been drawn, say in [30] answer to them all alike, that there is no necessity for such an attribute to belong. One must, however, be prepared to adduce an example. All arguments such as the following depend upon accident. 'Do you know what I am going to ask you?' 'Do you know the man who is approaching', or 'the man in the mask?' 'Is the statue your work of art?' or 'Is the dog your father?' 'Is the product of a small number with a [35] small number a small number?' For it is evident in all these cases that there is no necessity for what is true of the accident to be true of the object as well. For only to things that are indistinguishable and one in substance does it

seem that all the same attributes belong; whereas in the case of a good thing, to be good is not the same as to be going to be the subject of a question; nor in the case of a man approaching, or [179<sup>b</sup>1] wearing a mask, is to be approaching the same thing as to be Coriscus, so that if I know Coriscus, but do not know the man who is approaching, it still isn't the case that I both know and do not know the same man; nor, again, if this is mine and is [5] also a work of art, is it therefore my work of art, but my property or thing or something else. The solution is the same in the other cases as well.

Some solve these by demolishing the question; for they say that it is possible to know and not to know the same thing, only not in the same respect; accordingly, when they don't know the man who is coming towards them, but do know Coriscus, [10] they assert that they do know and don't know the same object, but not in the same respect. But first, as we have already remarked,<sup>32</sup> the correction of arguments that depend upon the same point ought to be the same, whereas this one will not hold if one adopts the same principle in regard not to knowing something, but to being, or [15] to being in a certain state (e.g. it is a father, and is also yours); for if in some cases this is true (and it is possible to know and not to know the same thing), yet with that case the solution stated has nothing to do. There is nothing to prevent the same argument from having a number of flaws; but it is not the exposition of any flaw that constitutes a solution; for it is possible for a man to prove that a false conclusion [20] has been deduced, but not to prove on what it depends, e.g. in the case of Zeno's argument to prove that motion is impossible. So that even if anyone were to try to establish that this is impossible,<sup>33</sup> he still is mistaken, even if he has deduced it ten thousand times over. For this is no solution; for a solution is an exposition of a false deduction, showing on what its falsity depends. If then he has not made a deduction, [25] whether he is trying to establish a true proposition or a false one,<sup>34</sup> to point this out is a solution. The present suggestion may very well apply in some cases; but in these cases, at any rate, not even this would seem to be so; for he knows both that Coriscus is Coriscus and that the approaching figure is approaching. To know and not to know the same thing is thought to be possible, when e.g. one knows that he is white, [30] but does not realize that he is musical; for in that way he does know and not know the same thing, though not in the same respect. But as to the approaching figure and Coriscus he knows both that it is approaching and that it is Coriscus.

A like mistake to that of those whom we have mentioned is that of



those who [35] solve the argument that every number is a small number; for if, when the conclusion is not deduced, they pass this over and say that a true conclusion has been deduced, on the ground that every number is both great and small, they make a mistake.

Some people also use the principle of ambiguity to solve the aforesaid deductions, e.g. that he is your father, or son, or slave. Yet it is evident that if the [180<sup>a</sup>1] appearance of a refutation depends upon a plurality of uses, the word or the expression in question ought to bear a number of literal senses, whereas no one speaks of someone as being his child in the literal sense, if he is the child's master, but the combination depends upon accident. 'Is he yours?' 'Yes'. 'And is he a [5] child?—Then the child is yours', because he happens to be both yours and a child; but he is not your child.<sup>35</sup>

There is also the argument that what is of evil is good; for wisdom is a knowledge of evils. But that this is of so-and-so does not have a number of uses: it means that it is so-and-so's property. But if it does have a number of uses (for we do [10] say that man is of the animal kingdom, though not their property; and also anything related to evils in a way expressed as being of one is on that account of evil, though it is not of evil), then it seems to depend on whether the term is used relatively or without qualification. Yet it is no doubt possible to find an ambiguity in the phrase 'What is of evil is good' but not with regard to the argument in question, but rather [15] if there is a good slave of the wicked; though perhaps not even there—for a thing may be good and be of so-and-so without being at the same time good of so-and-so. Nor is the saying that man is of the animal kingdom a phrase with a number of uses; for a phrase does not have a number of uses merely if we express it elliptically; for [20] we express 'Give me the Iliad' by quoting half a line of it, e.g. 'Give me "Sing, goddess, of the wrath. . ."'<sup>36</sup>

**25** · Those arguments which depend upon an expression that holds properly of a particular thing, or in a particular respect, or place, or manner, or relation, and not without qualification, should be solved by considering the conclusion in relation to its contradictory, to see if any of these things can possibly have happened to it. [25] For it is impossible for contraries and opposites and an affirmative and a negative to belong to the same thing without qualification; there is, however, nothing to prevent each from belonging in a particular respect or relation or manner, or to prevent one of them from belonging in a particular respect and the

other without qualification. So that if this one belongs without qualification and that one in a particular respect, there is as yet no refutation. This is a feature one has to find in the conclusion by [30] examining it in comparison with its contradictory.

All arguments of the following kind have this feature: 'Is it possible for what is not to be?—But it is something, despite its not being'. Likewise also, what is will not be; for it will not be some particular being. 'Is it possible for the same man at the same time to be a keeper and a breaker of his oath?' 'Can the same man at the same [35] time both obey and disobey the same man?' Or are being something and being not the same? (For it is not the case that what is not, even if it is something, is without qualification.) Nor if a man keeps his oath in this particular instance or in this particular respect, is he bound also to be a keeper of oaths (for he who swears that he will break his oath, and then breaks it, keeps this particular oath only; he is not a keeper of his oath); nor is the disobedient man obedient, though he obeys one [180<sup>b</sup>1] particular command. The argument is similar for the problem whether the same man can at the same time say what is false and what is true; but it appears to be a troublesome question because it is not easy to see whether it is saying what is true or saying what is false which should be stated without qualification. There is, however, [5] nothing to prevent him from being a liar without qualification, but truthful in some particular respect or relation, or there being truth in some of the things he says, though he himself is not truthful. Likewise also in cases of relation and place and time. For all arguments of the following kind depend upon this. 'Is health, or wealth, a good thing?—But to the fool who does not use it aright it is not a good thing; [10] therefore it is both good and not good'. 'Is health, or political power, a good thing?<sup>37</sup>—But sometimes it is not particularly good; therefore the same thing is both good and not good to the same man'. But there is nothing to prevent a thing, though good without qualification, being not good to a particular man, or being good to a particular man, and yet not good now or here. 'Is that which the prudent man would [15] not wish, an evil?—But he would not wish to lose the good; therefore the good is an evil'. But it is not the same thing to say that the good is an evil and to lose the good is an evil. Similarly with the argument of the thief: for it is not the case that if the thief is an evil thing, acquiring things is also evil; what he wishes, therefore, is not what is [20] evil but what is good; for to acquire is good. Also, disease is an evil thing, but not to get rid of disease. 'Is the just preferable to the unjust, and what takes place justly to what takes place unjustly?—But to be put to death

unjustly is preferable'. 'Is it just that each should have his own?—But whatever decisions a man comes to on the [25] strength of his own opinion, even if it is false, are valid in law; therefore the same result is both just and unjust'. Also, 'should one decide in favour of him who says what is just, or of him who says what is unjust?—But it is just for the injured party to say fully the things he has suffered; and these were unjust'. But because to suffer a thing unjustly is preferable, unjust ways are not therefore preferable to just; but [30] just ways are preferable without qualification, though in this particular case the unjust may very well be better than the just. Also, to have one's own is just, while to have what is another's is not just; all the same, the decision in question may very well be a just decision, whatever it is that the opinion of the man who gave the decision supports; for because it is just in this particular case or in this particular manner, it is not also just without qualification. Likewise also, though things are [35] unjust, there is nothing to prevent the *speaking* of them being just; for if to speak of things is just, it does not follow that the things should be just, any more than if to speak of things is of use, the things must be of use. Likewise also in the case of what is just. So that it is not the case that if the things spoken of are unjust, the victory goes to him who speaks unjust things;<sup>38</sup> for he speaks of things that are just to speak of, though without qualification, i.e. to suffer, they are unjust.

[181<sup>a</sup>1] **26** · Refutations that depend on the definition of a refutation must, according to the plan sketched above,<sup>39</sup> be met by comparing together the conclusion with its contradictory, and ensuring that it involves the same attribute in the same respect and relation and manner and time. If this additional question is [5] put at the start, you should not admit that it is impossible for the same thing to be both double and not double, but grant that it is possible, only not in such a way as was agreed to constitute a refutation. All the following arguments depend upon a point of that kind. 'Does a man who knows that so-and-so is so-and-so, know the thing? and in the same way for ignorance?—But one who knows that Coriscus is [10] Coriscus might be ignorant of the fact that he is musical, so that he both knows and is ignorant of the same thing'. 'Is a thing four cubits long greater than a thing three cubits long?—But a thing might grow from three to four cubits in length; now what is greater is greater than a less; accordingly the thing in question will be both greater and less than itself in the same respect'.

**27** · As to refutations that depend on postulating and assuming the original [15] point, if it is obvious, one should not grant it, even though it is reputable and he is telling the truth. But if it escapes one, then, thanks to the badness of arguments of that kind, one should make one's error recoil upon the questioner, and say that he has brought no argument; for a refutation must be proved independently of the original point. Secondly, one should say that the point was granted under the impression that he intended not to use it as a premiss, but to reason against it, in the [20] opposite way from that adopted in refutations on side issues.

**28** · Also, those refutations that draw their conclusion through the consequent you should show up in the course of the argument itself. The mode in which consequents follow is two-fold, either as the universal follows on its particular, as (e.g.) animal follows man (for the claim is made that if this is found with that, then [25] that also is found with this); or else by way of the opposites (for if this follows that, the opposite will follow the opposite). On this latter claim the argument of Melissus depends; for he claims that if that which has come to be has a beginning, that which has not come to be has none, so that if the heavens have not come to be, they are infinite. But that is not so; for the sequence is vice versa. [30]

**29** · In the case of refutations whose reasoning depends on some addition, look and see if upon its subtraction the impossibility follows none the less; and then the answerer should point this out, and say that he granted the addition not because he really thought it, but for the sake of the argument, whereas the questioner has not used it for the purpose of his argument at all. [35]

**30** · To meet those refutations which make several questions into one, one should draw a distinction between them straightaway at the start. For a question is single if it has a single answer, so that one must not affirm or deny several things of one thing, nor one thing of many, but one of one. But just as in the case of homonyms, an attribute belongs sometimes to both, and sometimes to neither, so [181<sup>b</sup>1] that a simple answer does one no harm despite the fact that the question is not simple, so it is in these cases too. Whenever, then, the several attributes belong to the one subject, or the one to the many, the man who gives a simple

answer encounters no obstacle even though he has committed this mistake; but whenever an [5] attribute belongs to one subject but not to the other, or a number of attributes belong to a number of subjects, he does. And in one sense both belong to both, while in another sense, again, they do not; so that one must beware of this. Thus (e.g.) in the following arguments: 'If one thing is good and another evil, it is true to call them [10] good and evil, and likewise to call them neither good nor evil (for each of them has not each character), so that the same thing will be both good and evil and neither good nor evil'. Also, if everything is the same as itself and different from anything else, inasmuch as they are the same not as other things but as themselves, and also different from themselves, the same things must be both the same as and different [15] from themselves. Moreover, 'if what is good becomes evil while what is evil becomes good, then they must both become two. But of two unequal things each is equal to itself, so that they are both equal and unequal to themselves'.

Now these refutations fall into the province of other solutions as well; for 'both' [20] and 'all' have more than one meaning, so that one does not affirm and deny the same thing, except verbally; and this is not what we meant by a refutation. But it is clear that if there is not a single question on a number of points, but the answerer has affirmed or denied one attribute only of one subject only, the impossibility will not come to pass.

[25] **31** · With regard to those which draw one into repeating the same thing a number of times, it is clear that one must not grant that predications of relative terms have any meaning in abstraction by themselves, e.g. double apart from double of half, merely on the ground that it figures in it. For ten figures in ten minus one [30] and do in not do, and generally the affirmation in the negation; but for all that, if someone says that this is not white, he does not say that it is white. Double, perhaps, has not even any meaning at all, any more than half; and even if it has a meaning, yet it has not the same meaning as in the combination. Nor is knowledge the same thing in a specific branch of it (suppose it, e.g., to be medical knowledge) as it is in [35] general; for in general it is knowledge of the knowable. In the case of terms that are predicated of the terms through which they are defined, you should say that the term defined is not the same in abstraction as it is in the whole phrase. For 'concave' has a general meaning which is the same in the case of a snub nose, and of a bandy leg, but when added, in the one case to

nose, in the other to leg, nothing prevents it [182<sup>a</sup>1] from meaning different things; for in the former connexion it means snub and in the latter bandy; and it makes no difference whether you say snub nose or concave nose. Moreover, the expression must not be granted in the nominative case; for it is a falsehood. For snubness is not a concave nose but something (e.g. an affection) [5] belonging to a nose; hence, there is no absurdity in supposing that the snub nose is a nose possessing the concavity that belongs to a nose.

**32** · With regard to solecisms, we have previously said<sup>40</sup> what it is that appears to bring them about; the method of their solution will be clear in the course of the arguments themselves. Solecism is the result aimed at in all arguments of the [10] following kind: ‘Is a thing truly that which (τοῦτο ὃ) you truly call it?—But you call something a stone (λίθον); so it is a stone (λίθον)’. But calling something a stone is not saying that which (ὃ) it is, but that which (ὅν) it is, not that (τοῦτο) but that (τοῦτον). Now if someone were to ask ‘Is a thing that which (τοῦτον ὅν) you truly call it?’ he would not seem to be speaking Greek, any more than if he asked ‘Is a thing that which (οὗτος ἦν) you call it?’ But if you talk in this way of a log, or of [15] whatever has neither feminine nor masculine signification, there is no difference; and for that reason there is no solecism—e.g. ‘A thing is that which you call it, and you call it a log; therefore it is a log’. But ‘stone’ and ‘that (οὗτος)’ have masculine designations. Now if someone asks ‘Is he (οὗτος) she?’, and then again ‘Well, isn’t he (οὗτος) Coriscus?’, and then were to say, ‘Then he is she’, he has not deduced the [20] solecism, even if ‘Coriscus’ does signify a ‘she’, if the answerer does not grant this: this point must be put as an additional question. But if neither is it the fact nor does he grant it, then he has not proved his case either in fact or as against the person he has been questioning. In like manner, then, in the above instance ‘that (τοῦτο)’ must [25] mean the stone.<sup>41</sup> If, however, this neither is so nor is granted, the conclusion must not be stated; though it follows apparently, because the case of the word, that is really unlike, appears to be like. ‘Is it true to say that this is what you call it by name?—But you call it by the name of a shield; therefore this is of a shield’. But ‘this’ means not of a shield but a shield: of a shield would be the meaning of of this. [30] Nor again if he is what you call him by name, while the name you call him by is Cleon’s, is he therefore Cleon’s; for he is not Cleon’s—for what was said was that he, not his, is what I call him by name. For the question, if put in the latter way, would not even be Greek. ‘Do you know this?—But this

is he; therefore you know he'. But 'this' has not the same meaning in 'Do you know this?' as in 'This is he'; in [35] the first it stands for an accusative, in the second for a nominative case. 'When you have understanding of anything, do you understand it?—But you have understanding of a stone; therefore you understand of a stone.' But the one phrase is in the genitive, 'of a stone', while the other is in the accusative, 'a stone'<sup>42</sup>; and what was granted was that you understand that, not of that, of which you have understanding, [182<sup>b</sup>1] so that you understand not of a stone, but the stone.

Thus that arguments of this kind do not deduce a solecism but merely appear to do so, and both why they so appear and how you should meet them, is clear from what has been said. [5]

**33** · We must also observe that of all the arguments aforesaid it is easier with some to see why and where the reasoning leads the hearer astray, while with others it is more difficult, though often they are the same arguments as the former. For we must call an argument the same if it depends upon the same point; but the [10] same argument is apt to be thought by some to depend on diction, by others on accident, and by others on something else, because each of them, when worked with different terms, is not equally clear. Accordingly, just as in fallacies that depend on homonymy, which seem to be the silliest form of fallacy, some are clear even to the man in the street (for humorous phrases nearly all depend on diction; e.g. 'The man [15] got the cart down from the stand'; and 'Where are you bound?'—"To the yard arm"; and 'Which cow will calve before?' 'Neither, but both behind'; and 'Is the North wind clear?' 'No, indeed; for it has murdered the beggar and the merchant.' 'Is he a [20] Goodenough-King?' 'No, indeed; a Rob-son': and so with the great majority of the rest as well), while others appear to elude the most expert (and it is a symptom of this that they often fight about words, e.g. whether the meaning of being and one is [25] the same in all their applications or different; for some think that being and one mean the same; while others solve the argument of Zeno and Parmenides by asserting that one and being are used in a number of ways), likewise also as regards fallacies of accident and each of the other types, some of the arguments will be [30] easier to see while others are more difficult; also to grasp to which class a fallacy belongs, and whether it is a refutation or not a refutation, is not equally easy in all cases.

An incisive argument is one which produces the greatest perplexity;

for this is the one with the sharpest fang. Now perplexity is two-fold, one which occurs in deductions, respecting which of the propositions asked one is to demolish, and the [35] other in contentious arguments, respecting the manner in which one is to express what is propounded. Therefore it is in deductions that the more incisive arguments produce the keenest inquiry. Now a deductive argument is most incisive if from premisses that are as generally accepted as possible it demolishes a conclusion that is as reputable as possible. For the one argument, if the contradictory is changed about, makes all the resulting deductions alike in character; for always from [183<sup>a</sup>1] premisses that are reputable it will demolish a conclusion that is just as reputable; and therefore one is bound to feel perplexed. An argument, then, of this kind is the most incisive, viz. the one that puts its conclusion on all fours with the propositions asked; and second comes the one that argues from premisses, all of which are [5] equally convincing; for this will produce an equal perplexity as to what kind of premiss, of those asked, one should demolish. Herein is a difficulty; for one must demolish something, but what one must demolish is uncertain. Of contentious arguments, on the other hand, the most incisive is the one which, in the first place, is characterized by an initial uncertainty whether it has been properly deduced or not; and also whether the solution depends on a false premiss or on the drawing of a distinction; while, of the rest, the second place is held by that whose solution clearly [10] depends upon a distinction or a demolition, and yet it does not reveal clearly which it is of the premisses asked, whose demolition, or the drawing of a distinction within it, will bring the solution about, whether it is on the conclusion or on one of the premisses that this depends.

Now sometimes an argument which has not been properly deduced is silly, if [15] the assumptions are extremely implausible or false; but sometimes it ought not to be held in contempt. For whenever some question is left out, of the kind that concerns both the subject and the nerve of the argument, the reasoning that has both failed to secure this as well, and also failed to deduce, is silly; but when what is omitted is some extraneous question, then it is by no means to be lightly despised, but the [20] argument is quite respectable, though the questioner has not put his questions well.

Just as it is possible to bring a solution sometimes against the argument, at others against the questioner and his mode of questioning, and at others against neither of these, likewise also it is possible to marshal one's questions and deduction both against the thesis, and



against the answerer and against the time, whenever the solution requires a longer time to examine than the period available for arguing to [25] the solution.

34 · As to the number, then, and kind of sources whence fallacies arise in discussion, and how we are to prove that our opponent is saying something false and make him utter paradoxes; moreover, by the use of what materials solecism<sup>43</sup> is brought about, and how to question and what is the way to arrange the questions; [30] moreover, as to the question what use is served by all arguments of this kind, and concerning the answerer's part, both as a whole in general, and in particular how to solve arguments and solecisms<sup>44</sup>—on all these things let the foregoing discussion suffice. It remains to recall our original proposal and to bring our discussion to a [35] close with a few words upon it.

Our programme was, then, to discover some faculty of reasoning about any theme put before us from the most reputable premisses that there are. For that is the essential task of the art of dialectic and of examination. Inasmuch, however, as [183<sup>b</sup>1] there is annexed to it,<sup>45</sup> on account of its affinity to the art of sophistry, that<sup>46</sup> it can conduct an examination not only dialectically but also with a show of knowledge, we therefore proposed for our treatise not only the aforesaid aim of being able to exact an account of any view, but also the aim of ensuring that in defending an argument [5] we shall defend our thesis in the same manner by means of views as reputable as possible. The reason of this we have explained; for this was why Socrates used to ask questions and not to answer them—for he used to confess that he did not know. We have made clear, in the course of what precedes, the number both of the points with reference to which, and of the materials from which, this will be accomplished, and also from what sources we can become well supplied with these; we have shown, moreover, how to question or arrange the questioning as a whole, and the problems [10] concerning the answers and solutions to be used against the deductions of the questioner. We have also cleared up the problems concerning all other matters that belong to the same inquiry into arguments. In addition to this we have been through the subject of fallacies, as we have already stated above.

That our programme has been adequately completed is clear. But we must not [15] omit to notice what has happened in regard to this inquiry. For in the case of all discoveries the results of previous labours that have been handed down from others have been advanced bit by bit by those

who have taken them on, whereas the original discoveries generally make an advance that is small at first though much [20] more useful than the development which later springs out of them. For it may be that in everything, as the saying is, ‘the first start is the main part’; and for this reason it is the most difficult; for in proportion as it is most potent in its influence, so it is smallest in its compass and therefore most difficult to see—but when this is [25] once discovered, it is easier to add and develop the remainder. This is in fact what has happened in regard to rhetorical speeches and to practically all the other arts; for those who discovered the beginnings of them advanced them in all only a little [30] way, whereas the celebrities of to-day are the heirs (so to speak) of a long succession of men who have advanced them bit by bit, and so have developed them to their present form, Tisias coming next after the first founders, then Thrasyarchus after Tisias, and Theodorus next to him, while several people have made their several contributions to it; and therefore it is not to be wondered at that the art has attained considerable dimensions. Of the present inquiry, on the other hand, it was not the [35] case that part of the work had been thoroughly done before, while part had not. Nothing existed at all. For the training given by the paid professors of contentious arguments was like the practice of Gorgias. For he<sup>47</sup> used to hand out rhetorical speeches to be learned by heart, and they handed out speeches in the form of question and answer, which each supposed would cover most of the arguments on [185<sup>a</sup>1] either side. And therefore the teaching they gave their pupils was rapid but unsystematic. For they used to suppose that they trained people by imparting to them not the art but its products, as though anyone professing that he would impart [5] a form of knowledge to obviate any pain in the feet, were then not to teach a man the art of shoe-making or the sources whence he can acquire anything of the kind, but were to present him with several kinds of shoes of all sorts—for he has helped him to meet his need, but has not imparted an art to him. Moreover, on the subject of rhetoric there exists much that has been said long ago, whereas on the subject of [184<sup>b</sup>1] deduction we had absolutely nothing else of an earlier date to mention, but<sup>48</sup> were kept at work for a long time in experimental researches. If, then, it seems to you after inspection that, such being the situation as it existed at the start, our [5] investigation is in a satisfactory condition compared with the other inquiries that have been developed by tradition, there must remain for all of you, our students, the task of extending us your pardon for the shortcomings of the inquiry, and for the discoveries thereof your warm thanks.

<sup>1</sup>See *Topics* VIII 5.

<sup>2</sup>I.e. in the *Topics*.

<sup>3</sup>Aristotle's Greek ambiguities rarely translate neatly into English ambiguities: on this and the following pages the translation sometimes presents a stilted but fairly literal version of the Greek, and sometimes offers English parallels to Aristotle's examples.

<sup>4</sup>Reading ἐμάνθανεν and omitting ἃ ἐπίσταται.

<sup>5</sup>They emend οὔ̃ to οὐ, 'Part of which decays in the rain' to 'It does not decay in the rain' (*Iliad* XXIII 328).

<sup>6</sup>Agamemnon's dream occurs at *Iliad* II 1–35; but in our texts the phrase Aristotle cites appears not there but at XXI 297.

<sup>7</sup>See *Topics* I 9.

<sup>8</sup>Omitting ἀλλὰ (ἄλλως, Ross) after ἔλεγχος.

<sup>9</sup>Omitting ὀνόματος.

<sup>10</sup>Omitting μίαν (inserted by Wallies).

<sup>11</sup>ὁ λόγος is apparently used here to mean ambiguity: see 169<sup>a</sup>22.

<sup>12</sup>Reading δόντας.

<sup>13</sup>They are called παραλογισμοὶ because they occur παρά τοῦ λόγου τήν ἑλλειψιν.

<sup>14</sup>See Chh. 24 and 28.

<sup>15</sup>Reading τρόποι for τόποι.

<sup>16</sup>See 168<sup>a</sup>25.

<sup>17</sup>Ross accidentally omits μή.

<sup>18</sup>Retaining δυάδες.

<sup>19</sup>Retaining πρὸς.

<sup>20</sup>Retaining ἄγειν.

<sup>21</sup>See *Topics* 111<sup>b</sup>32.

<sup>22</sup>See 165<sup>b</sup>16.

<sup>23</sup>See 165<sup>b</sup>20.

<sup>24</sup>See *Topics* 155<sup>b</sup>26–157<sup>a</sup>5.

<sup>25</sup>Probably a dialogue by Speusippus.

<sup>26</sup>The text and the punctuation of this long sentence are in many places uncertain.

<sup>27</sup>See *Topics* VIII 7.

<sup>28</sup>I.e. the classification of fallacies.

<sup>29</sup>Retaining ἔτι (ἐστὶ Ross).

<sup>30</sup>Reading ὁρός (Uhlig).

<sup>31</sup>Reading ὅσον δὲ μή ἔχει ἢ ὅσα.

<sup>32</sup>See 177<sup>b</sup>31.

<sup>33</sup>Reading ἀδύνατον (δυνατόν Ross).

<sup>34</sup>Reading εἰτ' ἀληθὲς εἴτε ψεῦδος.

<sup>35</sup>Retaining the MSS order.

<sup>36</sup>The arguments discussed in this paragraph turn on the various functions of the genitive case in Greek: they have no natural translation into an uninflected language.

<sup>37</sup>Retaining ἀγαθόν (βέλτιον Ross).

<sup>38</sup>Retaining νικᾷ (νικᾶται Ross).

<sup>39</sup>See 167<sup>a</sup>21.

<sup>40</sup>See 165<sup>b</sup>20ff. The solecisms Aristotle discusses have no exact English counterparts, for they depend on the inflected nature of Greek.

<sup>41</sup>Reading τοῦτο for οὗτος.

<sup>42</sup>Reading τούτου for οὗ and τούτου for τούτο.

<sup>43</sup>Reading σολοικισμός for συλλογισμός.

<sup>44</sup>Reading σολοικισμούς for συλλογισμούς.

<sup>45</sup>Retaining προσκατασκευάζεται.

<sup>46</sup>Retaining ὥς ... οὐναι.

<sup>47</sup>Reading ὁ μὲν (Solmsen) for οἱ μὲν.

<sup>48</sup>Reading ἄλλο λέγειν ἀλλὰ (λέγειν ἢ Ross).

# PHYSICS\*\*

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## BOOK I

1 · When the objects of an inquiry, in any department, have principles, [184<sup>a</sup>10] causes, or elements, it is through acquaintance with these that knowledge and understanding is attained. For we do not think that we know a thing until we are acquainted with its primary causes or first principles, and have carried our analysis as far as its elements. Plainly, therefore, in the science of nature too our first task [15] will be to try to determine what relates to its principles.

The natural way of doing this is to start from the things which are more knowable and clear to us and proceed towards those which are clearer and more knowable by nature; for the same things are not knowable relatively to us and knowable without qualification. So we must follow this method and advance from what is more obscure by nature, but clearer to us, towards what is more clear and [20] more knowable by nature.

Now what is to us plain and clear at first is rather confused masses, the elements and principles of which become known to us later by analysis. Thus we must advance from universals to particulars; for it is a whole that is more knowable to sense-perception, and a universal is a kind of whole, comprehending many things [25] within it, like parts. Much the same thing happens in the relation of the name to the [184<sup>b</sup>10] formula. A name, e.g. 'circle', means vaguely a sort of whole: its definition analyses this into particulars. Similarly a child begins by calling all men father, and all women mother, but later on distinguishes each of them.

2 · The principles in question must be either one or more than one. If

one, it [15] must be either motionless, as Parmenides and Melissus assert, or in motion, as the physicists hold, some declaring air to be the first principle, others water. If more than one, then either a finite or an infinite plurality. If finite (but more than one), then either two or three or four or some other number. If infinite, then either as [20] Democritus believed one in kind, but differing in shape; or different in kind and even contrary.

A similar inquiry is made by those who inquire into the number of existents; for they inquire whether the ultimate constituents of existing things are one or [25] many, and if many, whether a finite or an infinite plurality. So they are inquiring whether the principle or element is one or many.

Now to investigate whether what exists is one and motionless is not a [185a1] contribution to the science of nature. For just as the geometer has nothing more to say to one who denies the principles of his science—this being a question for a different science or for one common to all—so a man investigating *principles* cannot argue with one who denies their existence. For if what exists is just one, and one in the way mentioned, there is a principle no longer, since a principle must be the principle of some thing or things.

[5] To inquire therefore whether what exists is one in this sense would be like arguing against any other position maintained for the sake of argument (such as the Heraclitean thesis, or such a thesis as that what exists is one man) or like refuting a merely contentious argument—a description which applies to the arguments both of Melissus and of Parmenides: their premisses are false and their conclusions do [10] not follow. Or rather the argument of Melissus is gross and offers no difficulty at all: accept one ridiculous proposition and the rest follows—a simple enough proceeding.

We, on the other hand, must take for granted that the things that exist by nature are, either all or some of them, in motion—which is indeed made plain by induction. Moreover, no one is bound to solve every kind of difficulty that may be [15] raised, but only as many as are drawn falsely from the principles of the science: it is not our business to refute those that do not arise in this way; just as it is the duty of the geometer to refute the squaring of the circle by means of segments, but it is not his duty to refute Antiphon's proof. At the same time the holders of the theory of which we are speaking do incidentally raise physical questions, though nature is not their subject; so it will perhaps be as well to spend a few words on them, especially as [20] the inquiry is not

without scientific interest.

The most pertinent question with which to begin will be this: In what sense is it asserted that all things *are* one? For 'is' is used in many ways. Do they mean that all things are substance or quantities or qualities? And, further, are all things *one* substance—one man, one horse, or one soul—or quality and that one and the [25] same—white or hot or something of the kind? These are all very different doctrines and all impossible to maintain.

For if *both* substance and quantity and quality are, then, whether these exist independently of each other or not, what exists will be many.

If on the other hand it is asserted that all things are quality or quantity, then, [30] whether substance exists or not, an absurdity results, if indeed the impossible can properly be called absurd. For none of the others can exist independently except substance; for everything is predicated of substance as subject. Now Melissus says that what exists is infinite. It is then a quantity. For the infinite is in the category of [185<sup>b</sup>1] quantity, whereas substance or quality or affection cannot be infinite except accidentally, that is, if at the same time they are also quantities. For to define the infinite you must use quantity in your formula, but not substance or quality. If then what exists is both substance and quantity, it is two, not one; if only substance, it is [5] not infinite and has no magnitude; for to have that it will have to be a quantity.

Again, 'one' itself, no less than 'is', is used in many ways, so we must consider in what way the word is used when it is said that the universe is one.

Now we say that the continuous is one or that the indivisible is one, or things are said to be one, when the account of their essence is one and the same, as liquor and drink.

If their One is one in the sense of continuous, it is many; for the continuous is [10] divisible *ad infinitum*.

There is, indeed, a difficulty about part and whole, perhaps not relevant to the present argument, yet deserving consideration on its own account—namely, whether the part and the whole are one or more than one, and in what way they can be one or many, and, if they are more than one, in what way they are more than one. (Similarly with the parts of wholes which are not continuous.) Further, if each of [15] the two parts is indivisibly one with the whole, the difficulty arises that they will be indivisibly one with each other also.

But to proceed: If their One is one as indivisible, nothing will have



quantity or quality, and so what exists will not be infinite, as Melissus says—nor, indeed, limited, as Parmenides says; for though the limit is indivisible, the limited is not.

But if all things are one in the sense of having the same definition, like raiment and dress, then it turns out that they are maintaining the Heraclitean doctrine, for it [20] will be the same thing to be good and to be bad, and to be good and to be not good, and so the same thing will be good and not good, and man and horse; in fact, their view will be, not that all things are one, but that they are nothing; and that to be of such-and-such a quality is the same as to be of such-and-such a quantity. [25]

Even the more recent of the ancient thinkers were in a pother lest the same thing should turn out in their hands both one and many. So some, like Lycophron, were led to omit ‘is’, others to change the mode of expression and say ‘the man has been whitened’ instead of ‘is white’, and ‘walks’ instead of ‘is walking’, for fear that [30] if they added the word ‘is’ they should be making the one to *be* many—as if ‘one’ and ‘is’ were always used in one and the same way. What is may be many either in definition (for example to be white is one thing, to be musical another, yet the same thing may be both, so the one is many) or by division, as the whole and its parts. On this point, indeed, they were already getting into difficulties and admitted that the [186<sup>a</sup>1] one was many—as if there was any difficulty about the same thing being both one and many, provided that these are not opposites; for what is one may be either potentially one or actually one.

3 · If, then, we approach the thesis in this way it seems impossible for all things to be one. Further, the arguments they use to prove their position are not [5] difficult to expose. For both of them reason contentiously—I mean both Melissus and Parmenides. [Their premisses are false and their conclusions do not follow. Or rather the argument of Melissus is gross and offers no difficulty at all: admit one ridiculous proposition and the rest follows—a simple enough proceeding.]<sup>1</sup> [10]

The fallacy of Melissus is obvious. For he supposes that the assumption ‘what has come into being always has a beginning’ justifies the assumption ‘what has not come into being has no beginning’. Then this also is absurd, that in every case there should be a beginning of the *thing*—not of the time and not only in the case of [15] coming to be *simpliciter* but also in the case of qualitative change—as if change never took place all at once. Again, does it follow that what is, if one, is

motionless? Why should it not move, the whole of it within itself, as parts of it do which are unities, e.g. this water? Again, why is qualitative change impossible? But, further, what is cannot be one in form, though it may be in what it is made of. (Even some of [20] the physicists hold it to be one in the latter way, though not in the former.) Man obviously differs from horse in form, and contraries from each other.

The same kind of argument holds good against Parmenides also, besides any that may apply specially to his view: the answer to him being that *this* is not true and *that* does not follow. His assumption that 'is' is used in a single way only is false, [25] because it is used in several. His conclusion does not follow, because if we take only white things, and if 'white' has a single meaning, none the less what is white will be many and not one. For what is white will not be one either in the sense that it is continuous or in the sense that it must be defined in only one way. Whiteness will be different from what has whiteness. Nor does this mean that there is anything that [30] can exist separately, over and above what is white. For whiteness and that which is white differ in definition, not in the sense that they are things which can exist apart from each other. But Parmenides had not come in sight of this distinction.

It is necessary for him, then, to assume not only that 'is' has the same meaning, of whatever it is predicated, but further that it means what *just is* and what is *just one*. For an attribute is predicated of some subject, so that the subject to which 'is' is attributed will not be, as it is something different from being. Something, therefore, [186<sup>b</sup>1] which is not will be. Hence what just is will not belong to anything else. For the subject cannot be a *being*, unless 'is' means several things, in such a way that each is something. But *ex hypothesi* 'is' means only one thing.

If, then, what just is is not attributed to anything, but other things are [5] attributed to it, how does what just is mean what is rather than what is not? For suppose that what just is is also white, and that being white is not what just is (for being cannot even be attributed to white, since nothing is which is not what just is), it follows that what is white is not—and that not in the sense of not being something [10] or other, but in the sense that it is not at all. Hence what just is is not; for it is true to say that it is white, and we found this to mean what is not. So 'white' must also mean what just is; and then 'is' has more than one meaning.

In particular, then, what is will not have magnitude, if it is what just is. For each of the two parts must *be* in a different way.

What just is is plainly divisible into other things which just are, if we consider [15] the mere nature of a definition. For instance, if man is,

what just is, animal and biped must also be what just is. For if not, they must be attributes—and if attributes, attributes either of man or of some other subject. But neither is possible.

For an attribute is either that which may or may not belong to the subject or that in whose definition the subject of which it is an attribute is involved. Thus [20] sitting is an example of a separable attribute, while snubness contains the definition of nose, to which we attribute snubness. Further, the definition of the whole is not contained in the definitions of the contents or elements of the definitory formula; that of man for instance in biped, or that of white man in white. If then this is so, [25] and if biped is supposed to be an attribute of man, it must be either separable, so that man might possibly not be biped, or the definition of man must come into the definition of biped—which is impossible, as the converse is the case. [30]

If, on the other hand, we suppose that biped and animal are attributes not of man but of something else, and are not each of them what just is, then man too will be an attribute of something else. But we must assume that what just is is *not* the attribute of anything, and that the subject of which both biped and animal are predicated is the subject also of the complex. Are we then to say that the universe is composed of indivisibles?

Some thinkers did, in point of fact, give way to both arguments. To the [187<sup>a</sup>1] argument that all things are one if being means one thing, they conceded that what is not is; to that from bisection, they yielded by positing atomic magnitudes. But obviously it is not true that if being means one thing, and nothing can at the same time both be and not be, there will be nothing which is not; for even if what is not cannot *be* without qualification, there is no reason why it should not be something or [5] other. To say that all things will be one, if there is nothing besides what is itself, is absurd. For who understands ‘what is itself’ to be anything but some particular thing? But if this is so, there is still nothing to prevent there being many beings, as [10] has been said.

It is, then, clearly impossible for what is to be one in this sense.

#### 4 · The physicists on the other hand have two modes of explanation.

The first set make the underlying body one—either one of the three<sup>2</sup> or something else which is denser than fire and rarer than air—then generate everything else from this, and obtain multiplicity by condensation and rarefaction. [15] (Now these are contraries, which may be generalized into excess and defect. Compare Plato’s ‘Great and

Small?—except that he makes these his matter, the one his form, while the others treat the one which underlies as matter and the contraries as differentiae, i.e. forms.)

The second set assert that the contraries are contained in the one and [20] emerge from it by segregation, for example Anaximander and also all those who assert that what is is one and many, like Empedocles and Anaxagoras; for they too produce other things from their mixture by segregation. These differ, however, from each other in that the former imagines a cycle of such changes, the latter a single series. Anaxagoras again made both his homogeneous substances and his [25] contraries infinite, whereas Empedocles posits only the so-called elements.

The theory of Anaxagoras that the principles are infinite was probably due to his acceptance of the common opinion of the physicists that nothing comes into being from what is not. (For this is the reason why they use the phrase ‘all things [30] were together’ and the coming into being of such and such a kind of thing is reduced to change of quality, while some spoke of combination and separation.) Moreover, the fact that the contraries come into being from each other led them to the conclusion. The one, they reasoned, must have already existed in the other; for since everything that comes into being must arise either from what is or from what is not, [35] and it is impossible for it to arise from what is not (on this point all the physicists agree), they thought that the truth of the alternative necessarily followed, namely that things come into being out of existent things, i.e. out of things already present, [187<sup>b</sup>1] but imperceptible to our senses because of the smallness of their bulk. So they assert that everything has been mixed in everything, because they saw everything arising out of everything. But things, as they say, appear different from one another and receive different names according to what is numerically predominant among the innumerable constituents of the mixture. For nothing, they say, is purely and [5] entirely white or black or sweet, or bone or flesh, but the nature of a thing is held to be that of which it contains the most.

Now the infinite *qua* infinite is unknowable, so that what is infinite in multitude or size is unknowable in quantity, and what is infinite in variety of kind is [10] unknowable in quality. But the principles in question are infinite both in multitude and in kind. Therefore it is impossible to know things which are composed of them; for it is when we know the nature and quantity of its components that we suppose we know a complex.

Further, if the parts of a whole may be indefinitely big or small (by

parts I [15] mean components into which a whole can be divided and which are actually present in it), it is necessary that the whole thing itself may also be of any size. Clearly, therefore, if it is impossible for an animal or plant to be indefinitely big or small, neither can its parts be such, or the whole will be the same. But flesh, bone, and the like are the parts of animals, and the fruits are the parts of plants. Hence it is [20] obvious that neither flesh, bone, nor any such thing can be of indefinite size in the direction either of the greater or of the less.

Again, according to the theory all such things are already present in one another and do not come into being but are constituents which are separated out, and a thing receives its designation from its chief constituent. Further, anything [25] may come out of anything—water by segregation from flesh and flesh from water. Hence, since every finite body is exhausted by the repeated abstraction of a finite body, it is evident that everything cannot subsist in everything else. For let flesh be extracted from water and again more flesh be produced from the remainder by repeating the process of separation; then, even though the quantity separated out [30] will continually decrease, still it will not fall below a certain magnitude. If, therefore, the process comes to an end, everything will not be in everything else (for there will be no flesh in the remaining water); if on the other hand it does not, and further extraction is always possible, there will be an infinite multitude of finite equal parts in a finite quantity—which is impossible. Another proof may be added: [35] since every body must diminish in size when something is taken from it, and flesh is quantitatively definite in respect both of greatness and smallness, it is clear that from the minimum quantity of flesh no body can be separated out; for the flesh left [188<sup>a</sup>1] would be less than the minimum of flesh.

Again, in each of his infinite bodies there would be already present infinite flesh and blood and brain—having a distinct existence, however, from one another,<sup>3</sup> and no less real than the infinite bodies, and each infinite: which is contrary to reason.

The statement that complete separation never will take place is correct [5] enough, though Anaxagoras is not fully aware of what it means. For affections are indeed inseparable. If then colours and states had entered into the mixture, and if separation took place, there would be something white or healthy which was nothing *but* white or healthy, i.e. was not the predicate of a subject. So his Mind absurdly aims at the impossible, if it is supposed to wish to separate them, and it is [10] impossible to do so, both in respect of quantity and of quality—of

quantity, because there is no minimum magnitude, and of quality, because affections are inseparable.

Nor is Anaxagoras right about the coming to be of homogeneous bodies. It is true there is a sense in which clay is divided into pieces of clay, but there is another in which it is not. Water and air are, and are generated, from each other, but not in [15] the way in which bricks come from a house and again a house from bricks. And it is better to assume a smaller and finite number of principles, as Empedocles does.

All thinkers then agree in making the contraries principles, both those who describe the universe as one and unmoved (for even Parmenides treats hot and cold [20] as principles under the names of fire and earth) and those too who use the rare and the dense. The same is true of Democritus also, with his plenum and void, both of which exist, he says, the one as being, the other as not being. Again he speaks of differences in position, shape, and order, and these are genera of which the species are contraries, namely, of position, above and below, before and behind; of shape, [25] angular and angle-less, straight and round.

It is plain then that they all in one way or another identify the contraries with the principles. And with good reason. For first principles must not be derived from one another nor from anything else, while everything has to be derived from them. But these conditions are fulfilled by the primary contraries, which are not derived from anything else because they are primary, nor from each other because they are [30] contraries.

But we must see how this can be arrived at as a reasoned result. Our first presupposition must be that in nature nothing acts on, or is acted on by, any other thing at random, nor may anything come from anything else, unless we mean that it does so accidentally. For how could white come from musical, unless musical [35] happened to be an attribute of the not-white or of the black? No, white comes from [188<sup>b1</sup>] not-white—and not from *any* not-white, but from black or some intermediate. Similarly, musical comes to be from non-musical, but not from *any* thing other than musical, but from unmusical or any intermediate state there may be.

Nor again do things pass away into the first chance thing; white does not pass [5] into musical (except, it may be, accidentally), but into not-white—and not into any chance thing which is not white, but into black or an intermediate; musical passes into not-musical—and not into any chance thing other than musical, but into unmusical or any intermediate state there may be.

The same holds of other things also: even things which are not simple but [10] complex follow the same principle, but the opposite state has not received a name, so we fail to notice the fact. For what is in tune must come from what is not in tune, and *vice versa*; the tuned passes into untunedness—and not into *any* untunedness, [15] but into the corresponding opposite. It does not matter whether we take attunement, order, or composition for our illustration; the principle is obviously the same in all, and in fact applies equally to the production of a house, a statue, or anything else. A house comes from certain things in a certain state of separation instead of conjunction, a statue (or any other thing that has been shaped) from shapelessness [20]—each of these objects being partly order and partly composition.

If then this is true, everything that comes to be or passes away comes from, or passes into, its contrary or an intermediate state. But the intermediates are derived from the contraries—colours, for instance, from black and white. Everything, [25] therefore, that comes to be by a natural process is either a contrary or a product of contraries.

Up to this point we have practically had most of the other writers on the subject with us, as I have said already; for all of them identify their elements, and what they call their principles, with the contraries, giving no reason indeed for the [30] theory, but constrained as it were by the truth itself. They differ, however, from one another in that some assume contraries which are prior, others contraries which are posterior; some those more knowable in the order of explanation, others those more familiar to sense. For some make hot and cold, or again moist and dry, the causes of [35] becoming; while others make odd and even, or again Love and Strife; and these differ from each other in the way mentioned.

Hence their principles are in one sense the same, in another different; different certainly, as indeed most people think, but the same inasmuch as they are [189<sup>a</sup>1] analogous; for all are taken from the same table of columns, some of the pairs being wider, others narrower in extent. In this way then their theories are both the same and different, some better, some worse; some, as I have said, take as their contraries [5] what is more knowable in the order of explanation, others what is more familiar to sense. (The universal is knowable in the order of explanation, the particular in the order of sense; for explanation has to do with the universal, sense with the particular.) The great and the small, for example, belong to the former class, the dense and the rare to the latter.

[10] It is clear then that our principles must be contraries.

6 · The next question is whether the principles are two or three or more in number.

One they cannot be; for there cannot be one contrary. Nor can they be innumerable, because, if so, what is will not be knowable; and in any one genus there is only one contrariety, and substance is one genus; also a finite number is sufficient, and a finite number, such as the principles of Empedocles, is better than [15] an infinite multitude; for Empedocles professes to obtain all that Anaxagoras obtains from his innumerable principles. Again, some contraries are prior to others, and some arise from others—for example sweet and bitter, white and black—whereas the principles must always remain principles.

This will suffice to show that the principles are neither one nor innumerable. [20]

Granted, then, that they are a limited number, it is plausible to suppose them more than two. For it is difficult to see how either density should be of such a nature as to act in any way on rarity or rarity on density. The same is true of any other pair of contraries; for Love does not gather Strife together and make things out of it, nor does Strife make anything out of Love, but both act on a third thing different from [25] both. Some indeed assume more than one such thing from which they construct the world of nature.

Other objections to the view that it is not necessary to posit some other nature under the contraries may be added. We do not find that the contraries constitute the substance of any thing. But what is a first principle ought not to be predicated of [30] any subject. If it were, there would be a principle of the supposed principle; for the subject is a principle, and prior presumably to what is predicated of it. Again, we hold that a substance is not contrary to another substance. How then can substance be derived from what are not substances? Or how can non-substance be prior to substance?

If then we accept both the former argument and this one, we must, to preserve both, posit some third thing, such as is spoken of by those who describe the universe [189<sup>b</sup>1] as one nature—water or fire or what is intermediate between them. What is intermediate seems preferable; for fire, earth, air, and water are already involved with pairs of contraries. There is, therefore, much to be said for those who make the [5] underlying substance different from these four; of the rest, the next best choice is air, as presenting sensible differences in a less degree than the others; and after air, water. All, however, agree in this, that they



differentiate their One by means of the contraries, such as density and rarity and more and less, which may of course be generalized, as has already been said, into excess and defect. Indeed this doctrine [10] too (that the One and excess and defect are the principles of things) would appear to be of old standing, though in different forms; for the early thinkers made the two the active and the one the passive principle, whereas some of the more recent maintain [15] the reverse.

To suppose then that the elements are three in number would seem, from these and similar considerations, a plausible view, as I said before. On the other hand, the view that they are more than three in number would seem to be untenable.

For one thing is sufficient to be acted on; but if we have four contraries, there [20] will be two contrarieties, and we shall have to suppose an intermediate nature for each pair separately. If, on the other hand, the contrarieties, being two, can generate from each other, the second contrariety will be superfluous. Moreover, it is impossible that there should be more than one *primary* contrariety. For substance is [25] a single genus of being, so that the principles can differ only as prior and posterior, *not* in genus; for in a single genus there is always a single contrariety, all the other contrarieties in it being held to be reducible to one.

It is clear then that the number of elements is neither one nor more than two or three; but whether two or three is, as I said, a question of considerable difficulty.

[30] **7** · We will now give our own account, approaching the question first with reference to becoming in its widest sense; for we shall be following the natural order of inquiry if we speak first of common characteristics, and then investigate the characteristics of special cases.

We say that ‘one thing comes to be from another thing, and something from something different, in the case both of simple and of complex things. I mean the following. We can say the man becomes musical, or what is not-musical becomes [190<sup>a</sup>1] musical, or the not-musical man becomes a musical man. Now what becomes in the first two cases—man and not-musical—I call *simple*, and what each becomes—musical—simple also. But when we say the not-musical man becomes a musical man, both what becomes and what it becomes are *complex*.

[5] In some cases, we say not only this becomes so-and-so, but also from being this, it comes to be so-and-so (e.g.: from being not-musical he

comes to be musical); but we do not say this in all cases, as we do not say from being a man he came to be musical but only the man became musical.

When a simple thing is said to become something, in one case it survives [10] through the process, in the other it does not. For the man remains a man and is such even when he becomes musical, whereas what is not musical or is unmusical does not survive, either simply or combined with the subject.

These distinctions drawn, one can gather from surveying the various cases of becoming in the way we are describing that there must always be an underlying [15] something, namely that which becomes, and that this, though always one numerically, in form at least is not one. (By 'in form' I mean the same as 'in account'.) For to be a man is not the same as to be unmusical. One part survives, the other does not: what is not an opposite survives (for the man survives), but [20] not-musical or unmusical does not survive, nor does the compound of the two, namely the unmusical man.

We speak of 'becoming that from this' instead of 'this becoming that' more in the case of what does not survive the change—'becoming musical from unmusical', not 'from man'—but we sometimes use the latter form of expression even of what [25] survives; we speak of a statue coming to be from bronze, not of the bronze becoming a statue. The change, however, from an opposite which does not survive is described in both ways, 'becoming that from this' or 'this becoming that'. We say both that the unmusical becomes musical, and that from unmusical he becomes musical. And so both forms are used of the complex, 'becoming a musical from an unmusical [30] man', and 'an unmusical man becoming musical'.

Things are said to come to be in different ways. In some cases we do not use the expression 'come to be', but 'come to be so-and-so'. Only substances are said to come to be without qualification.

Now in all cases other than substance it is plain that there must be something underlying, namely, that which becomes. For when a thing comes to be of such a quantity or quality or in such a relation, time,<sup>4</sup> or place, a subject is always [35] presupposed, since substance alone is not predicated of another subject, but everything else of substance.

But that substances too, and anything that can be said to be without [190<sup>b</sup>1] qualification, come to be from some underlying thing, will appear on examination. For we find in every case something that underlies from which proceeds that which comes to be; for instance,

animals and plants from seed.

Things which come to be without qualification, come to be in different ways: [5] by change of shape, as a statue; by addition, as things which grow; by taking away, as the Hermes from the stone; by putting together, as a house; by alteration, as things which turn in respect of their matter.

It is plain that these are all cases of coming to be from some underlying [10] thing.

Thus, from what has been said, whatever comes to be is always complex. There is, on the one hand, something which comes to be, and again something which becomes that—the latter in two senses, either the subject or the opposite. By the opposite I mean the unmusical, by the subject, man; and similarly I call the absence of shape or form or order the opposite, and the bronze or stone or gold the [15] subject.

Plainly then, if there are causes and principles which constitute natural objects and from which they primarily are or have come to be—have come to be, I mean, what each is said to be in its substance, not what each is accidentally—plainly, I say, everything comes to be from both subject and form. For the musical man is [20] composed in a way of man and musical: you can analyse it into the definitions of its elements. It is clear then that what comes to be will come to be from these elements.

Now the subject is one numerically, though it is two in form. (For there is the man, the gold—in general, the countable matter; for it is more of the nature of a [25] ‘this’, and what comes to be does not come from it accidentally; the privation, on the other hand, and the contrariety *are* accidental.) And the form is one—the order, the art of music, or any similar predicate.

There is a sense, therefore, in which we must declare the principles to be two, and a sense in which they are three; a sense in which the contraries are the [30] principles—say for example the musical and the unmusical, the hot and the cold, the tuned and the untuned—and a sense in which they are not, since it is impossible for the contraries to be acted on by each other. But this difficulty also is solved by the fact that what underlies is different from the contraries; for it is itself not a [35] contrary. The principles therefore are, in a way, not more in number than the contraries, but as it were two; nor yet precisely two, since there is a difference of [191<sup>a</sup>1] being, but three. For to be man is different from to be unmusical, and to be unformed from to be bronze.

We have now stated the number of the principles of natural objects

which are subject to generation, and how the number is reached; and it is clear that there must [5] be something underlying the contraries, and that the contraries must be two. (Yet in another way of putting it this is not necessary, as one of the contraries will serve to effect the change by its absence and presence.)

The underlying nature can be known by analogy. For as the bronze is to the [10] statue, the wood to the bed, or the matter and<sup>5</sup> the formless before receiving form to any thing which has form, so is the underlying nature to substance, i.e. the 'this' or existent.

This then is one principle (though not one or existent in the same sense as the 'this'); one is the form or definition;<sup>6</sup> then further there is its contrary, the privation. [15] In what sense these are two, and in what sense more, has been stated above. We explained first that only the contraries were principles, and later that something else underlay them, and that the principles were three; our last statement has elucidated the difference between the contraries, the mutual relation of the principles, and the nature of what underlies. Whether the form or what underlies is [20] the substance is not yet clear. But that the principles are three, and in what sense, and the way in which each is a principle, is clear.

So much then for the question of the number and the nature of the principles.

8 · We will now proceed to show that the difficulty of the early thinkers, as well as our own, is solved in this way alone.

[25] The first of those who studied philosophy were misled in their search for truth and the nature of things by their inexperience, which as it were thrust them into another path. So they say that none of the things that are either comes to be or passes out of existence, because what comes to be must do so either from what is or from what is not, both of which are impossible. For what is cannot come to be [30] (because it is already), and from what is not nothing could have come to be (because something must be underlying). So too they exaggerated the consequence of this, and went so far as to deny even the *existence* of a plurality of things maintaining that only what is itself is. Such then was their opinion, and such the reason for its adoption.

[35] Our explanation on the other hand is that for something to come to be from what is or from what is not, or what is not or what is to do something or have something done to it or become some particular thing, are in one way no different from a doctor doing something or having

something done to him, or being or [191<sup>b</sup>1] becoming something from being a doctor. These expressions may be taken in two ways, and so too, clearly, may ‘from what is’, and ‘what is acts or is acted on’. A doctor builds a house, not *qua* doctor, but *qua* housebuilder, and turns gray, not *qua* [5] doctor, but *qua* dark-haired. On the other hand he doctors or fails to doctor *qua* doctor. But we are using words most appropriately when we say that a doctor does something or undergoes something, or becomes something from being a doctor, if he does, undergoes, or becomes *qua* doctor. Clearly then also to come to be so-and-so from what is not means ‘*qua* what is not’.

It was through failure to make this distinction that those thinkers gave the [10] matter up, and through this error that they went so much farther astray as to suppose that nothing else comes to be or exists apart from what is itself, thus doing away with all becoming.

We ourselves are in agreement with them in holding that nothing can be said without qualification to come from what is not. But nevertheless we maintain that a thing may come to be from what is not in a qualified sense, i.e. accidentally. For a [15] thing comes to be from the privation, which in its own nature is something which is not—this not surviving as a constituent of the result. Yet this causes surprise, and it is thought impossible that something should come to be in the way described from what is not.

In the same way we maintain that nothing comes to be from what is, and that what is does not come to be except accidentally. In that way, however, it does, just as animal might come to be from animal, and an animal of a certain kind from an animal of a certain kind. Thus, suppose a dog to come to be from a dog, or a horse [20] from a horse. The dog would then, it is true, come to be from animal (as well as from an animal of a certain kind) but not as *animal*, for that is already there. But if anything is to become an animal, *not* accidentally, it will not be from animal; and if what is, not from what is—nor from what is not either, for it has been explained that [25] by ‘from what is not’ we mean *qua* what is not.

Note further that we do not subvert the principle that everything either is or is not.

This then is one way of solving the difficulty. Another consists in pointing out that the same things can be spoken of in terms of potentiality and actuality. But this has been done with greater precision elsewhere.<sup>7</sup>

So, as we said, the difficulties which constrain people to deny the existence of [30] some of the things we mentioned are now solved. For it was this reason which also caused some of the earlier thinkers to turn so far aside from the road which leads to coming to be and passing away and change generally. If they had come in sight of this nature, all their ignorance would have been dispelled.

9 · Others, indeed, have apprehended the nature in question, but not [35] adequately.

In the first place they allow that a thing may come to be without qualification [192<sup>a</sup>1] from what is not, accepting on this point the statement of Parmenides. Secondly, they think that if it is one numerically, it must have also only a single potentiality—which is a very different thing.

Now we distinguish matter and privation, and hold that one of these, namely [5] the matter, accidentally is not, while the privation in its own nature is not; and that the matter is nearly, in a sense *is*, substance, while the privation in no sense is. They, on the other hand, identify their Great and Small alike with what is not, and that whether they are taken together as one or separately. Their triad is therefore of [10] quite a different kind from ours. For they got so far as to see that there must be some underlying nature, but they make it one—for even if one philosopher<sup>8</sup> makes a dyad of it, which he calls Great and Small, the effect is the same; for he overlooked the other nature. For the one which persists is a joint cause, with the form, of what comes to be—a mother, as it were. But the other part of the contrariety may often [15] seem, if you concentrate your attention on it as an evil agent, not to exist at all.

For admitting that there is something divine, good, and desirable, we hold that there are two other principles, the one contrary to it, the other such as of its own nature to desire and yearn for it. But the consequence of their view is that the [20] contrary desires its own extinction. Yet the form cannot desire itself, for it is not defective; nor can the contrary desire it, for contraries are mutually destructive. The truth is that what desires the form is matter, as the female desires the male and the ugly the beautiful—only the ugly or the female not in itself but accidentally.

[25] The matter comes to be and ceases to be in one sense, while in another it does not. As that which contains the privation, it ceases to be in its own nature; for what ceases to be—the privation—is contained within it. But as potentiality it does not cease to be in its own nature, but

is necessarily outside the sphere of becoming and ceasing to be. For if it came to be, something must have existed as a primary [30] substratum from which it should come and which should persist in it; but this is its own very nature, so that it will be before coming to be. (For my definition of matter is just this—the primary substratum of each thing, from which it comes to be, and which persists in the result, not accidentally.) And if it ceases to be it will pass into that at the last, so it will have ceased to be before ceasing to be.

The accurate determination of the first principle in respect of form, whether it is one or many and what it is or what they are, is the province of first philosophy; so [192<sup>b</sup>1] these questions may stand over till then. But of the natural, i.e. perishable, forms we shall speak in the expositions which follow.

The above, then, may be taken as sufficient to establish that there are principles and what they are and how many there are. Now let us make a fresh start and proceed.

## BOOK II

1 · Of things that exist, some exist by nature, some from other causes. By nature the animals and their parts exist, and the plants and the simple bodies (earth, [10] fire, air, water)—for we say that these and the like exist by nature.

All the things mentioned plainly differ from things which are *not* constituted by nature. For each of them has within itself a principle of motion and of stationariness (in respect of place, or of growth and decrease, or by way of [15] alteration). On the other hand, a bed and a coat and anything else of that sort, *qua* receiving these designations—i.e. in so far as they are products of art—have no innate impulse to change. But in so far as they happen to be composed of stone or of earth or of a mixture of the two, they *do* have such an impulse, and just to that [20] extent—which seems to indicate that nature is a principle or cause of being moved and of being at rest in that to which it belongs primarily, in virtue of itself and not accidentally.

I say ‘not accidentally’, because (for instance) a man who is a doctor might himself be a cause of health to himself. Nevertheless it is not in so far as he is a [25] patient that he possesses the art of medicine: it merely has happened that the same man is doctor and patient—and that is why these attributes are not always found together. So it is with all other artificial products. None of them has in itself the principle of its own production. But while in some cases (for instance houses and the [30] other products of manual labour) that principle is in something else external to the thing, in others—those which may cause a change in themselves accidentally—it lies in the things themselves (but not in virtue of what they are).

Nature then is what has been stated. Things have a nature which have a principle of this kind. Each of them is a substance; for it is a subject, and nature is always in a subject.

The term ‘according to nature’ is applied to all these things and also to the [35] attributes which belong to them in virtue of what they are, for instance the property of fire to be carried upwards—which is not a nature nor has a nature but is by [193<sup>a</sup>1] nature or according to nature.

*What* nature is, then, and the meaning of the terms ‘by nature’ and ‘according to nature’, has been stated. *That* nature exists, it would be



absurd to try to prove; for it is obvious that there are many things of this kind, and to prove what is obvious by [5] what is not is the mark of a man who is unable to distinguish what is self-evident from what is not. (This state of mind is clearly possible. A man blind from birth might reason about colours.) Presumably therefore such persons must be talking about words without any thought to correspond.

Some identify the nature or substance of a natural object with that immediate [10] constituent of it which taken by itself is without arrangement, e.g. the wood is the nature of the bed, and the bronze the nature of the statue.

As an indication of this Antiphon points out that if you planted a bed and the rotting wood acquired the power of sending up a shoot, it would not be a bed that would come up, but *wood* which shows that the arrangement in accordance with the [15] rules of the art is merely an accidental attribute, whereas the substance is the other, which, further, persists continuously through the process.

But if the material of each of these objects has itself the same relation to something else, say bronze (or gold) to water, bones (or wood) to earth and so on, [20] *that* (they say) would be their nature and substance. Consequently some assert earth, others fire or air or water or some or all of these, to be the nature of the things that are. For whatever any one of them supposed to have this character—whether one thing or more than one thing—this or these he declared to be the whole of [25] substance, all else being its affections, states, or dispositions. Every such thing they held to be eternal (for it could not pass into anything else), but other things to come into being and cease to be times without number.

This then is one account of nature, namely that it is the primary underlying matter of things which have in themselves a principle of motion or change.

[30] Another account is that nature is the shape or form which is specified in the definition of the thing.

For the word 'nature' is applied to what is according to nature and the natural in the same way as 'art' is applied to what is artistic or a work of art. We should not say in the latter case that there is anything artistic about a thing, if it is a bed only [35] potentially, not yet having the form of a bed; nor should we call it a work of art. The same is true of natural compounds. What is potentially flesh or bone has not yet its [193<sup>b</sup>1] own nature, and does not exist by nature, until it receives the form specified in the definition, which we name in defining what flesh or bone is. Thus on

the second account of nature, it would be the shape or form (not separable except in statement) [5] of things which have in themselves a principle of motion. (The combination of the two, e.g. man, is not nature but by nature.)

The form indeed is nature rather than the matter; for a thing is more properly said to be what it is when it exists in actuality than when it exists potentially. Again man is born from man but not bed from bed. That is why people say that the shape is [10] not the nature of a bed, but the wood is—if the bed sprouted, not a bed but wood would come up. But even if the shape is art,<sup>9</sup> then on the same principle the shape of man is his nature. For man is born from man.

Again, nature in the sense of a coming-to-be proceeds towards nature. For it is not like doctoring, which leads not to the art of doctoring but to health. Doctoring [15] must start from the art, not lead to it. But it is not in this way that nature is related to nature. What grows *qua* growing grows from something into something. Into what then does it grow? Not into that from which it arose but into that to which it tends. The shape then is nature.

Shape and nature are used in two ways. For the privation too is in a way form. [20] But whether in unqualified coming to be there is privation, i.e. a contrary, we must consider later.

2 · We have distinguished, then, the different ways in which the term ‘nature’ is used.

The next point to consider is how the mathematician differs from the student of nature; for natural bodies contain surfaces and volumes, lines and points, and these are the subject-matter of mathematics. [25]

Further, is astronomy different from natural science or a department of it? It seems absurd that the student of nature should be supposed to know the nature of sun or moon, but not to know any of their essential attributes, particularly as the writers on nature obviously do discuss their shape and whether the earth and the [30] world are spherical or not.

Now the mathematician, though he too treats of these things, nevertheless does not treat of them as the limits of a natural body; nor does he consider the attributes indicated as the attributes of such bodies. That is why he separates them; for in thought they are separable from motion, and it makes no difference, nor does any falsity result, if they are separated. The holders of the theory of Forms do the same, [35] though they are not aware of it; for they separate the objects of natural science,

which are less separable than those of mathematics. This becomes plain if one tries [194<sup>a</sup>1] to state in each of the two cases the definitions of the things and of their attributes. Odd and even, straight and curved, and likewise number, line, and figure, do not involve motion; not so flesh and bone and man—*these* are defined like snub nose, [5] not like curved.

Similar evidence is supplied by the more natural of the branches of mathematics, such as optics, harmonics, and astronomy. These are in a way the converse of geometry. While geometry investigates natural lines but not *qua* natural, optics [10] investigates mathematical lines, but *qua* natural, not *qua* mathematical.

Since two sorts of thing are called nature, the form and the matter, we must investigate its objects as we would the essence of snubness, that is neither independently of matter nor in terms of matter only. Here too indeed one might [15] raise a difficulty. Since there are two natures, with which is the student of nature concerned? Or should he investigate the combination of the two? But if the combination of the two, then also each severally. Does it belong then to the same or to different sciences to know each severally?

If we look at the ancients, natural science would seem to be concerned with the *matter*. (It was only very slightly that Empedocles and Democritus touched on form [20] and essence.)

But if on the other hand art imitates nature, and it is the part of the same discipline to know the form and the matter up to a point (e.g. the doctor has a knowledge of health and also of bile and phlegm, in which health is realized and the builder both of the form of the house and of the matter, namely that it is bricks and [25] beams, and so forth): if this is so, it would be the part of natural science also to know nature in both its senses.

Again, that for the sake of which, or the end, belongs to the same department of knowledge as the means. But the nature is the end or that for the sake of which. For if a thing undergoes a continuous change toward some end, that last stage<sup>10</sup> is [30] actually that for the sake of which. (That is why the poet was carried away into making an absurd statement when he said 'he has the end for the sake of which he was born'. For not every stage that is last claims to be an end, but only that which is best.)

For the arts make their material (some simply make it, others make it [35] serviceable), and we use everything as if it was there for our sake. (We also are in a sense an end. 'That for the sake of which' may be taken

in two ways, as we said in [194b1] our work *On Philosophy*.) The arts, therefore, which govern the matter and have knowledge are two, namely the art which uses the product and the art which directs the production of it. That is why the using art also is in a sense directive; but it differs in that it knows the form,<sup>11</sup> whereas the art which is directive as being [5] concerned with production knows the matter. For the helmsman knows and prescribes what sort of form a helm should have, the other from what wood it should be made and by means of what operations. In the products of art, however, we make the material with a view to the function, whereas in the products of nature the matter is there all along.

Again, matter is a relative thing—for different forms there is different matter.

[10] How far then must the student of nature know the form or essence? Up to a point, perhaps, as the doctor must know sinew or the smith bronze (i.e. until he understands the purpose of each);<sup>12</sup> and the student of nature is concerned only with things whose forms are separable indeed, but do not exist apart from matter. Man is begotten by man and by the sun as well. The mode of existence and essence of the [15] separable it is the business of first philosophy to define.

**3** · Now that we have established these distinctions, we must proceed to consider causes, their character and number. Knowledge is the object of our inquiry, and men do not think they know a thing till they have grasped the ‘why’ of [20] it (which is to grasp its primary cause). So clearly we too must do this as regards both coming to be and passing away and every kind of natural change, in order that, knowing their principles, we may try to refer to these principles each of our problems.

In one way, then, that out of which a thing comes to be and which persists, is [25] called a cause, e.g. the bronze of the statue, the silver of the bowl, and the genera of which the bronze and the silver are species.

In another way, the form or the archetype, i.e. the definition of the essence, and its genera, are called causes (e.g. of the octave the relation of 2: 1, and generally number), and the parts in the definition.

[30] Again, the primary source of the change or rest; e.g. the man who deliberated is a cause, the father is cause of the child, and generally what makes of what is made and what changes of what is changed.

Again, in the sense of end or that for the sake of which a thing is done, e.g. health is the cause of walking about. (‘Why is he walking about?’ We say: ‘To be healthy’, and, having said that, we think we have

assigned the cause.) The same is [35] true also of all the intermediate steps which are brought about through the action of something else as means towards the end, e.g. reduction of flesh, purging, drugs, or surgical instruments are means towards health. All these things are for the sake of [195a1] the end, though they differ from one another in that some are activities, others instruments.

This then perhaps exhausts the number of ways in which the term 'cause' is used.

As things are called causes in many ways, it follows that there are several causes of the same thing (not merely accidentally), e.g. both the art of the sculptor [5] and the bronze are causes of the statue. These are causes of the statue *qua* statue, not in virtue of anything else that it may be—only not in the same way, the one being the material cause, the other the cause whence the motion comes. Some things cause each other reciprocally, e.g. hard work causes fitness and *vice versa*, but again not in the same way, but the one as end, the other as the principle of [10] motion. Further the same thing is the cause of contrary results. For that which by its presence brings about one result is sometimes blamed for bringing about the contrary by its absence. Thus we ascribe the wreck of a ship to the absence of the pilot whose presence was the cause of its safety.

All the causes now mentioned fall into four familiar divisions. The letters are [15] the causes of syllables, the material of artificial products, fire and the like of bodies, the parts of the whole, and the premisses of the conclusion, in the sense of 'that from which'. Of these pairs the one set are causes in the sense of what underlies, e.g. the parts, the other set in the sense of essence—the whole and the combination and the [20] form. But the seed and the doctor and the deliberator, and generally the maker, are all sources whence the change or stationariness originates, which the others are causes in the sense of the end or the good of the rest; for that for the sake of which tends to be what is best and the end of the things that lead up to it. (Whether we call [25] it good or apparently good makes no difference.)

Such then is the number and nature of the kinds of cause.

Now the modes of causation are many, though when brought under heads they too can be reduced in number. For things are called causes in many ways and even within the same kind one may be prior to another: e.g. the doctor and the expert are [30] causes of health, the relation 2: 1 and number of the octave, and always what is inclusive to what is particular. Another mode of causation is the accidental and its genera,

e.g. in one way Polyclitus, in another a sculptor is the cause of a statue, because being Polyclitus and a sculptor are accidentally conjoined. Also the classes [35] in which the accidental attribute is included; thus a man could be said to be the cause of a statue or, generally, a living creature. An accidental attribute too may be [195<sup>b</sup>1] more or less remote, e.g. suppose that a pale man or a musical man were said to be the cause of the statue.

All causes, both proper and accidental, may be spoken of either as potential or as actual; e.g. the cause of a house being built is either a house-builder or a [5] house-builder building.

Similar distinctions can be made in the things of which the causes are causes, e.g. of this statue or of a statue or of an image generally, of this bronze or of bronze [10] or of material generally. So too with the accidental attributes. Again we may use a complex expression for either and say, e.g., neither 'Polyclitus' nor a 'sculptor' but 'Polyclitus, the sculptor'.

All these various uses, however, come to six in number, under each of which again the usage is twofold. It is either what is particular or a genus, or an accidental [15] attribute or a genus of that, and these either as a complex or each by itself; and all either as actual or as potential. The difference is this much, that causes which are actually at work and particular exist and cease to exist simultaneously with their effect, e.g. this healing person with this being-healed person and that housebuilding [20] man with that being-built house; but this is not always true of potential causes—the house and the housebuilder do not pass away simultaneously.

In investigating the cause of each thing it is always necessary to seek what is most precise (as also in other things): thus a man builds because he is a builder, and a builder builds in virtue of his art of building. This last cause then is prior; and so [25] generally.

Further, generic effects should be assigned to generic causes, particular effects to particular causes, e.g. statue to sculptor, this statue to this sculptor; and powers are relative to possible effects, actually operating causes to things which are actually being effected.

This must suffice for our account of the number of causes and the modes of [30] causation.

4 · But chance and spontaneity are also reckoned among causes: many things are said both to be and to come to be as a result of chance

and spontaneity. We must inquire therefore in what manner chance and spontaneity are present [35] among the causes enumerated, and whether they are the same or different, and generally what chance and spontaneity are.

Some people even question whether there are such things or not. They say that [196<sup>a</sup>1] nothing happens by chance, but that everything which we ascribe to chance or spontaneity has some definite cause, e.g. coming by chance into the market and finding there a man whom one wanted but did not expect to meet is due to one's [5] wish to go and buy in the market. Similarly, in other so-called cases of chance it is always possible, they maintain, to find something which is the cause; but not chance, for if chance were real, it would seem strange indeed, and the question might be raised, why on earth none of the wise men of old in speaking of the causes [10] of generation and decay took account of chance; whence it would seem that they too did not believe that anything is by chance. But there is a further circumstance that is surprising. Many things both come to be and are by chance and spontaneity, and although all know that each of them can be ascribed to some cause (as the old [15] argument said which denied chance), nevertheless they all speak of some of these things as happening by chance and others not. For this reason they ought to have at least referred to the matter in some way or other.

Certainly the early physicists found no place for chance among the causes which they recognized—love, strife, mind, fire, or the like. This is strange, whether they supposed that there is no such thing as chance or whether they thought there is but omitted to mention it—and that too when they sometimes used it, as [20] Empedocles does when he says that the air is not always separated into the highest region, but as it may chance. At any rate he says in his cosmogony that 'it happened to run that way at that time, but it often ran otherwise'.<sup>13</sup> He tells us also that most of the parts of animals came to be by chance.

There are some who actually ascribe this heavenly sphere and all the worlds to [25] spontaneity. They say that the vortex arose spontaneously, i.e. the motion that separated and arranged the universe in its present order. This statement might well cause surprise. For they are asserting that chance is not responsible for the existence or generation of animals and plants, nature or mind or something of the kind being [30] the cause of them (for it is not any chance thing that comes from a given seed but an olive from one kind and a man from another); and yet at the same time they assert that the heavenly sphere and the divinest of visible things arose spontaneously, having no such cause as is assigned to

animals and plants. Yet if this is so, it is a fact [35] which deserves to be dwelt upon, and something might well have been said about it. For besides the other absurdities of the statement, it is the more absurd that people [196<sup>b</sup>1] should make it when they see nothing coming to be spontaneously in the heavens, but much happening by chance among the things which as they say are not due to chance; whereas we should have expected exactly the opposite.

Others there are who believe that chance is a cause, but that it is inscrutable to [5] human intelligence, as being a divine thing and full of mystery.

Thus we must inquire what chance and spontaneity are, whether they are the same or different, and how they fit into our division of causes.

5 · First then we observe that some things always come to pass in the same [10] way, and others for the most part. It is clearly of neither of these that chance, or the result of chance, is said to be the cause—neither of that which is by necessity and always, nor of that which is for the most part. But as there is a third class of events besides these two—events which all say are by chance—it is plain that there is such [15] a thing as chance and spontaneity; for we know that things of this kind are due to chance and that things due to chance are of this kind.

Of things that come to be, some come to be for the sake of something, others not. Again, some of the former class are in accordance with intention, others not, but both are in the class of things which are for the sake of something. Hence it is clear that even among the things which are outside what is necessary and what is for [20] the most part, there are some in connexion with which the phrase ‘for the sake of something’ is applicable. (Things that are for the sake of something include whatever may be done as a result of thought or of nature.) Things of this kind, then, when they come to pass accidentally are said to be by chance. For just as a thing is something either in virtue of itself or accidentally, so may it be a cause. For [25] instance, the housebuilding faculty is in virtue of itself a cause of a house, whereas the pale or the musical is an accidental cause. That which is *per se* cause is determinate, but the accidental cause is indeterminable; for the possible attributes of an individual are innumerable. As we said, then, when a thing of this kind comes [30] to pass among events which are for the sake of something, it is said to be spontaneous or by chance. (The distinction between the two must be made later—for the present it is sufficient if it is plain that both



are in the sphere of things done for the sake of something.)

Example: A man is engaged in collecting<sup>14</sup> subscriptions for a feast. He would have gone to such and such a place for the purpose of getting the money, if he had [35] known. He actually went there for another purpose, and it was only accidentally that he got his money by going there;<sup>15</sup> and this was not due to the fact that he went [197<sup>a</sup>1] there as a rule or necessarily, nor is the end effected (getting the money) a cause present in himself—it belongs to the class of things that are objects of choice and the result of thought. It is when these conditions are satisfied that the man is said to have gone by chance. If he had chosen and gone for the sake of this—if he always or normally went there when he was collecting payments—he would not be said to [5] have gone by chance. It is clear then that chance is an accidental cause in the sphere of those actions for the sake of something which involve choice. Thought, then, and chance are in the same sphere, for choice implies thought.

It is necessary, no doubt, that the causes of what comes to pass by chance be indefinite; and that is why chance is supposed to belong to the class of the indefinite [10] and to be inscrutable to man, and why it might be thought that, in a way, nothing occurs by chance. For all these statements are correct, as might be expected. Things *do*, in a way, occur by chance, for they occur accidentally and chance is an accidental cause. But it is not the cause without qualification of anything; for [15] instance, a housebuilder is the cause of a house; accidentally, a fluteplayer may be so.

And the causes of the man's coming and getting the money (when he did not come for the sake of that) are innumerable. He may have wished to see somebody or been following somebody or avoiding somebody, or may have gone to see a spectacle. Thus to say that chance is unaccountable is correct. For an account is of [20] what holds always or for the most part, whereas chance belongs to a third type of event. Hence, since causes of this kind are indefinite, chance too is indefinite. (Yet in some cases one might raise the question whether *any* chance fact might be the cause of the chance occurrence, e.g. of health the fresh air or the sun's heat may be the cause, but having had one's hair cut *cannot*; for some accidental causes are more relevant to the effect than others.)

[25] Chance is called good when the result is good, evil when it is evil. The terms 'good fortune' and 'ill fortune' are used when either result is of considerable magnitude. Thus one who comes within an ace of some great evil or great good is said to be fortunate or unfortunate. The mind affirms the presence of the attribute, ignoring the hair's breadth of

difference. Further, it is with reason that good fortune [30] is regarded as unstable; for chance is unstable, as none of the things which result from it can hold always or for the most part.

Both are then, as I have said, accidental causes—both chance and spontaneity—in the sphere of things which are capable of coming to pass not simply, nor for the most part and with reference to such of these as might come to pass for the sake [35] of something.

6 · They differ in that spontaneity is the wider. Every result of chance is from what is spontaneous, but not everything that is from what is spontaneous is from chance.

Chance and what results from chance are appropriate to agents that are [197<sup>b</sup>1] capable of good fortune and of action generally. Therefore necessarily chance is in the sphere of actions. This is indicated by the fact that good fortune is thought to be the same, or nearly the same, as happiness, and happiness to be a kind of action, [5] since it is well-doing. Hence what is not capable of action cannot do anything by chance. Thus an inanimate thing or a beast or a child cannot do anything by chance, because it is incapable of choice; nor can good fortune or ill fortune be ascribed to them, except metaphorically, as Protarchus, for example, said that the stones of [10] which altars are made are fortunate because they are held in honour, while their fellows are trodden under foot. Even these things, however, can in a way be affected by chance, when one who is dealing with them does something to them by chance, but not otherwise.

The spontaneous on the other hand is found both in the beasts and in many inanimate objects. We say, for example, that the horse came spontaneously, [15] because, though his coming saved him, he did not come for the sake of safety. Again, the tripod fell spontaneously, because, though it stood on its feet so as to serve for a seat, it did not fall so as to serve for a seat.

Hence it is clear that events which belong to the general class of things that may come to pass for the sake of something, when they come to pass not for the sake of what actually results, and have an external cause, may be described by the phrase [20] ‘from spontaneity’. These spontaneous events are said to be from chance if they have the further characteristics of being the objects of choice and happening to agents capable of choice. This is indicated by the phrase ‘in vain’, which is used when one thing which is for the sake of another, does not result in it.<sup>16</sup> For instance, taking a walk is for the sake of evacuation of the bowels; if

this does not follow after walking, we say that we have walked in vain and that the walking was vain. This [25] implies that what is naturally for the sake of an end is in vain, when it does not effect the end for the sake of which it was the natural means—for it would be absurd for a man to say that he had bathed in vain because the sun was not eclipsed, since the one was not done for the sake of the other. Thus the spontaneous is even according to its derivation<sup>17</sup> the case in which the thing itself happens in vain. The stone that struck the man did not fall for the sake of striking him; therefore it fell [30] spontaneously, because it might have fallen by the action of an agent and for the sake of striking. The difference between spontaneity and what results by chance is greatest in things that come to be by nature; for when anything comes to be contrary to nature, we do not say that it came to be by chance, but by spontaneity. Yet [35] strictly this too is different from the spontaneous proper; for the cause of the latter is external, that of the former internal.

[198<sup>a</sup>1] We have now explained what chance is and what spontaneity is, and in what they differ from each other. Both belong to the mode of causation ‘source of change’, for either some natural or some intelligent agent is always the cause; but in this sort of causation the number of possible causes is infinite.

[5] Spontaneity and chance are causes of effects which, though they might result from intelligence or nature, have in fact been caused by something accidentally. Now since nothing which is accidental is prior to what is *per se*, it is clear that no accidental cause can be prior to a cause *per se*. Spontaneity and chance, therefore, [10] are posterior to intelligence and nature. Hence, however true it may be that the heavens are due to spontaneity, it will still be true that intelligence and nature will be prior causes of this universe and of many things in it besides.

7 · It is clear then that there are causes, and that the number of them is what [15] we have stated. The number is the same as that of the things comprehended under the question ‘why’. The ‘why’ is referred ultimately either, in things which do not involve motion, e.g. in mathematics, to the ‘what’ (to the definition of straight line or commensurable or the like); or to what initiated a motion, e.g. ‘why did they go to war?—because there had been a raid’; or we are inquiring ‘for the sake of [20] what?’—‘that they may rule’; or in the case of things that come into being, we are looking for the matter. The causes, therefore, are these and so many in number.

Now, the causes being four, it is the business of the student of nature to know about them all, and if he refers his problems back to all of them, he will assign the 'why' in the way proper to his science—the matter, the form, the mover, that for the [25] sake of which. The last three often coincide; for the what and that for the sake of which are one, while the primary source of motion is the same in species as these. For man generates man—and so too, in general, with all things which cause movement by being themselves moved; and such as are not of this kind are no longer inside the province of natural science, for they cause motion not by possessing motion or a source of motion in themselves, but being themselves incapable of [30] motion. Hence there are three branches of study, one of things which are incapable of motion, the second of things in motion, but indestructible, the third of destructible things.

The question 'why', then, is answered by reference to the matter, to the form, and to the primary moving cause. For in respect of coming to be it is mostly in this last way that causes are investigated—'what comes to be after what? what was the [35] primary agent or patient?' and so at each step of the series. Now the principles which cause motion in a natural way are two, of which one is not [198<sup>b</sup>1] natural, as it has no principle of motion in itself. Of this kind is whatever causes movement, not being itself moved, such as that which is completely unchangeable, the primary reality, and the essence of a thing, i.e. the form; for this is the end or that for the sake of which. Hence since nature is for the sake of something, we must know this cause also. We must explain the 'why' in all the [5] senses of the term, namely, that from this that will necessarily result ('from this' either without qualification or for the most part); that this must be so if that is to be so (as the conclusion presupposes the premisses); that this was the essence of the thing; and because it is better thus (not without qualification, but with reference to the substance in each case).

8 · We must explain then first why nature belongs to the class of causes [10] which act for the sake of something; and then about the necessary and its place in nature, for all writers ascribe things to this cause, arguing that since the hot and the cold and the like are of such and such a kind, therefore certain things *necessarily* are and come to be—and if they mention any other cause (one friendship and strife, [15] another mind), it is only to touch on it, and then good-bye to it.

A difficulty presents itself: why should not nature work, not for the sake of something, nor because it is better so, but just as the sky rains, not in order to make the corn grow, but of necessity? (What is drawn up must cool, and what has been cooled must become water and descend, the result of this being that the corn grows.) [20] Similarly if a man's crop is spoiled on the threshing-floor, the rain did not fall for the sake of this—in order that the crop might be spoiled—but that result just followed. Why then should it not be the same with the parts in nature, e.g. that our teeth should come up of necessity—the front teeth sharp, fitted for tearing, the [25] molars broad and useful for grinding down the food—since they did not arise for this end, but it was merely a coincident result; and so with all other parts in which we suppose that there is purpose? Wherever then all the parts came about just what they would have been if they had come to be for an end, such things survived, being [30] organized spontaneously in a fitting way; whereas those which grew otherwise perished and continue to perish, as Empedocles says his 'man-faced oxprogeny' did.<sup>18</sup>

Such are the arguments (and others of the kind) which may cause difficulty on this point. Yet it is impossible that this should be the true view. For teeth and all other natural things either invariably or for the most part come about in a given way; but of not one of the results of chance or spontaneity is this true. We do not [199a<sup>1</sup>] ascribe to chance or mere coincidence the frequency of rain in winter, but frequent rain in summer we do; nor heat in summer but only if we have it in winter. If then, it is agreed that things are either the result of coincidence or for the sake of something, and these cannot be the result of coincidence or spontaneity, it follows [5] that they must be for the sake of something; and that such things are all due to nature even the champions of the theory which is before us would agree. Therefore action for an end is present in things which come to be and are by nature.

Further, where there is an end, all the preceding steps are for the sake of that. [10] Now surely as in action, so in nature; and as in nature, so it is in each action, if nothing interferes. Now action is for the sake of an end; therefore the nature of things also is so. Thus if a house, e.g., had been a thing made by nature, it would have been made in the same way as it is now by art; and if things made by nature were made not only by nature but also by art, they would come to be in the same [15] way as by nature. The one, then, is for the sake of the other; and generally art in some cases completes what nature cannot bring to a finish, and in others imitates nature. If, therefore, artificial products are for the sake of an end,

so clearly also are natural products. The relation of the later to the earlier items is the same in both.

[20] This is most obvious in the animals other than man: they make things neither by art nor after inquiry or deliberation. That is why people wonder whether it is by intelligence or by some other faculty that these creatures work,—spiders, ants, and the like. By gradual advance in this direction we come to see clearly that in plants [25] too that is produced which is conducive to the end—leaves, e.g. grow to provide shade for the fruit. If then it is both by nature and for an end that the swallow makes its nest and the spider its web, and plants grow leaves for the sake of the fruit and send their roots down (not up) for the sake of nourishment, it is plain that this kind [30] of cause is operative in things which come to be and are by nature. And since nature is twofold, the matter and the form, of which the latter is the end, and since all the rest is for the sake of the end, the form must be the cause in the sense of that for the sake of which.

Now mistakes occur even in the operations of art: the literate man makes a mistake in writing and the doctor pours out the wrong dose. Hence clearly mistakes [199<sup>b</sup>1] are possible in the operations of nature also. If then in art there are cases in which what is rightly produced serves a purpose, and if where mistakes occur there was a purpose in what was attempted, only it was not attained, so must it be also in natural products, and monstrosities will be failures in the purposive effort. Thus in the [5] original combinations the ‘ox-progeny’, if they failed to reach a determinate end must have arisen through the corruption of some principle, as happens now when the seed is defective.

Further, seed must have come into being first, and not straightway the animals: what was ‘undifferentiated first’<sup>19</sup> was seed.

[10] Again, in plants too we find that for the sake of which, though the degree of organization is less. Were there then in plants also olive-headed vine-progeny, like the ‘man-headed ox-progeny’, or not? An absurd suggestion; yet there must have been, if there were such things among animals.

Moreover, among the seeds anything must come to be at random. But the [15] person who asserts this entirely does away with nature and what exists by nature. For those things are natural which, by a continuous movement originated from an internal principle, arrive at some end: the same end is not reached from every principle; nor any chance end, but always the tendency in each is towards the same end, if there is no impediment.

The end and the means towards it may come about by chance. We say, for instance, that a stranger has come by chance, paid the ransom, and gone away, [20] when he does so as if he had come for that purpose, though it was not for that that he came. This is accidental, for chance is an accidental cause, as I remarked before. But when an event takes place always or for the most part, it is not accidental or by [25] chance. In natural products the sequence is invariable, if there is no impediment.

It is absurd to suppose that purpose is not present because we do not observe the agent deliberating. Art does not deliberate. If the ship-building art were in the wood, it would produce the same results by nature. If, therefore, purpose is present in art, it is present also in nature. The best illustration is a doctor doctoring himself: [30] nature is like that.

It is plain then that nature is a cause, a cause that operates for a purpose.

9 · As regards what is of necessity, we must ask whether the necessity is hypothetical, or simple as well. The current view places what is of necessity in the process of production, just as if one were to suppose that the wall of a house [200<sup>a</sup>1] necessarily comes to be because what is heavy is naturally carried downwards and what is light to the top, so that the stones and foundations take the lowest place, with earth above because it is lighter, and wood at the top of all as being the lightest. Whereas, though the wall does not come to be *without* these, it is not *due* to these, [5] except as its material cause: it comes to be for the sake of sheltering and guarding certain things. Similarly in all other things which involve that for the sake of which: the product cannot come to be without things which have a necessary nature, but it is not due to these (except as its material); it comes to be for an end. For instance, why is a saw such as it is? To effect so-and-so and for the sake of so-and-so. This [10] end, however, cannot be realized unless the saw is made of iron. It is, therefore, necessary for it to be of iron, if we are to have a saw and perform the operation of sawing. What is necessary then, is necessary on a hypothesis, not as an end. Necessity is in the matter, while that for the sake of which is in the definition.

Necessity in mathematics is in a way similar to necessity in things which come [15] to be through the operation of nature. Since a straight line is what it is, it is necessary that the angles of a triangle should equal two right angles. But not conversely; though if the angles are *not* equal to two right angles, then the straight line is not what it is either. But in

things which come to be for an end, the reverse is true. If the end is to exist or does exist, that also which precedes it will exist or does [20] exist; otherwise just as there, if the conclusion is not true, the principle will not be true, so here the end or that for the sake of which will not exist. For this too is itself a principle, but of the reasoning, not of the action. (In mathematics the principle is the principle of the reasoning only, as there is no action.) If then there is to be a house, such-and-such things must be made or be there already or exist, or generally [25] the matter relative to the end, bricks and stones if it is a house. But the end is not due to these except as the matter, nor will it come to exist because of them. Yet if they do not exist at all, neither will the house, or the saw—the former in the absence of stones, the latter in the absence of iron—just as in the other case the principles will not be true, if the angles of the triangle are not equal to two right angles. [30]

The necessary in nature, then, is plainly what we call by the name of matter, and the changes in it. Both causes must be stated by the student of nature, but especially the end; for that is the cause of the matter, not *vice versa*; and the end is that for the sake of which, and the principle starts from the definition or essence: as [200<sup>b</sup>1] in artificial products, since a house is of such-and-such a kind, certain things must *necessarily* come to be or be there already, or since health is this, these things must necessarily come to be or be there already, so too if man is this, then these; if these, then those. Perhaps the necessary is present also in the definition. For if one defines [5] the operation of sawing as being a certain kind of dividing, then this cannot come about unless the saw has teeth of a certain kind; and these cannot be unless it is of iron. For in the definition too there are some parts that stand as matter.



## BOOK III

1 · Nature is a principle of motion and change, and it is the subject of our inquiry. We must therefore see that we understand what motion is; for if it were unknown, nature too would be unknown.

[15] When we have determined the nature of motion, our task will be to attack in the same way the terms which come next in order. Now motion is supposed to belong to the class of things which are continuous; and the infinite presents itself first in the continuous—that is how it comes about that the account of the infinite is often used in definitions of the continuous; for what is infinitely divisible is [20] continuous. Besides these, place, void, and time are thought to be necessary conditions of motion.

Clearly, then, for these reasons and also because the attributes mentioned are common to everything and universal, we must first take each of them in hand and discuss it. For the investigation of special attributes comes after that of the common attributes.

[25] To begin then, as we said, with motion.

Some things are in fulfilment only, others in potentiality and in fulfilment—one being a ‘this’, another so much, another such and such, and similarly for the other categories of being. The term ‘relative’ is applied sometimes with reference to [30] excess and defect, sometimes to agent and patient, and generally to what can move and what can be moved. For what can cause movement is relative to what can be moved, and *vice versa*.

There is no such thing as motion over and above the things. It is always with respect to substance or to quantity or to quality or to place that what changes changes. But it is impossible, as we assert, to find anything common to these which [201<sup>a</sup>1] is neither ‘this’ nor quantity nor quality nor any of the other predicates. Hence neither will motion and change have reference to something over and above the things mentioned; for there *is* nothing over and above them.

Now each of these belongs to all its subjects in either of two ways: namely, substance—the one is its form, the other privation; in quality, white and black; in [5] quantity, complete and incomplete. Similarly, in respect of locomotion, upwards and downwards or light and heavy.

Hence there are as many types of motion or change as there are of being.

We have distinguished in respect of each class between what is in fulfilment [10] and what is potentially; thus the fulfilment of what is potentially, as such, is motion—e.g. the fulfilment of what is alterable, as alterable, is alteration; of what is increasable and its opposite, decreasable (there is no common name for both), increase and decrease; of what can come to be and pass away, coming to be and passing away; of what can be carried along, locomotion.

That this is what motion is, is clear from what follows: when what is buildable, [15] in so far as we call it such, is in fulfilment, it is being built, and that is building. Similarly with learning, doctoring, rolling, jumping, ripening, aging.

The same thing can be both potential and fulfilled, not indeed at the same time [20] or not in the same respect, but e.g. potentially hot and actually cold. Hence such things will act and be acted on by one another in many ways: each of them will be capable at the same time of acting and of being acted upon. Hence, too, what effects motion as a natural agent can be moved: when a thing of this kind causes motion, it is itself also moved. This, indeed, has led some people to suppose that every mover is [25] moved. But this question depends on another set of arguments, and the truth will be made clear later.<sup>20</sup> It is possible for a thing to cause motion, though it is itself incapable of being moved.

It is the fulfilment of what is potential when it is already fulfilled and operates not as itself but as movable, that is motion. What I mean by ‘as’ is this: bronze is potentially a statue. But it is not the fulfilment of bronze as *bronze* which is motion. [30] For to be bronze and to be a certain potentiality are not the same. If they were identical without qualification, i.e. in definition, the fulfilment of bronze as bronze *would* be motion. But they are not the same, as has been said. (This is obvious in contraries. To be capable of health and to be capable of illness are not the same; for if they were there would be no difference between being ill and being well. Yet the [201<sup>b</sup>1] subject both of health and of sickness—whether it is humour or blood—is one and the same.)

We can distinguish, then, between the two—just as colour and visible are different—and clearly it is the fulfilment of what is potential as potential that is [5] motion.

It is evident that this is motion, and that motion occurs just when the fulfilment itself occurs, and neither before nor after. For each thing is capable of being at one time actual, at another not. Take for instance the

buildable: the actuality of the buildable as buildable is the process of building. For the actuality must be either [10] this or the house. But when there is a house, the buildable is no longer there. On the other hand, it is the buildable which is *being* built. Necessarily, then, the actuality is the process of building. But building is a kind of motion, and the same account will apply to the other kinds also. [15]

2 · The soundness of this definition is evident both when we consider the accounts of motion that the others have given, and also from the difficulty of defining it otherwise.

One could not easily put motion and change in another genus—this is plain if [20] we consider where some people put it: they identify motion with difference or inequality or not being; but such things are not necessarily moved, whether they are different or unequal or non-existent. Nor is change either to or from *these* rather than to or from their opposites.

The reason why they put motion into these genera is that it is thought to be [25] something indefinite, and the principles in the second column<sup>21</sup> are indefinite because they are privative: none of them is either a ‘this’ or such or comes under any of the other categories. The reason why motion is thought to be indefinite is that it cannot be classed as a potentiality or as an actuality—a thing that is merely *capable* [30] of having a certain size is not necessarily undergoing change, nor yet a thing that is *actually* of a certain size, and motion is thought to be a sort of *actuality*, but incomplete, the reason for this view being that the potential whose actuality it is is incomplete. This is why it is hard to grasp what motion is. It is necessary to class it with privation or with potentiality or with simple actuality, yet none of these seems [202<sup>a</sup>1] possible. There remains then the suggested mode of definition, namely that it is a sort of actuality, or actuality of the kind described, hard to grasp, but not incapable of existing.

Every mover too is moved, as has been said—every mover, that is, which is capable of motion, and whose immobility is rest (for when a thing is subject to [5] motion its immobility is rest). For to act on the movable as such is just to move it. But this it does by contact, so that at the same time it is also acted on. Hence motion is the fulfilment of the movable as movable, the cause being contact with what can move, so that the mover is also acted on. The mover will always transmit a form, [10] either a ‘this’ or such or so much, which, when it moves, will be the

principle and cause of the motion, e.g. the actual man begets man from what is potentially man.

3 · The solution of the difficulty is plain: motion is in the movable. It is the fulfilment of this potentiality by the action of that which has the power of causing [15] motion; and the actuality of that which has the power of causing motion is not other than the actuality of the movable; for it must be the fulfilment of *both*. A thing is capable of causing motion because it *can* do this, it is a mover because it actually *does* it. But it is on the movable that it is capable of acting. Hence there is a single actuality of both alike, just as one to two and two to one are the same interval, and the steep ascent and the steep descent are one—for these are one and the same, [20] although their definitions are not one. So it is with the mover and the moved.

This view has a dialectical difficulty. Perhaps it is necessary that there should be an actuality of the agent and of the patient. The one is agency and the other patiency; and the outcome and end of the one is an action, that of the other a passion. Since [25] then they are both motions, we may ask: *in* what are they, if they are different? Either both are in what is acted on and moved, or the agency is in the agent and the patiency in the patient. (If we ought to call the latter also ‘agency’, the word would be used in two senses.)

Now, in the latter case, the motion will be in the mover, for the same account will hold of mover and moved. Hence either *every* mover will be moved, or, though [30] having motion, it will not be moved.

If on the other hand both are in what is moved and acted on—both the agency and the patiency (e.g. both teaching and learning, though they are two, in the learner), then, first, the actuality of each will not be present *in* each, and, a second absurdity, a thing will have two motions at the same time. How will there be two [35] alterations of quality in *one* subject towards *one* form? The thing is impossible: the actualization will be one.

But (someone will say) it is contrary to reason to suppose that there should be [202<sup>b</sup>1] one identical actualization of two things which are different in kind. Yet there will be, if teaching and learning are the same, and agency and patiency. To teach will be the same as to learn, and to act the same as to be acted on—the teacher will necessarily be learning everything that he teaches, and the agent will be acted on. [5] It is not absurd that the actualization of one thing should be in another. Teaching

is the activity of a person who can teach, yet the operation is performed in something—it is not cut adrift from a subject, but is of one thing in another.

There is nothing to prevent two things having one and the same actualization (not the same in being, but related as the potential is to the actual). [10]

Nor is it necessary that the teacher should learn, even if to act and to be acted on are one and the same, provided they are not the same in respect of the account which states their essence (as raiment and dress), but are the same in the sense in which the road from Thebes to Athens and the road from Athens to Thebes are the same, as has been explained above. For it is not things which are in any way the [15] same that have all their attributes the same, but only those to be which is the same. But indeed it by no means follows from the fact that teaching is the same as learning, that to learn is the same as to teach, any more than it follows from the fact that there is one distance between two things which are at a distance from each other, that being here at a distance from there and being there at a distance from here are one and the same. To generalize, teaching is not the same as learning, or agency as patiency, in the full sense, though they belong to the same subject, the [20] motion; for the actualization of this in that and the actualization of that through the action of this differ in definition.

What then motion is, has been stated both generally and particularly. It is not difficult to see how each of its types will be defined—alteration is the fulfilment of the alterable as alterable (or, more scientifically, the fulfilment of what can act and [25] what can be acted on, as such)—generally and again in each particular case, building, healing. A similar definition will apply to each of the other kinds of motion.

4 · The science of nature is concerned with magnitudes and motion and time, [30] and each of these is necessarily infinite or finite, even if some things are not, e.g. a quality or a point—it is not necessary perhaps that such things should be put under [35] either head. Hence it is incumbent on the person who treats of nature to discuss the infinite and to inquire whether there is such a thing or not, and, if there is, what it is.

[203a1] The appropriateness to the science of this problem is clearly indicated; for all who have touched on this kind of science in a way worth considering have formulated views about the infinite, and indeed, to a man, make it a principle of things.

Some, as the Pythagoreans and Plato, make the infinite a principle as a [5] substance in its own right, and not as an accident of some other thing. Only the Pythagoreans place the infinite among the objects of sense (they do not regard number as separable from these), and assert that what is outside the heaven is infinite. Plato, on the other hand, holds that there is no body outside (the Forms are not outside, because they are nowhere), yet that the infinite is present not only in the objects of sense but in the Forms also.

[10] Further, the Pythagoreans identify the infinite with the even. For this, they say, when it is cut off and shut in by the odd, provides things with the element of infinity. An indication of this is what happens with numbers. If the gnomons are placed round the one, and without the one, in the one construction the figure that [15] results is always different, in the other it is always the same. But Plato has two infinities, the Great and the Small.

The physicists, on the other hand, all of them, regard the infinite as an attribute of a substance which is different from it and belongs to the class of the so-called elements—water or air or what is intermediate between them. Those who make them limited in number never make them infinite in amount. But those who [20] make the elements infinite in number, as Anaxagoras and Democritus do, say that the infinite is continuous by contact—compounded of the homogeneous parts according to the one, of the seedmass of the atomic shapes according to the other.

Further, Anaxagoras held that any part is a mixture in the same way as the whole, on the ground of the observed fact that anything comes out of anything. For [25] it is probably for this reason that he maintains that once upon a time all things were together. *This* flesh and *this* bone were together, and so of *any* thing; therefore *all* things—and at the same time too. For there is a principle of separation, not only for each thing, but for all. Each thing that comes to be comes to be from a similar body, and there is a coming to be of all things, though not, it is true, at the same time. [30] Hence there must also be a principle of coming to be. One such source there is which he calls Mind, and Mind begins its work of thinking from some principle. So necessarily all things must have been together at a certain time, and must have begun to be moved at a certain time.

Democritus, for his part, asserts that no element arises from another element. [203<sup>b</sup>1] Nevertheless for him the common body is a principle of all things, differing from part to part in size and in shape.

It is clear then from these considerations that the inquiry concerns the student of nature. Nor is it without reason that they all make it a

principle. We cannot say that the infinite exists in vain, and the only power which we can ascribe to it is that [5] of a principle. For everything is either a principle or derived from a principle. But there cannot be a principle of the infinite, for that would be a limit of it. Further, as it is a principle, it is both uncreatable and indestructible. For there must be a point at which what has come to be reaches its end, and also a termination of all passing away. That is why, as we say, there is no principle of *this*, but it is this which is held [10] to be the principle of other things, and to encompass all and to steer all, as those assert who do not recognize, alongside the infinite, other causes, such as Mind or Friendship. Further they identify it with the Divine, for it is deathless and imperishable as Anaximander says, with the majority of the physicists. [15]

Belief in the existence of the infinite comes mainly from five considerations: From the nature of time—for it is infinite; From the division of magnitudes—for the mathematicians also use the infinite; again, if coming to be and passing away do not give out, it is only because that from which things come to be is infinite; again, [20] because the limited always finds its limit in something, so that there must be no limit, if everything is always limited by something different from itself. Most of all, a reason which is peculiarly appropriate and presents the difficulty that is felt by everybody—not only number but also mathematical magnitudes and what is [25] outside the heaven are supposed to be infinite because they never give out in our thought.

If what is outside is infinite it seems that body also is infinite, and that there is an infinite number of worlds. Why should there be body in one part of the void rather than in another? Grant only that mass is anywhere and it follows that it must be everywhere. Also, if void and place are infinite, there must be infinite body too; for in the case of eternal things what may be is. [30] But the problem of the infinite is difficult: many contradictions result whether we suppose it to exist or not to exist. If it exists, we have still to ask *how* it exists—as a substance or as the essential attribute of some entity? Or in neither way, yet none the less is there something which is infinite or some things which are infinitely many?

The problem, however, which specially belongs to the physicist is to investigate [204<sup>a</sup>1] whether there is a sensible magnitude which is infinite.

We must begin by distinguishing the various ways in which the term 'infinite' is used: in one way, it is applied to what is incapable of being

gone through, because it is not its nature to be gone through (the way in which the voice is invisible); in another, to what admits of a traversal which cannot be completed, or which can only [5] be completed with difficulty, or what naturally admits of a traversal but does not have a traversal or limit.

Further, everything that is infinite may be so in respect of addition or division or both.

5 · Now it is impossible that the infinite should be a thing which is in itself infinite, separable from sensible objects. If the infinite is neither a magnitude nor an aggregate, but is itself a substance and not an accident, it will be indivisible; for the [10] divisible must be either a magnitude or an aggregate. But if indivisible, then not infinite, except in the way in which the voice is invisible. But this is not the way in which it is used by those who say that the infinite exists, nor that in which we are investigating it, namely as that which cannot be gone through. But if the infinite is [15] accidental, it would not be, *qua* infinite, an element in things, any more than the invisible would be an element of speech, though the voice is invisible.

Further, how can the infinite be itself something, unless both number and magnitude, of which it is an essential attribute, exist in that way? If they are not substances, *a fortiori* the infinite is not.

[20] It is plain, too, that the infinite cannot be an actual thing and a substance and principle. For any part of it that is taken will be infinite, if it has parts; for to be infinite and the infinite are the same, if it is a substance and not predicated of a subject. Hence it will be either indivisible or divisible into infinities. But the same [25] thing cannot be many infinities. (Yet just as part of air is air, so a part of the infinite would be infinite, if it is supposed to be a substance and principle.) Therefore the infinite must be without parts and indivisible. But this cannot be true of what is infinite in fulfilment; for it must be a definite quantity.

[30] Suppose then that infinity belongs accidentally. But, if so, it cannot, as we have said, be described as a principle, but rather that of which it is an accident—the air or the even number.

Thus the view of those who speak after the manner of the Pythagoreans is absurd. With the same breath they treat the infinite as substance, and divide it into parts.

This discussion, however, involves the more general question whether the [204<sup>b1</sup>] infinite can be present in mathematical objects and things



which are intelligible and do not have extension. Our inquiry is limited to our special subject-matter, the objects of sense, and we have to ask whether there is or is not among them a body which is infinite in the direction of increase.

We may begin with a dialectical argument and show as follows that there is no such thing.

[5] If 'bounded by a surface' is the definition of body there cannot be an infinite body either intelligible or sensible. Nor can number taken in abstraction be infinite; for number or that which has number is numerable. If then the numerable can be numbered, it would also be possible to go through the infinite.

[10] If, on the other hand, we investigate the question more in accordance with principles appropriate to physics, we are led as follows to the same result.

The infinite can be either compound, or simple.

It will not be compound, if the elements are finite in number. For they must be more than one, and the contraries must always balance, and no *one* of them can be [15] infinite. If one of the bodies falls in any degree short of the other in potency—suppose fire is finite in amount while air is infinite and a given quantity of fire exceeds in power the same amount of air in any ratio provided it is numerically definite—the infinite body will obviously prevail over and annihilate the finite body. On the other hand, it is impossible that *each* should be infinite. Body is what has extension in all directions and the infinite is what is boundlessly extended, so that [20] the infinite body would be extended in all directions *ad infinitum*.

Nor can an infinite body be one and simple, whether it is, as some hold, a thing over and above the elements (from which they generate the elements) or is not thus qualified. There *are* some people who make this the infinite, and not air or water, in [25] order that the other elements may not be annihilated by the element which is infinite. They have contrariety with each other—air is cold, water moist, fire hot; if one were infinite, the others by now would have ceased to be. As it is, they say, the infinite is different from them and is their source.

It is impossible, however, that there should be such a body; not because it is infinite—on that point a general proof can be given which applies equally to all, air, [30] water, or anything else—but because there is no such sensible body, alongside the so-called elements. Everything can be resolved into the elements of which it is composed. Hence the body in

question would have been present in our world here, alongside air and fire and earth and water; but nothing of the kind is observed.

Nor can fire or any other of the elements be infinite. For generally, and apart [205<sup>a</sup>1] from the question how any of them could be infinite, the universe, even, if it were limited, cannot either be or become one of them, as Heraclitus says that at some time all things become fire. (The same argument applies also to the one which the physicists suppose to exist alongside the elements: for everything changes from [5] contrary to contrary, e.g. from hot to cold.)

In each case, we should consider along these lines whether it is or is not possible that it should be infinite. The following arguments give a general demonstration that it is not possible for there to be an infinite sensible body.

It is the nature of every kind of sensible body to be somewhere, and there is a [10] place appropriate to each, the same for the part and for the whole, e.g. for the whole earth and for a single clod, and for fire and for a spark.

Suppose that the infinite sensible body is homogeneous. Then each will be either immovable or always being carried along. Yet neither is possible. For why downwards rather than upwards or in any other direction? I mean, e.g., if you take a clod, where will it be moved or where will it be at rest? For the place of the body [15] akin to it is infinite. Will it occupy the whole place, then? And how? What then will be the nature of its rest and of its movement, or where will they be? It will either be at rest everywhere—then it will not be moved; or it will be moved everywhere—then it will not come to rest.

But if the universe has dissimilar parts, the proper places of the parts will be [20] dissimilar also, and the body of the universe will have no unity except that of contact. Then, further, the parts will be either finite or infinite in variety of kind.

*Finite* they cannot be; for if the universe is to be infinite, some of them would have to be infinite, while the others were not, e.g. fire or water will be infinite. But such an element would destroy what is contrary to it.

But if the parts are *infinite* in number and simple, their proper places too will [25] be infinite in number, and the same will be true of the elements themselves. If that is impossible, and the places are finite, the whole too must be finite; for the place and the body cannot but fit each other. Neither is the whole place larger than what can be filled by the

body (and then the body would no longer be infinite), nor is the body larger than the place; for either there would be an empty space or a body whose [30] nature it is to be nowhere. This indeed is the reason why none of the physicists made fire or earth the one infinite body, but either water or air or what is intermediate between them, because the abode of each of the two was plainly determinate, while the others have an ambiguous place between up and down.

[205<sup>b</sup>1] Anaxagoras gives an absurd account of why the infinite is at rest. He says that the infinite itself is the cause of its being fixed. This because it is *in* itself, since nothing else contains it—on the assumption that wherever anything is, it is there by [5] its own nature. But this is not true: a thing could be somewhere by compulsion, and not where it is its nature to be.

Thus however true it may be that the whole is not moved (for what is fixed by itself and is in itself must be immovable), yet we must explain *why* it is not its nature to be moved. It is not enough just to make this statement and then decamp. For it might be not moving because there is nowhere else for it to move, even though there [10] is no reason why it should not be its nature to be moved. The earth is not carried along, and would not be carried along if it were infinite, provided it is held together by the centre. But it would not be because there was no other region in which it could be carried along that it would remain, but because this is its nature. Yet in this case also we may say that it fixes itself. If then in the case of the earth, supposed [15] to be infinite, it is at rest, not for this reason, but because it has weight and what is heavy rests at the centre and the earth is at the centre, similarly the infinite also would rest in itself, not because it is infinite and fixes itself, but owing to some other cause.

It is clear at the same time that part of the infinite body ought to remain at rest. Just as the infinite remains at rest in itself because it fixes itself, so too any part [20] of it you may take will remain in itself. The appropriate places of the whole and of the part are alike, e.g. of the whole earth and of a clod the appropriate place is the lower region; of fire as a whole and of a spark, the upper region. If, therefore, to be in itself is the place of the infinite, that also will be appropriate to the part. Therefore it will remain in itself.

In general, the view that there is an infinite body is plainly incompatible with [25] the doctrine that there is a proper place for each kind of body, if every sensible body has either weight or lightness, and if a body has a natural locomotion towards the centre if it is heavy, and

upwards if it is light. This would need to be true of the infinite also. But neither character can belong to it: it cannot be either as a whole, nor can it be half the one and half the other. For how should you divide it? or how [30] can the infinite have the one part up and the other down, or an extremity and a centre?

Further, every sensible body is in place, and the kinds or differences of place are up-down, before-behind, right-left; and these distinctions hold not only in relation to us and by convention, but also in the whole itself. But in the infinite body [206<sup>a</sup>1] they cannot exist. In general, if it is impossible that there should be an infinite place, and if every body is in place, there cannot be an infinite body.

Surely what is in a place is somewhere, and what is somewhere is in a place. Just, then, as the infinite cannot be quantity—that would imply that it has a particular quantity, e.g. two or three cubits; quantity just means these—so a thing's being in a place means that it is somewhere, and that is either up or down or in some [5] other of the six differences of position; but each of these is a limit.

It is plain from these arguments that there is no body which is actually infinite.

6 · But on the other hand to suppose that the infinite does not exist in any way leads obviously to many impossible consequences: there will be a beginning and [10] an end of time, a magnitude will not be divisible into magnitudes, number will not be infinite. If, then, in view of the above considerations, neither alternative seems possible, an arbiter must be called in; and clearly there is a sense in which the infinite exists and another in which it does not.

Now things are said to exist both potentially and in fulfilment. Further, a thing is infinite either by addition or by division. Now, as we have seen, magnitude is not [15] actually infinite. But by division it is infinite. (There is no difficulty in refuting the theory of indivisible lines.) The alternative then remains that the infinite has a potential existence.

But we must not construe potential existence in the way we do when we say that it is possible for this to be a statue—this will *be* a statue, but something [20] infinite will not be in actuality. Being is spoken of in many ways, and we say that the infinite is in the sense in which we say it is day or it is the games, because one thing after another is always coming into existence. For of these things too the distinction between potential and actual existence holds. We say that there are Olympic

games, both in the sense that they may occur and that they are actually [25] occurring.

The infinite exhibits itself in different ways—in time, in the generations of man, and in the division of magnitudes. For generally the infinite has this mode of existence: one thing is always being taken after another, and each thing that is taken is always finite, but always different. [Again, ‘being’ is spoken of in several ways, so that we must not regard the infinite as a ‘this’, such as a man or a horse, but must [30] suppose it to exist in the sense in which we speak of the day or the games as existing—things whose being has not come to them like that of a substance, but consists in a process of coming to be or passing away, finite, yet always different.]<sup>22</sup>

But in spatial magnitudes, what is taken persists, while in the succession of [206<sup>b</sup>1] time and of men it takes place by the passing away of these in such a way that the source of supply never gives out.

In a way the infinite by addition is the same thing as the infinite by division. In a finite magnitude, the infinite by addition comes about in a way inverse to that of the other. For just as we see division going on *ad infinitum*, so we see addition being [5] made in the same proportion to what is already marked off. For if we take a determinate part of a finite magnitude and add another part determined by the same ratio (not taking in the same amount of the original whole), we shall not [10] traverse the given magnitude. But if we increase the ratio of the part, so as always to take in the same amount, we shall traverse the magnitude; for every finite magnitude is exhausted by means of any determinate quantity however small.

The infinite, then, exists in no other way, but in this way it does exist, potentially and by reduction. It exists in fulfillment in the sense in which we say ‘it is [15] day’ or ‘it is the games’; and potentially as matter exists, not independently as what is finite does.

By addition then, also, there is potentially an infinite, namely, what we have described as being in a sense the same as the infinite in respect of division. For it will always be possible to take something *ab extra*. Yet the sum of the parts taken will not exceed every determinate magnitude, just as in the direction of division every [20] determinate magnitude is surpassed and there will always be a smaller part.

But in respect of addition there cannot even potentially be an infinite which exceeds every assignable magnitude, unless it is accidentally infinite in fulfillment, as the physicists hold to be true of the body which

is outside the world, whose substance is air or something of the kind. But if there cannot be in this way a [25] sensible body which is infinite in fulfilment, evidently there can no more be a body which is potentially infinite in respect of addition, except as the inverse of the infinite by division, as we have said. It is for this reason that Plato also made the infinities two in number, because it is supposed to be possible to exceed all limits and to proceed *ad infinitum* in the direction both of increase and of reduction. Yet [30] though he makes the infinities two, he does not use them. For in the numbers the infinite in the direction of reduction is not present, as the monad is the smallest; nor is the infinite in the direction of increase, for he makes numbers only up to the decad.

The infinite turns out to be the contrary of what it is said to be. It is not what [207<sup>a</sup>1] has nothing outside it that is infinite, but what always has something outside it. This is indicated by the fact that rings also that have no bezel are described as infinite,<sup>23</sup> because it is always possible to take a part which is outside a given part. The description depends on a certain similarity, but it is not true in the full sense of the [5] word. This condition alone is not sufficient: it is necessary also that the same part should never be taken twice. In the circle, the latter condition is not satisfied: it is true only that the next part is always different.

Thus something is infinite if, taking it quantity by quantity, we can always take something outside. On the other hand, what has nothing outside it is complete and whole. For thus we define the whole—that from which nothing is wanting, as a [10] whole man or box. What is true of each particular is true of the whole properly speaking—the whole is that of which nothing is outside. On the other hand that from which something is absent and outside, however small that may be, is not ‘all’. Whole and complete are either quite identical or closely akin. Nothing is complete which has no end and the end is a limit.

[15] Hence Parmenides must be thought to have spoken better than Melissus. The latter says that the whole is infinite, but the former describes it as limited, ‘equally balanced from the middle’.<sup>24</sup> For to connect the infinite with the universe and the whole is not like joining two pieces of string; for it is from this they get the dignity they ascribe to the infinite—its containing all things and holding the universe in itself—from its having a certain similarity to the whole. It is in fact the matter of [20] the completeness which belongs to size, and what is potentially a whole, though not in fulfilment. It is divisible both in the direction of reduction and of the inverse addition. It is a whole and limited; not, however, in virtue of its own nature, but in virtue of something else. It

does not contain, but, in so far as it is infinite, is contained. Consequently, also, it is unknowable, *qua* infinite; for the matter has no [25] form. (Hence it is plain that the infinite stands in the relation of part rather than of whole. For the matter is part of the whole, as the bronze is of the bronze statue.) If it contains in the case of sensible things, in the case of intelligible things the great and the small ought to contain them. But it is absurd and impossible to suppose that the [30] unknowable and indeterminate should contain and determine.

7 · It is reasonable that there should not be held to be an infinite in respect of addition such as to surpass every magnitude, but that there should be thought to be such an infinite in the direction of division. For the matter and the infinite are contained inside what contains them, while it is the form which contains. It is [207<sup>b</sup>1] reasonable too to suppose that in number there is a limit in the direction of the minimum, and that in the other direction every amount is always surpassed. In magnitude, on the contrary, every magnitude is surpassed in the direction of smallness, while in the other direction there is no infinite magnitude. The reason is [5] that what is one is indivisible whatever it may be, e.g. a man is one man, not many. Number on the other hand is a plurality of 'ones' and a certain quantity of them. Hence number must stop at the indivisible; for 'two' and 'three' are derivative terms, and so with each of the other numbers. But in the direction of largeness it is [10] always possible to think of a large number; for the number of times a magnitude can be bisected is infinite. Hence this infinite is potential, never actual: the number of parts that can be taken always surpasses any definite amount. But this number is not separable, and its infinity does not persist but consists in a process of coming to be, like time and the number of time. [15]

With magnitudes the contrary holds. What is continuous is divided *ad infinitum*, but there is no infinite in the direction of increase. For the size which it can potentially be, it can actually be. Hence since no sensible magnitude is infinite, it is impossible to exceed every definite magnitude; for if it were possible there [20] would be something bigger than the heavens.

The infinite is not the same in magnitude and movement and time, in the sense of a single nature, but the posterior depends on the prior, e.g. movement is called infinite in virtue of the magnitude covered by the movement (or alteration or growth), and time because of the movement.

(I use these terms for the moment. [25] Later I shall explain what each of them means, and also why every magnitude is divisible into magnitudes.)

Our account does not rob the mathematicians of their science, by disproving the actual existence of the infinite in the direction of increase, in the sense of the [30] untraversable. In point of fact they do not need the infinite and do not use it. They postulate only that a finite straight line may be produced as far as they wish. It is possible to have divided into the same ratio as the largest quantity another magnitude of any size you like. Hence, for the purposes of proof, it will make no difference to them whether the infinite is found among existent magnitudes.

In the four-fold scheme of causes, it is plain that the infinite is a cause in the [208<sup>a</sup>1] sense of matter, and that its essence is privation, the subject as such being what is continuous and sensible. All the other thinkers, too, evidently treat the infinite as matter—that is why it is inconsistent in them to make it what contains, and not what is contained.

[5] 8 · It remains to go through the arguments which are supposed to support the view that the infinite exists not only potentially but as a separate thing. Some have no cogency; others can be met by fresh objections that are true.

In order that coming to be should not fail, it is not necessary that there should [10] be a sensible body which is actually infinite. The passing away of one thing may be the coming to be of another, the universe being limited.

There is a difference between touching and being limited. The former is relative to something and is the touching of something (for everything that touches touches something), and further is an attribute of some one of the things which are limited. On the other hand, what is limited is not limited in relation to anything. Again, contact is not possible between any two things taken at random.

[15] To rely on thinking is absurd; for then the excess or defect is not in the thing but in the thought. One might think that one of us is bigger than he is and magnify him *ad infinitum*. But it does not follow that he is bigger than the size we are, just because some one thinks he is, but only because he is the size he is. The thought is an accident.

[20] Time indeed and movement are infinite, and also thinking; but the parts that are taken do not persist.

Magnitude is not infinite either in the way of reduction or of magnification in thought.



This concludes my account of the way in which the infinite exists, and of the way in which it does not exist, and of what it is.

## BOOK IV

1 · The physicist must have a knowledge of place, too, as well as of the infinite—namely, whether there is such a thing or not, and the manner of its existence and what it is—both because all suppose that things which exist are [30] *somewhere* (the non-existent is nowhere—where is the goat-stag or the sphinx?), and because motion in its most general and proper sense is change of place, which we call ‘locomotion’.

The question, what is place? presents many difficulties. An examination of all the relevant facts seems to lead to different conclusions. Moreover, we have inherited nothing from previous thinkers, whether in the way of a statement of difficulties or of a solution.

The existence of place is held to be obvious from the fact of mutual [208<sup>b</sup>1] replacement. Where water now is, there in turn, when the water has gone out as from a vessel, air is present; and at another time another body occupies this same place. The place is thought to be different from all the bodies which come to be in it [5] and replace one another. What now contains air formerly contained water, so that clearly the place or space into which and out of which they passed was something different from both.

Further, the locomotions of the elementary natural bodies—namely, fire, earth, and the like—show not only that place is something, but also that it exerts a [10] certain influence. Each is carried to its own place, if it is not hindered, the one up, the other down. Now these are regions or kinds of place—up and down and the rest of the six directions. Nor do such distinctions (up and down and right and left) hold only in relation to us. To *us* they are not always the same but change with the [15] direction in which we are turned: that is why the same thing is often both right *and* left, up *and* down, before *and* behind. But in *nature* each is distinct, taken apart by itself. It is not every chance direction which is up, but where fire and what is light are carried; similarly, too, down is not any chance direction but where what has [20] weight and what is made of earth are carried—the implication being that these places do not differ merely in position, but also as possessing distinct powers. This is made plain also by the objects studied by mathematics. Though they have no place, they nevertheless, in respect of their position relatively to us, have a right and left as these are spoken of merely in respect of relative position, not

having by nature these various characteristics. Again, the theory that the void exists involves the existence [25] of place; for one would define void as place bereft of body.

These considerations then would lead us to suppose that place is something distinct from bodies, and that every sensible body is in place. Hesiod too might be held to have given a correct account of it when he made chaos first. At least he says:

First of all things came chaos to being, then broadbreasted earth,<sup>25</sup>  
[30]

implying that things need to have space first, because he thought, with most people, that everything is somewhere and in place. If this is its nature, the power of place must be a marvellous thing, and be prior to all other things. For that without which nothing else can exist, while it can exist without the others, must needs be first; for [209<sup>a</sup>1] place does not pass out of existence when the things in it are annihilated.

True, but even if we suppose its existence settled, the question of what it is presents difficulty—whether it is some sort of ‘bulk’ of body or some entity other than that; for we must first determine its genus.

[5] Now it has three dimensions, length, breadth, depth, the dimensions by which all body is bounded. But the place cannot *be* body; for if it were there would be two bodies in the same place.

Further, if body has a place and space, clearly so too have surface and the other limits of body; for the same argument will apply to them: where the bounding planes [10] of the water were, there in turn will be those of the air. But when we come to a point we cannot make a distinction between it and its place. Hence if the place of a point is not different from the point, no more will that of any of the others be different, and place will not be something different from each of them.

What in the world, then, are we to suppose place to be? If it has the sort of [15] nature described, it cannot be an element or composed of elements, whether these be corporeal or incorporeal; for while it has size, it has not body. But the elements of sensible bodies are bodies, while nothing that has size results from a combination of intelligible elements.

[20] Also we may ask: of what in things is space the cause? None of the four modes of causation can be ascribed to it. It is neither cause in the sense of the matter of existents (for nothing is composed of it), nor as the form and definition of things, nor as end, nor does it move existents.

Further, too, if it is itself an existent, it will be somewhere. Zeno’s difficulty demands an explanation; for if everything that exists has a

place, place too will have [25] a place, and so on *ad infinitum*.

Again, just as every body is in place, so, too, every place has a body in it. What then shall we say about *growing* things? It follows from these premisses that their place must grow with them, if their place is neither less nor greater than they are.

By asking these questions, then, we must raise the whole problem about [30] place—not only as to what it is, but even whether there is such a thing.

2 · Something can be said of a subject either in virtue of itself or in virtue of something else; and there is place which is common and in which all bodies are, and which is the proper and primary location of each body. I mean, for instance, that you are now in the world because you are in the air and it is in the world; and you are in the air because you are on the earth; and similarly on the earth because you are in this place which contains no more than you.

[209<sup>b</sup>1] Now if place is what *primarily* contains each body, it would be a limit, so that the place would be the form or shape of each body which the magnitude or the matter of the magnitude is defined; for this is the limit of each body.

[5] If, then, we look at the question in this way the place of a thing is its form. But, if we regard the place as the *extension* of the magnitude, it is the matter. For this is different from the magnitude: it is what is contained and defined by the form, as by a bounding plane. Matter or the indeterminate is of this nature; for when the [10] boundary and attributes of a sphere are taken away, nothing but the matter is left.

This is why Plato in the *Timaeus* says that matter and space are the same; for the ‘participant’ and space are identical. (It is true, indeed, that the account he gives there of the ‘participant’ is different from what he says in his so-called unwritten teaching. Nevertheless, he did identify place and space.) I mention Plato because, [15] while all hold place to be something, he alone tried to say *what* it is.

In view of these facts we should naturally expect to find difficulty in determining what place is, if indeed it is one of these two things, matter or form. They demand a very close scrutiny, especially as it is not easy to recognize them [20] apart.

But it is at any rate not difficult to see that place cannot be either of them. The form and the matter are not separate from the thing, whereas the place can be separated. As we pointed out, where air was, water in

turn comes to be, the one [25] replacing the other; and similarly with other bodies. Hence the place of a thing is neither a part nor a state of it, but is separable from it. For place is supposed to be something like a vessel—the vessel being a transportable place. But the vessel is no part of the thing.

In so far then as it is separable from the thing, it is not the form; and in so far as [30] it contains it, it is different from the matter.

Also it is held that what is anywhere is both itself something and that there is a different thing outside it. (Plato of course, if we may digress, ought to tell us why the form and the numbers are not in place, if ‘what participates’ is place—whether what participates is the Great and the Small or the matter, as he has written in the [210<sup>a</sup>1] *Timaeus*.)

Further, how could a body be carried to its own place, if place was the matter or the form? It is impossible that what has no reference to motion or the distinction of up and down can be place. So place must be looked for among things which have these characteristics.

If the place is in the thing (it must be if it is either shape or matter) place will [5] have a place; for both the form and the indeterminate undergo change and motion along with the thing, and are not always in the same place, but are where the thing is. Hence the place will have a place.

Further, when water is produced from air, the place has been destroyed, for the [10] resulting body is not in the same place. What sort of destruction then is that?

This concludes my statement of the reasons why place must be something, and again of the difficulties that may be raised about its essential nature.

**3** · The next step we must take is to see in how many ways one thing is said to be *in* another. In one way, as a finger is in a hand, and generally a part in a whole. In [15] another way, as a whole is in its parts; for there is no whole over and above the parts. Again, as man is in animal, and in general a species in a genus. Again, as the genus is in the species, and in general a part of the species in its definition. Again, as [20] health is in the hot and the cold, and in general the form in the matter. Again, as the affairs of Greece are in the King, and generally events are in their primary motive agent. Again, as a thing is in its good, and generally in its end, i.e. in that for the sake of which. And most properly of all, as something is in a vessel, and generally in a place.<sup>26</sup>

[25] One might raise the question whether a thing can be in itself, or whether nothing can be in itself—everything being either nowhere or in something else. The question is ambiguous; we may mean the thing *qua* itself or *qua* something else.

When there are parts of a whole—the one that in which a thing is, the other the thing which is in it—the whole will be described as being in itself. For a thing is described in terms of its parts, as well as in terms of the thing as a whole, e.g. a man [30] is said to be white because the visible surface of him is white, or to be scientific because his thinking faculty is. The jar then will not be in itself and the wine will not be in itself. But the jar of wine will; for the contents and the container are both parts of the same whole.

In this sense then, but not primarily, a thing can be in itself, namely, as white is [210<sup>b</sup>1] in body (for the visible surface is in body), and science is in the mind.

It is from these, which are parts (in the sense at least of being in the man), that the man is called white, &c. (But the jar and the wine in separation are not parts of a whole, though together they are.) So when there are parts, a thing will be in itself, [5] as white is in man because it is in body, and in body because it resides in the visible surface. But it is not in surface in virtue of something else. And these things—the surface and the white—differ in form, and each has a different nature and power.

Thus if we look at the matter inductively we do not find anything to be in itself in any of the senses that have been distinguished; and it can be seen by argument [10] that it is impossible. For each of two things will have to be both, e.g. the jar will have to be both vessel and wine, and the wine both wine and jar, if it is possible for a thing to be in itself; so that, however true it might be that they were in each other, the jar will receive the wine in virtue not of *its* being wine but of the wine's being wine, and [15] the wine will be in the jar in virtue not of *its* being a jar but of the jar's being a jar. Now that they are different in respect of what they are is evident; for that in which something is and that which is in it would be differently defined.

Nor is it possible for a thing to be in itself even accidentally; for two things would be at the same time in the same thing. The jar would be in itself—if a thing [20] whose nature it is to receive can be in itself; and that which it receives, namely (if wine) wine, will be in it.

Obviously then a thing cannot be in itself primarily.

Zeno's problem—that if place is something it must be in something—

is not difficult to solve. There is nothing to prevent the first place from being in something [25] else—not indeed in that as in a place, but as health is in the hot as a state of it or as the hot is in body as an affection. So we escape the infinite regress.

Another thing is plain: since the vessel is no part of what is in it (what contains something primarily is different from what is contained), place could not be either the matter or the form of the thing contained, but must be different—for the latter, [30] both the matter and the shape, are parts of what is contained.

This then may serve as a critical statement of the difficulties involved.

4 · What then after all is place? The answer to this question may be elucidated as follows.

Let us take for granted about it the various characteristics which are supposed correctly to belong to it essentially. We assume first that place is what contains that of which it is the place, and is no part of the thing; again, that the primary place of a [211<sup>a</sup>1] thing is neither less nor greater than the thing; again, that place can be left behind by the thing and is separable; and in addition that all place admits of the distinction of up and down, and each of the bodies is naturally carried to its appropriate place and rests there, and this makes the place either up or down. [5] Having laid these foundations, we must complete the theory. We ought to try to conduct our inquiry into what place is in such a way as not only to solve the difficulties connected with it, but also to show that the attributes supposed to belong to it do really belong to it, and further to make clear the cause of the trouble and of [10] the difficulties about it. In that way, each point will be proved in the most satisfactory manner.

First then we must understand that place would not have been inquired into, if there had not been motion with respect to place. It is chiefly for this reason that we suppose the heaven also to be in place, because it is in constant movement. Of this kind of motion there are two species—locomotion on the one hand and, on the other, increase and diminution. For these too involve change: what was then in this place [15] has now in turn changed to what is larger or smaller.

Again, things are moved either in themselves, actually, or accidentally. In the latter case it may be either something which by its own nature is capable of being moved, e.g. the parts of the body or the nail in the ship, or something which is not in [20] itself capable of being moved, but is *always* moved accidentally, as whiteness or science. These

have changed their place only because the subjects to which they belong do so.

We say that a thing is in the world, in the sense of in place, because it is in the air, and the air is in the world; and when we say it is in the air, we do not mean it is in [25] every part of the air, but that it is in the air because of the surface of the air which surrounds it; for if all the air were its place, the place of a thing would not be equal to the thing—which it is supposed to be, and which the primary place in which a thing is actually is.

When what surrounds, then, is not separate from the thing, but is in continuity with it, the thing is said to be in what surrounds it, not in the sense of in place, but as [30] a part in a whole. But when the thing is separate and in contact, it is primarily in the inner surface of the surrounding body, and this surface is neither a part of what is in it nor yet greater than its extension, but equal to it; for the extremities of things which touch are coincident.

Further, if one body is in continuity with another, it is not moved *in* that but [35] *with* that. On the other hand it is moved *in* that if it is separate. It makes no difference whether what contains is moved or not.

[Again, when it is not separate it is described as a part in a whole, as the pupil [211<sup>b</sup>1] in the eye or the hand in the body: when it is separate, as the water in the cask or the wine in the jar. For the hand is moved *with* the body and the water *in* the cask.]<sup>27</sup>

It will now be plain from these considerations what place is. There are just four [5] things of which place must be one—the shape, or the matter, or some sort of extension between the extremities, or the extremities (if there is no extension over and above the bulk of the body which comes to be in it).

[10] Three of these it obviously cannot be. The shape is supposed to be place because it surrounds, for the extremities of what contains and of what is contained are coincident. Both the shape and the place, it is true, are boundaries. But not the same thing: the form is the boundary of the thing, the place is the boundary of the body which contains it.

The extension between the extremities is thought to be something, because [15] what is contained and separate may often be changed while the container remains the same (as water may be poured from a vessel)—the assumption being that the extension is something over and above the body displaced. But there is no such extension. One of the bodies which change places and are naturally capable of being in contact with the



container falls in—whichever it may chance to be.

If there were an extension which were such as to exist independently and be [20] permanent, there would be an infinity of places in the same thing. For when the water and the air change places, all the portions of the two together will play the same part in the whole which was previously played by all the water in the vessel; at the same time the place too will be undergoing change; so that there will be another place which is the place of the place, and many places will be coincident. There is [25] not a different place of the part, in which it is moved, when the whole vessel changes its place: it is always the same; for it is in the place where they are that the air and the water (or the parts of the water) succeed each other, not in that place in which they come to be, which is part of the place which is the place of the whole world.

[30] The matter, too, might seem to be place, at least if we consider it in what is at rest and is not separate but in continuity. For just as in change of quality there is something which was formerly black and is now white, or formerly soft and now hard—this is why we say that the matter exists—so place, because it presents a similar phenomenon, is thought to exist—only in the one case we say so because *what* was air is now water, in the other because *where* air formerly was there is now [212<sup>a</sup>1] water. But the matter, as we said before, is neither separable from the thing nor contains it, whereas place has both characteristics.

Well, then, if place is none of the three—neither the form nor the matter nor an extension which is always there, different from, and over and above, the [5] extension of the thing which is displaced—place necessarily is the one of the four which is left, namely, the boundary of the containing body at which it is in contact with the contained body. (By the contained body is meant what can be moved by way of locomotion.)

Place is thought to be something important and hard to grasp, both because the matter and the shape present themselves along with it, and because the [10] displacement of the body that is moved takes place in a stationary container, for it seems possible that there should be an interval which is other than the bodies which are moved. The air, too, which is thought to be incorporeal, contributes something to the belief: it is not only the boundaries of the vessel which seem to be place, but also what is between them, regarded as empty. Just, in fact, as the vessel is transportable place, so place is a non-portable vessel. So when what is within a thing [15] which is moved, is moved and changes, as a boat on a river, what contains plays the part of a vessel rather than that of place. Place on the other hand is rather what is motionless: so it is rather the

whole river that is place, because as a whole it is motionless.

Hence the place of a thing is the innermost motionless boundary of what [20] contains it.

This explains why the middle of the world and the surface which faces us of the rotating system are held to be up and down in the strict and fullest sense for all men: for the one is always at rest, while the inner side of the rotating body remains always coincident with itself. Hence since the light is what is naturally carried up, and the [25] heavy what is carried down, the boundary which contains in the direction of the middle of the universe, and the middle itself, are down, and that which contains in the direction of the extremity, and the extremity itself, are up.

For this reason place is thought to be a kind of surface, and as it were a vessel, i.e. a container of the thing.

Further, place is coincident with the thing, for boundaries are coincident with [30] the bounded.

5 · If then a body has another body outside it and containing it, it is in place, and if not, not. That is why, even if there were to be water which had not a container, the parts of it will be moved (for one part is contained in another), while the whole will be moved in one sense, but not in another. For as a whole it does not simultaneously change its place, though it will be moved in a circle; for this place is [212<sup>b</sup>1] the place of its parts. And some parts are moved, not up and down, but in a circle; others up and down, such things namely as admit of condensation and rarefaction.

As was explained, some things are potentially in place, others actually. So, when you have a homogeneous substance which is continuous, the parts are [5] potentially in place: when the parts are separated, but in contact, like a heap, they are actually in place.

Again, some things are *per se* in place, namely every body which is movable either by way of locomotion or by way of increase is *per se* somewhere, but the world, as has been said, is not anywhere as a whole, nor in any place, if, that is, no body contains it. But the line on which it is moved provides a place for its parts; for [10] each is contiguous to the next.

Other things are in place accidentally, as the soul and the world. The latter is, in a way, in place, for all its parts are; for on the circle one part contains another. That is why the upper part is moved in a circle, while the universe is not anywhere. For what is somewhere is itself something,

and there must be alongside it some [15] other thing wherein it is and which contains it. But alongside the universe or the Whole there is nothing outside the universe, and for this reason all things are in the world; for the world, we may say, is the universe. Yet their place is not the same as the world. It is part of it, the innermost part of it, which is in contact with the [20] movable body; and for this reason the earth is in water, and this in the air, and the air in the aether, and the aether in the world, but we cannot go on and say that the world is in anything else.

It is clear, too, from these considerations that all the problems which were raised about place will be solved when it is explained in this way.

There is no necessity that the place should grow with the body in it, nor that a [25] point should have a place; nor that two bodies should be in the same place; nor that place should be a corporeal interval (for what is between the boundaries of the place is any body which may chance to be there, not an interval in body).

Further, place is indeed somewhere, not in the sense of being in a place, but as the limit is in the limited; for not everything that is in place, but only movable body.

[30] Also, it is reasonable that each kind of body should be carried to its own place. For a body which is next in the series and in contact (not by compulsion) is akin, and bodies which are united do not affect each other, while those which are in contact interact on each other.

Nor is it without reason that each should remain naturally in its proper place. For parts do, and that which is in a place has the same relation to its place as a [213<sup>a</sup>1] separable part to its whole, as when one moves a part of water or air: so, too, air is related to water, for the one is like matter, the other form—water is the matter of air, air as it were the actuality of water; for water is potentially air, while air is potentially water, though in another way.

These distinctions will be drawn more carefully later. On the present occasion [5] it was necessary to refer to them: what has now been stated obscurely will then be made more clear.<sup>28</sup> If the matter and the fulfilment are the same thing (for water is both, the one potentially, the other in fulfilment), water will be related to air in a way as part to whole. That is why these have contact: it is organic union when both become actually one.

[10] This concludes my account of place—both of its existence and of its nature.

6 · The investigation of similar questions about the void, also, must be held to belong to the physicist—namely whether it exists or not, and how it exists or what it is—just as about place. The views taken of it involve arguments both for and [15] against, in much the same sort of way. For those who hold that the void exists regard it as a sort of place or vessel which is supposed to be full when it holds the bulk which it is capable of containing, void when it is deprived of that—as if void and full and place were the same thing, though the essence of the three is different.

[20] We must begin the inquiry by putting down the account given by those who say that it exists, then the account of those who say that it does not exist, and third the common opinions on these questions.

Those who try to show that the void does not exist do not disprove what people really mean by it, but only their erroneous way of speaking; this is true of Anaxagoras and of those who refute the existence of the void in this way. They show [25] that air is something—by straining wine-skins and showing the resistance of the air, and by cutting it off in clepsydras. But people really mean by void an interval in which there is *no* sensible body. They hold that everything which is is body and say that what has nothing in it at all is void (so what is full of air is void). It is not then [30] the existence of air that needs to be proved, but the non-existence of an interval, different from the bodies, either separable or actual—an interval which divides the whole body so as to break its continuity, as Democritus and Leucippus hold, and many other physicists—or even perhaps as something which is outside the whole [213<sup>b</sup>1] body, which remains continuous.

These people, then, have not reached even the threshold of the problem, but rather those who say that the void exists.

They argue, for one thing, that change in place (i.e. locomotion and increase) would not occur. For it is maintained that motion would seem not to exist, if there [5] were no void, since what is full cannot contain anything more. If it could, and there were two bodies in the same place, it would also be true that any number of bodies could be together; for it is impossible to draw a line of division beyond which the statement would become untrue. If this were possible, it would follow also that the smallest body would contain the greatest; for many small things make a large thing: [10] thus if many equal bodies can be in the same place, so also can many unequal bodies.

Melissus, indeed, actually argues from this that the universe is

immovable; for if it were moved there must, he says, be void, but void is not among the things that exist.

This argument, then, is one way in which they show that there is a void. [15] They also reason from the fact that some things are observed to contract and be compressed, as people say that a cask will hold the wine along with the skins, which implies that the compressed body contracts into the voids present in it.

Again increase, too, is thought by everyone to take place by means of void; for nutriment is body, and it is impossible for two bodies to be together. Evidence of this [20] they find also in what happens to ashes, which absorb as much water as the empty vessel.

The Pythagoreans, too, held that void exists and that it enters the world from the infinite air, the world inhaling also the void which distinguishes the natures of [25] things, as if it were what separates and distinguishes the terms of a series. This holds primarily in the numbers; for the void distinguishes their nature.

These, then, and so many, are the main grounds on which people have argued for and against the existence of the void.

7 · As a step towards settling which view is true, we must determine the [30] meaning of the word.

The void is thought to be place with nothing in it. The reason for this is that people take what exists to be body, and hold that while every body is in place, void is place in which there is no body, so that where there is no body, there is nothing.

[214<sup>a</sup>1] Every body, again, they suppose to be tangible; and of this nature is whatever has weight or lightness. Hence, by deduction, what has nothing heavy or light in it, is void.

This result, then, as I have just said, is reached by deduction. It would be [5] absurd to suppose that the point is void; for the void must be *place* which has in it an interval in tangible body.

But at all events we observe then that in one way the void is described as what is not full of body perceptible to touch; and what has heaviness and lightness is perceptible to touch. So we would raise the question: what would they say of an [10] interval that has colour or sound—is it void or not? Clearly they would reply that if it *could* receive what is tangible it was void, and if not, not.

In another way void is that in which there is not ‘this’ or corporeal

substance. So some say that the void is the matter of the body (they identify the place, too, with [15] this), and in this they speak incorrectly; for the matter is not separable from the things, but they are inquiring about the void as about something separable.

Since we have determined the nature of place, and void must, if it exists, be place deprived of body, and we have stated both in what sense it does not, it is plain that on this showing void does not exist, either unseparated or separated; for the [20] void is meant to be, not body but rather an interval in body. This is why the void is thought to be something, viz. because place is, and for the same reasons. For the fact of motion in respect of place comes to the aid both of those who maintain that place is something over and above the bodies that come to occupy it, and of those who maintain that the void is something. They state that the void is a cause of movement [25] in the sense of that in which movement takes place; and this would be the kind of thing that some say place is.

But there is no necessity for there being a void if there is movement. It is not in the least needed as a condition of movement in general, for a reason which escaped Melissus; viz. that the full can suffer qualitative change.

But not even movement in respect of place involves a void; for bodies may [30] simultaneously make room for one another, though there is no interval separate and apart from the bodies that are in movement. And this is plain even in the rotation of continuous things, as in that of liquids.

And things can also be compressed not into a void but because they squeeze out [214<sup>b</sup>1] what is contained in them (as, for instance, when water is compressed the air within it is squeezed out); and things can increase in size not only by the entrance of something but also by qualitative change; e.g. if water were to be transformed into air.

In general, both the argument about increase of size and that about the water [5] poured on to the ashes get in their own way. For either not any and every part of the body is increased, or bodies may be increased otherwise than by the addition of body, or there may be two bodies in the same place (in which case they are claiming to solve a general difficulty, but are not proving the existence of void), or the *whole* body must be void, if it is increased in every part and is increased by means of void. The same argument applies to the ashes.

It is evident, then, that it is easy to refute the arguments by which they prove [10] the existence of the void.

8 · Let us explain again that there is no void existing separately, as some maintain. If each of the simple bodies has a natural locomotion, e.g. fire upward and earth downward and towards the middle of the universe, it is clear that the void [15] cannot be a cause of locomotion. What, then, will the void be a cause of? It is thought to be a cause of movement in respect of place, and it is not a cause of this.

Again, if void is a sort of place deprived of body, when there is a void where will a body placed in it move to? It certainly cannot move into the whole of the void. The same argument applies as against those who think that place is something separate, [20] into which things are carried; viz. how will what is placed in it move, or rest? The same argument will apply to the void as to the up and down in place, as is natural enough since those who maintain the existence of the void make it a place.

And in what way will things be present either in place or in the void? For the result does not take place when a body is placed as a whole in a place conceived of as [25] separate and permanent; for a part of it, unless it be placed apart, will not be in a place but in the whole. Further, if separate place does not exist, neither will void.

If people say that the void must exist, as being necessary if there is to be movement, what rather turns out to be the case, if one studies the matter, is the [30] opposite, that not a single thing can be moved if there is a void; for as with those who say the earth is at rest because of the uniformity, so, too, in the void things must be at rest; for there is no place to which things can move more or less than to another; since the void in so far as it is void admits no difference.

The second reason is this: all movement is either compulsory or according to [215<sup>a</sup>1] nature, and if there is compulsory movement there must also be natural (for compulsory movement is contrary to nature, and movement contrary to nature is posterior to that according to nature, so that if each of the natural bodies has not a natural movement, none of the other movements can exist); but how can there be [5] *natural* movement if there is no difference throughout the void or the infinite? For in so far as it is infinite, there will be no up or down or middle, and in so far as it is a void, up differs no whit from down; for as there is no difference in what is nothing, there is none in the void (for the void seems to be a non-existent and a privation); but [10] natural locomotion seems to be differentiated, so that the things that exist by nature must be differentiated. Either, then, nothing has a natural locomotion, or else there is no void.

Further, in point of fact things that are thrown move though that which gave them their impulse is not touching them, either by reason of mutual replacement, as [15] some maintain, or because the air that has been pushed pushes them with a movement quicker than the natural locomotion of the projectile wherewith it moves to its proper place. But in a void none of these things can take place, nor can anything be moved save as that which is carried is moved.

Further, no one could say why a thing once set in motion should stop anywhere; [20] for why should it stop *here* rather than *here*? So that a thing will either be at rest or must be moved *ad infinitum*, unless something more powerful gets in its way.

Further, things are now thought to move into the void because it yields; but in a void this quality is present equally everywhere, so that things should move in all directions.

Further, the truth of what we assert is plain from the following considerations. [25] We see the same weight or body moving faster than another for two reasons, either because there is a difference in what it moves through, as between water, air, and earth, or because, other things being equal, the moving body differs from the other owing to excess of weight or of lightness.

Now the medium causes a difference because it impedes the moving thing, most of all if it is moving in the opposite direction, but in a secondary degree even if [30] it is at rest; and especially a medium that is not easily divided, i.e. a medium that is somewhat dense.

[215<sup>b</sup>1] A, then, will move through B in time C, and through D, which is thinner, in time E (if the length of B is equal to D), in proportion to the density of the hindering [5] body. For let B be water and D air; then by so much as air is thinner and more incorporeal than water, A will move through D faster than through B. Let the speed have the same ratio to the speed, then, that air has to water. Then if air is twice as thin, the body will traverse B in twice the time that it does D, and the time C will be [10] twice the time E. And always, by so much as the medium is more incorporeal and less resistant and more easily divided, the faster will be the movement.

Now there is no ratio in which the void is exceeded by body, as there is no ratio of nought to a number. For if 4 exceeds 3 by 1, and 2 by more than 1, and 1 by still [15] more than it exceeds 2, still there is no ratio by which it exceeds 0; for that which exceeds must be divisible into the excess and that which is exceeded, so that 4 will be what it exceeds 0 by



and 0. For this reason, too, a line does not exceed a [20] point—unless it is composed of points. Similarly the void can bear no ratio to the full, and therefore neither can movement through the one to movement through the other, but if a thing moves through the thinnest medium such and such a distance in such and such a time, it moves through the void with a speed beyond any ratio. For let F be void, equal to B and to D. Then if A is to traverse and move through it in a [25] certain time, G, a time less than E, however, the void will bear this ratio to the full. But in a time equal to G, A will traverse the part H of D. And it will surely also traverse in that time any substance F which exceeds air in thinness in the ratio [30] which the time E bears to the time G. For if the body F be as much thinner than D as E exceeds G, A, if it moves through F, will traverse it in a time inverse to the [216<sup>a</sup>1] speed of the movement, i.e. in a time equal to G. If, then, there is *no* body in F, A will traverse F still more quickly. But we suppose that its traverse of F when F was void occupied the time G. So that it will traverse F in an equal time whether F be full or void. But this is impossible. It is plain, then, that if there is a time in which it [5] will move through any part of the void, this impossible result will follow: it will be found to traverse a certain distance, whether this be full or void, in an equal time; for there will be some body which is in the same ratio to the other body as the time is to the time.

To sum the matter up, the cause of this result is obvious, viz. that between any two movements there is a ratio (for they occupy time, and there is a ratio between any two times, so long as both are finite), but there is no ratio of void to full. [10]

These are the consequences that result from a difference in the media; the following depend upon an excess of one moving body over another. We see that bodies which have a greater impulse either of weight or of lightness, if they are alike in other respects, move faster over an equal space, and in the ratio which their [15] magnitudes bear to each other. Therefore, they will also move through the void with this ratio of speed. But that is impossible; for why should one move faster? (In moving through *plena* it must be so; for the greater divides them faster by its force. For a moving thing cleaves the medium either by its shape, or by the impulse which the body that is carried along or is projected possesses.) Therefore all will possess [20] equal velocity. But this is impossible.

It is evident from what has been said, then, that, if there is a void, a result follows which is the very opposite of the reason for which those who believe in a void set it up. They think that if movement in respect of

place is to exist, the void must exist, separated by itself; but this is the same as to say that place is separate; and [25] this has already been stated to be impossible.

But even if we consider it on its own merits the so-called void will be found to be really vacuous. For as, if one puts a cube in water, an amount of water equal to the cube will be displaced, so too in air (but the effect is imperceptible to sense). And indeed always, in the case of any body that can be displaced, it must, if it is not [30] compressed, be displaced in the direction in which it is its nature to be displaced—always either down, if its locomotion is downwards as in the case of earth, or up, if it is fire, or in both directions—whatever be the nature of the inserted body. Now in the void this is impossible; for it is not body; the void must have penetrated the cube to a distance equal to that which this portion of void formerly occupied in the void, just as if the water or air had not been displaced by the wooden cube, but had [216<sup>b</sup>1] penetrated right through it.

But the cube also has a magnitude equal to that occupied by the void; a magnitude which, if it is also hot or cold, or heavy or light, is none the less different in essence from all its attributes, even if it is not separable from them; I mean the [5] bulk of the wooden cube. So that even if it were separated from everything else and were neither heavy nor light, it will occupy an equal amount of void, and fill the same place, as the part of place or of the void equal to itself. How then will the body of the cube differ from the void or place that is equal to it? And if there can be two [10] such things, why cannot there be any number coinciding?

This, then, is one absurd and impossible implication of the theory. It is also evident that the cube will have this same volume even if it is displaced, which is an attribute possessed by all other bodies also. Therefore if this differs in no respect from its place, why need we assume a place for bodies over and above the bulk of each, if their bulk be conceived of as free from attributes? It contributes nothing to [15] the situation if there is an equal interval attached to it as well. [Further, it ought to be clear by the study of moving things what sort of thing void is. But in fact it is found nowhere in the world. For air is something, though it does not *seem* to be so—nor, for that matter, would water, if fishes were made of iron; for the discrimination of the tangible is by touch.]<sup>29</sup>

[20] It is clear, then, from these considerations that there is no separate void.

9 · There are some who think that the existence of rarity and density shows that there is a void. If rarity and density do not exist, they say, neither can things contract and be compressed. But if this were not to take place, either there would be [25] no movement at all, or the universe would bulge, as Xuthus said, or air and water must always change into equal amounts (e.g. if air has been made out of a cupful of water, at the same time out of an equal amount of air a cupful of water must have been made), or void must necessarily exist; for compression and expansion cannot take place otherwise.

[30] Now, if they mean by the rare that which has many voids existing separately, it is plain that if void cannot exist separate any more than a place can exist with an extension all to itself, neither can the rare exist in this sense. But if they mean that there is void, not separately existent, but still present in the rare, this is less impossible; yet, first, the void turns out not to be a cause of *all* movement, but only [217<sup>a</sup>1] of movement upwards (for the rare is light, which is the reason why they say fire is rare); second, the void turns out to be a cause of movement not as that in which it takes place, but in that the void carries things up as skins by being carried up themselves carry up what is continuous with them. Yet how can void have a local movement or a place? For thus that into which void moves is till then void of a [5] void.

Again, how will they explain, in the case of what is heavy, its movement downwards? And it is plain that if the rarer and more void a thing is the quicker it will move upwards, if it were completely void it would move with a maximum speed. But perhaps even this is impossible, that it should move at all; the same reason which showed that in the void all things are incapable of moving shows that the void [10] cannot move, viz., the fact that the speeds are incomparable.

Since we deny that a void exists, but for the rest the problem has been truly stated, that *either* there will be no movement, if there is no condensation and rarefaction, *or* the universe will bulge, *or* a transformation of water into air will always be balanced by an equal transformation of air into water (for it is clear that [15] more air is produced from the water: it is necessary therefore, if compression does not exist, *either* that the next portion will be pushed outwards and make the outermost part bulge, *or* that somewhere else there must be an equal amount of water produced out of air, so that the entire bulk of the whole may be equal, *or* that nothing moves. For when anything is displaced this will always happen, unless it comes round in a circle; but locomotion is

not always circular, but sometimes in a [20] straight line)—these then are the reasons for which they might say that there is a void; *our* statement is based on the assumption that there is a single matter for contraries, hot and cold and the other natural contrarieties, and that what is actually is produced from what is potentially, and that matter is not separable from the contraries but its being is different, and that a single matter may serve for colour [25] and heat and cold.

The same matter also serves for both a large and a small body. This is evident; for when air is produced from water, the same matter has become something different, not by acquiring an addition to it, but has become actually what it was potentially; and, again, water is produced from air in the same way, the change being sometimes from smallness to greatness, and sometimes from greatness to [30] smallness. Similarly, therefore, if air which is large in extent comes to have a smaller bulk, or becomes greater from being smaller, it is the matter which is potentially both that comes to be each of the two.

For as the same matter becomes hot from being cold, and cold from being hot, because it was potentially both, so too from hot it can become more hot, though nothing in the matter has become hot that was not hot when the thing was less hot; [217<sup>b</sup>1] just as, if the arc or curve of a greater circle becomes that of a smaller, whether it remains the same or becomes a different curve, convexity has not come to exist in anything that was not convex but straight (for differences of degree do not depend [5] on an intermission of the quality); nor can we get any portion of a flame, in which both heat and whiteness are not present. So too, then, is the earlier heat related to the later. So that the greatness and smallness, also, of the sensible bulk are extended, not by the matter's acquiring anything new, but because the matter is potentially matter for both states; so that the same thing is dense and rare, and the [10] two qualities have one matter.

The dense is heavy, and the rare is light. [Again, as the arc of a circle when contracted into a smaller space does not acquire a new part which is convex, but what was there had been contracted; and as any part of fire that one takes will be hot; so, too, it is all a question of contraction and expansion of the same matter.]<sup>30</sup> [15] There are two types in each case, both in the dense and in the rare; for both the heavy and the hard are thought to be dense, and contrariwise both the light and the soft are rare; and weight and hardness fail to coincide in the case of lead and iron.

From what has been said it is evident, then, that void does not exist either [20] separate (either absolutely separate or as a separate element

in the rare) or potentially, unless one is willing to call the cause of movement void, whatever it may be. At that rate the matter of the heavy and the light; *qua* matter of them, would be the void; for the dense and the rare are productive of locomotion in virtue of *this* contrariety, and in virtue of their hardness and softness productive of passivity and [25] impassivity, i.e. not of locomotion but rather of qualitative change.

So much, then, for the discussion of the void, and of the sense in which it exists and the sense in which it does not exist.

10 · Next for discussion after the subjects mentioned is time. The best plan will be to begin by working out the difficulties connected with it, making use of the [30] current arguments. First, does it belong to the class of things that exist or to that of things that do not exist? Then secondly, what is its nature? To start, then: the [218<sup>a</sup>1] following considerations would make one suspect that it either does not exist at all or barely, and in the obscure way. One part of it has been and is not, while the other is going to be and is not yet. Yet time—both infinite time and any time you like to take—is made up of these. One would naturally suppose that what is made up of things which do not exist could have no share in reality.

Further, if a divisible thing is to exist, it is necessary that, when it exists, all or [5] some of its parts must exist. But of time some parts have been, while others are going to be, and no part of it *is*, though it is divisible. For the ‘now’ is not a part: a part is a measure of the whole, which must be made up of parts. Time, on the other hand, is not held to be made up of ‘nows’.

Again, the ‘now’ which seems to bound the past and the future—does it always [10] remain one and the same or is it always other and other? It is hard to say.

If it is always different and different, and if none of the *parts* in time which are other and other are simultaneous (unless the one contains and the other is contained, as the shorter time is by the longer), and if the ‘now’ which is not, but [15] formerly was, must have ceased to be at some time, the ‘nows’ too cannot be simultaneous with one another, but the prior ‘now’ must always have ceased to be. But the prior ‘now’ cannot have ceased to be in itself (since it then existed); yet it cannot have ceased to be in another ‘now’. For we may lay it down that one ‘now’ cannot be next to another, any more than a point to a point. If then it did not cease [20] to be in the next ‘now’ but in another, it would exist

simultaneously with the innumerable 'nows' between the two—which is impossible.

Yes, but neither is it possible for the 'now' to remain always the same. No determinate divisible thing has a single termination, whether it is continuously extended in one or in more than one dimension; but the 'now' is a termination, and it [25] is possible to cut off a determinate time. Further, if coincidence in time (i.e. being neither prior nor posterior) means to be in one and the same 'now', then, if both what is before and what is after are in this same 'now', things which happened ten thousand years ago would be simultaneous with what has happened to-day, and nothing would be before or after anything else.

[30] This may serve as a statement of the difficulties about the attributes of time. As to what time is or what is its nature, the traditional accounts give us as little light as the preliminary problems which we have worked through.

Some assert that it is the movement of the whole, others that it is the sphere [218<sup>b</sup>1] itself.

Yet part, too, of the revolution is a time, but it certainly is not a revolution; for what is taken is part of a revolution, not a revolution. Besides, if there were more heavens than one, the movement of any of them equally would be time, so that there [5] would be many times at the same time.

Those who said that time is the sphere of the whole thought so, no doubt, on the ground that all things are in time and all things are in the sphere of the whole. The view is too naive for it to be worth while to consider the impossibilities implied in it.

[10] But as time is most usually supposed to be motion and a kind of change, we must consider this view.

Now the change or movement of each thing is only *in* the thing which changes or *where* the thing itself which moves or change may chance to be. But time is present equally everywhere and with all things.

Again, change is always faster or slower, whereas time is not; for fast and slow [15] are defined by time—fast is what moves much in a short time, slow what moves little in a long time; but time is not defined by time, by being either a certain amount or a certain kind of it.

Clearly then it is not movement. (We need not distinguish at present between movement and change.) [20]

11 · But neither does time exist without change; for when the state of our minds does not change at all, or we have not noticed its changing, we do not think that time has elapsed, any more than those who are fabled to sleep among the heroes in Sardinia do when they are awakened; for they connect the earlier ‘now’ with the [25] later and make them one, cutting out the interval because of their failure to notice it. So, just as, if the ‘now’ were not different but one and the same, there would not have been time, so too when its difference escapes our notice the interval does not seem to be time. If, then, the non-realization of the existence of time happens to us when we do not distinguish any change, but the mind seems to stay in one indivisible [30] state, and when we perceive and distinguish we say time has elapsed, evidently time is not independent of movement and change. It is evident, then, that time is neither [219<sup>a</sup>1] movement nor independent of movement.

We must take this as our starting-point and try to discover—since we wish to know what time is—what exactly it has to do with movement.

Now we perceive movement and time together; for even when it is dark and we are not being affected through the body, if any movement takes place in the mind [5] we at once suppose that some time has indeed elapsed; and not only that but also, when some time is thought to have passed, some movement also along with it seems to have taken place. Hence time is either movement or something that belongs to movement. Since then it is not movement, it must be the other.

But what is moved is moved from something to something, and all magnitude [10] is continuous. Therefore the movement goes with the magnitude. Because the magnitude is continuous, the movement too is continuous, and if the movement, then the time; for the time that has passed is always thought to be as great as the movement.

The distinction of before and after holds primarily, then, in place; and there in [15] virtue of relative position. Since then before and after hold in magnitude, they must hold also in movement, these corresponding to those. But also in time the distinction of before and after must hold; for time and movement always correspond with each other. The before and after in motion identical in substratum with motion yet [20] differs from it in being, and is not identical with motion.

But we apprehend time only when we have marked motion, marking it by before and after; and it is only when we have perceived before and after in motion that we say that time has elapsed. Now we mark them by judging that one thing is [25] different from another, and that some third

thing is intermediate to them. When we think of the extremes as different from the middle and the mind pronounces that the 'nows' are two, one before and one after, it is then that we say that there is time, and this that we say is time. For what is bounded by the 'now' is thought to be time—we may assume this.

[30] When, therefore, we perceive the 'now' as one, and neither as before and after in a motion nor as the same element but in relation to a 'before' and an 'after', no time is thought to have elapsed, because there has been no motion either. On the other hand, when we do perceive a 'before' and an 'after', then we say that there is [219<sup>b</sup>1] time. For time is just this—number of motion in respect of 'before' and 'after'.

Hence time is not movement, but only movement in so far as it admits of enumeration. An indication of this: we discriminate the more or the less by number, [5] but more or less movement by time. Time then is a kind of number. (Number, we must note, is used in two ways—both of what is counted or countable and also of that with which we count. Time, then, is what is counted, not that with which we count: these are different kinds of thing.)

[10] Just as motion is a perpetual succession, so also is time. But every simultaneous time is the same; for the 'now' is the same in substratum—though its being is different—and the 'now' determines time, in so far as time involves the before and after.

The 'now' in one sense is the same, in another it is not the same. In so far as it is in succession, it is different (which is just what its being now was supposed to [15] mean), but its substratum is the same; for motion, as was said, goes with magnitude, and time, as we maintain, with motion. Similarly, then, there corresponds to the point the body which is carried along, and by which we are aware of the motion and of the before and after involved in it. This is an identical *substratum* (whether a point or a stone or something else of the kind), but it is different in definition—as [20] the sophists assume that Coriscus' being in the Lyceum is a different thing from Coriscus' being in the market-place. And the body which is carried along is different, in so far as it is at one time here and at another there. But the 'now' corresponds to the body that is carried along, as time corresponds to the motion. For it is by means of the body that is carried along that we become aware of the [25] before and after in the motion, and if we regard these as countable we get the 'now'. Hence in these also the 'now' as substratum remains the same (for it is what is before and after in movement), but its being is different; for it is in so far as the before and after is that we get the 'now'. This is what is most knowable;



for motion is [30] known because of that which is moved, locomotion because of that which is carried. For what is carried is a 'this', the movement is not. Thus the 'now' in one sense is always the same, in another it is not the same; for this is true also of what is carried.

[220<sup>a</sup>1] Clearly, too, if there were no time, there would be no 'now', and vice versa. Just as the moving body and its locomotion involve each other mutually, so too do the number of the moving body and the number of its locomotion. For the number of the locomotion is time, while the 'now' corresponds to the moving body, and is like the unit of number.

[5] Time, then, also is both made continuous by the 'now' and divided at it. For here too there is a correspondence with the locomotion and the moving body. For the motion or locomotion is made one by the thing which is moved, because *it* is one—not because it is one in substratum (for there might be pauses in the movement of such a thing)—but because it is one in definition; for this determines the movement as 'before' and 'after'. Here, too, there is a correspondence with the point; for the point also both connects and terminates the length—it is the [10] beginning of one and the end of another. But when you take it in this way, using the one point as two, a pause is necessary, if the same point is to be the beginning and the end. The 'now' on the other hand, since the body carried is moving, is always different.

Hence time is not number in the sense in which there is number of the same [15] point because it is beginning and end, but rather as the extremities of a line form a number, and not as the parts of the line do so, both for the reason given (for we can use the middle point as two, so that on that analogy time might stand still), and further because obviously the 'now' is no *part* of time nor the section any part of the movement, any more than the points are parts of the line—for it is two *lines* that are [20] *parts* of one line.

In so far then as the 'now' is a boundary, it is not time, but an attribute of it; in so far as it numbers, it is number; for boundaries being only to that which they bound, but number (e.g. ten) is the number of these horses, and belongs also elsewhere.

It is clear, then, that time is number of movement in respect of the before and [25] after, and is continuous since it is an attribute of what is continuous.

The smallest number, in the strict sense, is two. But of number as concrete, sometimes there is a minimum, sometimes not: e.g. of a line, the smallest in respect of *multiplicity* is two (or, if you like, one), but in

respect of *size* there is no minimum; for every line is divided *ad infinitum*. Hence it is so with time. In respect [30] of number the minimum is one (or two); in point of extent there is no minimum.

It is clear, too, that time is not described as fast or slow, but as many or few and [220<sup>b</sup>1] as long or short. For as continuous it is long or short and as a number many or few; but it is not fast or slow—any more than any number with which we count is fast or slow. [5]

Further, there is the same time everywhere at once, but not the same time before and after; for while the present change is one, the change which has happened and that which will happen are different. Time is not number with which we count, but the number of things which are counted; and this according as it occurs before or after is always different, for the ‘nows’ are different. And the [10] number of a hundred horses and a hundred men is the same, but the things numbered are different—the horses for the men. Further, as a movement can be one and the same again and again, so too can time, e.g. a year or a spring or an autumn.

Not only do we measure the movement by the time, but also the time by the [15] movement, because they define each other. The time marks the movement, since it is its number, and the movement the time. We describe the time as much or little, measuring it by the movement, just as we know the number by what is numbered, e.g. the number of the horses by one horse as the unit. For we know how many horses there are by the use of the number; and again by using the one horse as unit we know the number of the horses itself. So it is with the time and the movement; for we measure the movement by the time and vice versa. It is reasonable that the [25] should happen; for the movement goes with the distance and the time with the movement, because they are quanta and continuous and divisible. The movement has these attributes because the distance is of this nature, and the time has then because of the movement. And we measure both the distance by the movement and [30] the movement by the distance; for we say that the road is long, if the journey is long; and that this is long, if the road is long—the time, too, if the movement, and the movement, if the time.

Time is a measure of motion and of being moved, and it measures the motion [221<sup>a</sup>1] by determining a motion which will measure the whole motion, as the cubit does the length by determining an amount which will measure out the whole. Further to be in time means, for movement, that both it and its essence are measured by time (for [5] simultaneously it measures both the movement and its essence, and this is what being in time means for it, that its essence should be measured).

Clearly, then, to be in time has the same meaning for other things also, namely, [10] that their being should be measured by time. To be in time is one of two things: to exist when time exists, and as we say of some things that they are 'in number'. The latter means either what is a part or mode of number—in general, something which belongs to number—or that things have a number.

Now, since time is number, the 'now' and the before and the like are in time, [15] just as unit and odd and even are in number, i.e. in the sense that the one set belongs to number, the other to time. But things are in time as they are in number. If this is so, they are contained by time as things in number are contained by number and things in place by place.

Plainly, too, to be in time does not mean to coexist with time, any more than to [20] be in motion or in place means to coexist with motion or place. For if 'to be in something' is to mean this, then all things will be in anything, and the world will be in a grain; for when the grain is, then also is the world. But this is accidental, whereas the other is necessarily involved: that which is in time necessarily involves [25] that there is time when *it* is, and that which is in motion that there is motion when *it* is.

Since what is in time is so in the same sense as what is in number is so, a time greater than everything in time can be found. So it is necessary that all the things in time should be contained by time, just like other things also which are in anything, e.g. the things in place by place.

[30] A thing, then, will be affected by time, just as we are accustomed to say that time wastes things away, and that all things grow old through time, and that people forget owing to the lapse of time, but we do not say the same of getting to know or of [221<sup>b</sup>1] becoming young or fair. For time is by its nature the cause rather of decay, since it is the number of change, and change removes what is.

Hence, plainly, things which are always are not, as such, in time; for they are not contained by time, nor is their being measured by time. An indication of this is [5] that none of them is *affected* by time, which shows that they are not in time.

Since time is the measure of motion, it will be the measure of rest too. For all rest is in time. For it does not follow that what is in time is moved, though what is in motion is necessarily moved. For time is not motion, but number of motion; and [10] what is at rest can be in the number of motion. Not everything that is not in motion can be said to be at rest—but only that which can be moved, though it actually is not moved, as was said above.

To be in number means that there is a number of the thing, and that its being is [15] measured by the number in which it is. Hence if a thing is in time it will be measured by time. But time will measure what is moved and what is at rest, the one *qua* moved, the other *qua* at rest; for it will measure their motion and rest respectively.

Hence what is moved will not be measured by the time simply in so far as it has quantity, but in so far as its *motion* has quantity. Thus none of the things which are [20] neither moved nor at rest are in time; for to be in time is to be measured by time, while time is the measure of motion and rest.

Plainly, then, neither will everything that does not exist be in time, i.e. those non-existent things that cannot exist, as the diagonal's being commensurate with the side.

Generally, if time is the measure of motion in itself and of other things [25] accidentally, it is clear that a thing whose being is measured by it will have its being in rest or motion. Those things therefore which are subject to perishing and becoming—generally, those which at one time exist, at another do not—are necessarily in time; for there is a greater time which will extend both beyond their [30] being and beyond the time which measures their being. Of things which do not exist but are contained by time some were, e.g. Homer once was, some will be, e.g. a future event; this depends on the direction in which time contains them; if on both, [222<sup>a</sup>1] they have both modes of existence. As to such things as it does not contain in any way, they neither were nor are nor will be. These are those non-existents whose opposites always are, as the incommensurability of the diagonal always is—and this [5] will not be in time. Nor will the commensurability, therefore; hence this eternally is not, because it is contrary to what eternally is. A thing whose contrary is not eternal can be and not be, and it is of such things that there is coming to be and passing away.

**13** · The 'now' is the link of time, as has been said (for it connects past and [10] future time), and it is a limit of time (for it is the beginning of the one and the end of the other). But this is not obvious as it is with the point, which is fixed. It divides potentially, and in so far as it is dividing the 'now' is always different, but in so far as it connects it is always the same, as it is with mathematical lines. For the intellect it [15] is not always one and the same point, since it is other and other when one divides the line; but in so far as it is one, it is the same in every respect.

So the 'now' also is in one way a potential dividing of time, in another the termination of both parts, and their unity. And the dividing and the uniting are the [20] same thing and in the same reference, but in essence they are not the same.

So one kind of 'now' is described in this way: another is when the time of something is *near*. He will come now, because he will come to-day; he has come now, because he came to-day. But the things in the *Iliad* have not happened now, nor is the flood now—not that the time from now to them is not continuous, but because they are not near.

[25] 'At some time' means a time determined in relation to the first of the two types of 'now', e.g. at some time Troy was taken, and at some time there will be a flood; for it must be determined with reference to the 'now'. There *will* thus be a determinate time from this 'now' to that, and there *was* such in reference to the past event. But if there be no time which is not 'sometime', every time will be determined.

[30] Will time then fail? Surely not, if motion always exists. Is time then always different or does the same time recur? Clearly, it is the same with time as with motion. For if one and the same motion sometimes recurs, it will be one and the same time, and if not, not.

Since the 'now' is an end and a beginning of time, not of the same time [222<sup>b</sup>1] however, but the end of that which is past and the beginning of that which is to come, it follows that, as the circle has its convexity and its concavity, in a sense, in the same thing, so time is always at a beginning and at an end. And for this reason it [5] seems to be always different; for the 'now' is not the beginning and the end of the same thing; if it were, it would be at the same time and in the same respect two opposites. And time will not fail; for it is always at a beginning.

'Just now' refers to the part of future time which is near the indivisible present [10] 'now' (When are you walking?—Just now; because the time in which he is going to do so is near), and to the part of past time which is not far from the 'now' (When are you walking?—I have been walking just now). But to say that Troy has just now been taken—we do not say that, because it is too far from the 'now'. 'Lately', too, refers to the part of past time which is near the present 'now'. 'When did you go?' 'Lately', if the time is near the existing now. 'Long ago' refers to the distant past.

[15] 'Suddenly' refers to what has departed from its former condition in a time imperceptible because of its smallness; but it is the nature of *all*

change to alter things from their former condition. In time all things come into being and pass away; for which reason some called it the wisest of all things, but the Pythagorean Paron called it the most stupid, because in it we also forget; and his was the truer view. It is clear then that it must be in itself, as we said before, a cause of destruction [20] rather than of coming into being (for change, in itself, makes things depart from their former condition), and only accidentally of coming into being, and of being. A sufficient evidence of this is that nothing comes into being without itself moving somehow and acting, but a thing can be destroyed even if it does not move at all. And this is what, as a rule, we chiefly mean by a thing's being destroyed by time. [25] Still, time does not work even this change; but this sort of change too happens to occur in time.

We have stated, then, that time exists and what it is, and in how many ways we speak of the 'now', and what 'at some time', 'lately', 'just now', 'long ago', and 'suddenly' mean.

14 · These distinctions having been drawn, it is evident that every change [30] and everything that moves is in time; for the distinction of faster and slower exists in reference to all change, since it is found in every instance. In the phrase 'moving faster' I refer to that which changes before another into the condition in question, when it moves over the same interval and with a regular movement; e.g. in the case [223<sup>a</sup>1] of locomotion, if both things move along the circumference of a circle, or both along a straight line; and similarly in all other cases. But what is *before* is in time; for we say 'before' and 'after' with reference to the distance from the 'now', and the 'now' [5] is the boundary of the past and the future; so that since 'nows' are in time, the before and the after will be in time too; for in that in which the 'now' is, the distance from the 'now' will also be. But 'before' is used contrariwise with reference to past and to future time; for in the past we call 'before' what is farther from the 'now', and 'after' [10] what is nearer, but in the future we call the nearer 'before' and the farther 'after'. So that since the 'before' is in time, and every movement involves a 'before', evidently every change and every movement is in time. [15]

It is also worth considering how time can be related to the soul; and why time is thought to be in everything, both in earth and in sea and in heaven. It is because it is an attribute, or state, of movement (since it is the number of movement) and all these things are movable (for they are

all in place), and time and movement are [20] together, both in respect of potentiality and in respect of actuality?

Whether if soul did not exist time would exist or not, is a question that may fairly be asked; for if there cannot be some one to count there cannot be anything that can be counted either, so that evidently there cannot be number; for number is either what has been, or what can be, counted. But if nothing but soul, or in soul [25] reason, is qualified to count, it is impossible for there to be time unless there is soul, but only that of which time is an attribute, i.e. if *movement* can exist without soul. The before and after are attributes of movement, and time is these *qua* countable.

One might also raise the question what sort of movement time is the number of. Must we not say 'of *any* kind'? For things both come into being in time and pass [30] away, and grow, and are altered, and are moved locally; thus it is of each movement *qua* movement that time is the number. And so it is simply the number of continuous movement, not of any particular kind of it.

But other things as well may have been moved now, and there would be a [223<sup>b</sup>1] number of each of the two movements. Is there another time, then, and will there be two equal times at once? Surely not. For a time that is both equal and simultaneous is one and the same time, and even those that are not simultaneous are one in kind; for if there were dogs, and horses, and seven of each, it would be the same number. [5] So, too, movements that have simultaneous limits have the same time, yet the one may in fact be fast and the other not, and one may be locomotion and the other alteration; still the time of the two changes is the same if it is both equal and [10] simultaneous; and for this reason, while the movements are different and separate, the time is everywhere the same, because the *number* of equal and simultaneous movements is everywhere one and the same.

Now there is such a thing as locomotion, and in locomotion there is included circular movement, and everything is counted by some one thing homogeneous with [15] it, units by a unit, horses by a horse, and similarly times by some definite time, and, as we said, time is measured by motion as well as motion by time (this being so because by a motion definite in time the quantity both of the motion and of the time is measured): if, then, what is first is the measure of everything homogeneous with it, regular circular motion is above all else the measure, because the number of this [20] is the best known. Now neither alteration nor increase nor coming into being can be regular, but

locomotion can be. This also is why time is thought to be the movement of the sphere, viz. because the other movements are measured by this, and time by this movement.

[25] This also explains the common saying that human affairs form a circle, and that there is a circle in all other things that have a natural movement and coming into being and passing away. This is because all other things are discriminated by time, and end and begin as though conforming to a cycle; for even time itself is [30] though to be a circle. And this opinion again is held because time is a measure of this kind of locomotion and is itself measured by such. So that to say that the things that come into being form a circle is to say that there is a circle of time; and this is to say that it is measured by the circular movement; for apart from the measure [224<sup>a</sup>1] nothing else is observed in what is measured; the whole is just a plurality of measures.

It is said rightly, too, that the number of the sheep and of the dogs is the same *number* if the two numbers are equal, but not the same *decad* or the same *ten*; just [5] as the equilateral and the scalene are not the same *triangle*, yet they are the same *figure*, because they are both triangles. For things are called the same so-and-so if they do not differ by a differentia of that thing, but not if they do; e.g. triangle differs from triangle by a differentia of triangle, therefore they are different triangles; but they do not differ by a differentia of figure, but are in one and the [10] same division of it. For a figure of one kind is a circle and a figure of another kind a triangle, and a triangle of one kind is equilateral and a triangle of another kind scalene. They are the same figure, then, and that is a triangle, but not the same triangle. Therefore the number of two groups also is the same number (for their number does not differ by a differentia of number), but it is not the same decad; for [15] the things of which it is asserted differ; one group are dogs, and the other horses.

We have now discussed time—both time itself and the matters appropriate to the consideration of it.



## BOOK V

1 · Everything which changes does so in one of three ways. It may accidentally, as for instance when we say that something musical walks, that which walks being something in which aptitude for music is an accident. Again, a thing is said without qualification to change because something belonging to it changes, i.e. in statements which refer to part of the thing in question: thus the body is restored to [25] health because the eye or the chest, that is to say a *part* of the whole body, is restored to health. And there is the case of a thing which is in motion neither accidentally nor in respect of something else belonging to it, but in virtue of being *itself* directly in motion. Here we have a thing which is *essentially* movable: and that which is so is a different thing according to the particular variety of motion: for instance it may be a thing capable of alteration—and within the sphere of alteration it is again a different thing according as it is capable of being restored to health or [30] capable of being heated. And there are the same distinctions in the case of the mover: one thing causes motion accidentally, another partially (because something belonging to it causes motion), another of itself directly, as, for instance, the physician heals, the hand strikes. We have, then, the following factors: that which directly causes motion, and that which is in motion; further, that in which motion takes place, namely time, and (distinct from these three) that from which and that to which it proceeds (for every motion proceeds from something and to something, [224<sup>b</sup>1] that which is directly in motion being distinct from that to which it is in motion and that from which it is in motion: for instance, wood, hot, and cold—the first is that which is in motion, the second is that to which the motion proceeds, and the third is that from which it proceeds). This being so, it is clear that the motion is in the wood, not in its form; for the motion is neither caused nor experienced by the form or the [5] place or the quantity. So we are left with a mover, a moved, and that to which the motion proceeds; for it is that to which rather than that from which the motion proceeds that gives its name to the change. Thus perishing is change to not-being, though it is also true that that which perishes changes from being; and becoming is change to being, though it is also change from not-being. [10]

Now a definition of motion has been given above. Every goal of motion, whether it be a form, an affection, or a place, is immovable, as, for instance, knowledge and heat. Here, however, a difficulty may be

raised. Affections, it may be said, are motions, and whiteness is an affection: thus there may be change to a motion. To this we may reply that it is not whiteness but whitening that is a motion. [15] Here also things may hold accidentally, or partially and with reference to something other than itself, or directly and with no reference to anything else: for instance, a thing which is becoming white changes accidentally to an object of thought, the colour being only accidentally the object of thought; it changes to colour, because white is a part of colour (or to Europe, because Athens is a part of [20] Europe); but it changes essentially to white colour. It is now clear in what way a thing is in motion essentially or accidentally, and in respect of something other than itself or itself directly moving—in the case both of the mover and of the moved; and it is also clear that the motion is not in the form but in that which is in motion, that is [25] to say the movable in actuality. Now accidental change we may leave out of account; for it is to be found in everything, at any time, and in any subject. Change which is not accidental on the other hand is not to be found in everything, but only in contraries, in things intermediate between contraries, and in contradictories, as may be shown by induction. An intermediate may be a starting-point of change, [30] since it serves as contrary to either of two contraries; for the intermediate is in a sense the extremes. Hence we speak of the intermediate as in a sense a contrary relatively to the extremes and of either extreme as a contrary relatively to the intermediate: for instance, the central note is low relatively to the highest and high relatively to the lowest, and grey is white relatively to black and black relatively to white.

[225<sup>a</sup>1] And since every change is *from* something *to* something—as the word itself indicates, implying something ‘after’ something else, that is to say something earlier and something later<sup>31</sup>—that which changes must change in one of four ways: from [5] subject to subject, from subject to non-subject, from non-subject to subject, or from non-subject to non-subject, where by ‘subject’ I mean what is affirmatively expressed. So it follows necessarily from what has been said that there are three kinds of change, that from subject to subject, that from subject to non-subject, and [10] that from non-subject to subject; for that from non-subject to non-subject is not change, as in that case there is no opposition either of contraries or of contradictories.

Now change from non-subject to subject, the relation being that of contradiction, is coming to be—unqualified coming to be when the change takes place in an unqualified way, particular coming to be when

the change is change in a [15] particular character: for instance, a change from not-white to white is a coming to be of the particular thing, white, while change from unqualified not-being to being is coming to be in an unqualified way, in respect of which we say that a thing comes to be without qualification, not that it comes to be some particular thing. Change from subject to non-subject is perishing—unqualified perishing when the change is from being to not-being, particular perishing when the change is to the opposite negation, the distinction being the same as that made in the case of coming to be.

[20] Now things are said not to be in several ways; and there can be motion neither of that which is not in respect of the affirmation or negation of a predicate, nor of that which is not in the sense that it only *potentially* is, that is to say the opposite of that which *actually* is in an unqualified sense; for although that which is not white or not good may nevertheless be in motion *accidentally* (for example that which is [25] not white might be a man), yet that which is without qualification not a ‘this’ cannot in any sense be in motion: therefore it is impossible for that which is not to be in motion. This being so, it follows that becoming cannot be a motion; for it is that which is not that becomes. For however true it may be that it *accidentally* becomes, it is nevertheless correct to say that it is that which is not that in an unqualified sense becomes. And similarly it is impossible for that which is not to be at rest.

[30] There are these difficulties, then, [in the way of the assumption that that which is not can be in motion],<sup>32</sup> and it may be further objected that, whereas everything which is in motion is in place, that which is not is not in place; for then it would be *somewhere*.

So, too, perishing is not a motion; for a motion has for its contrary either another motion or rest, whereas perishing is the contrary of becoming.

Since, then, every motion is a kind of change, and there are only the three kinds of change mentioned above; and since of these three those which take the form of becoming and perishing, that is to say those which imply a relation of contradiction, [225<sup>b</sup>1] are not motions: it necessarily follows that only change from subject to subject is motion. And every such subject is either a contrary or an intermediate (for a privation may be allowed to rank as a contrary) and can be affirmatively expressed, as naked, toothless, or black. If, then, the categories are severally distinguished as [5] substance, quality, place, [time],<sup>33</sup> relation, quantity, and activity or passivity, it necessarily follows that there are three kinds of motion—qualitative, quantitative, and local.

2 · In respect of substance there is no motion, because substance has no [10] contrary among things that are. Nor is there motion in respect of relation; for it may happen that when one correlative changes, the other, although this does not itself change, may be true or not true, so that in these cases the motion is accidental. Nor is there motion in respect of agent and patient—in fact there can never be motion of mover and moved, because there cannot be motion of motion or becoming of [15] becoming or in general change of change.

For in the first place there are two ways in which motion of motion is conceivable. The motion of which there is motion might be conceived as subject; e.g. a man is in motion because he changes from fair to dark. Can it be that in this sense motion grows hot or cold, or changes place, or increases or decreases? Impossible; [20] for change is not a subject. Or can there be motion of motion in the sense that some other subject changes from a change to another mode of being [as that of a man from illness to health]?<sup>34</sup> Even this is possible only in an accidental sense. For the movement itself is change from one form to another, as that of a man from illness to health. (And the same holds good of becoming and perishing, except that in [25] these processes we have a change to a particular kind of opposite, while the other, motion, is a change to a different kind.) So, if there is to be motion of motion, that which is changing from health to sickness must simultaneously be changing from this very change to another. It is clear, then, that by the time that he has become sick, he must also have changed to whatever may be the other

change concerned (for he could be at rest). Moreover this other can never be any casual change, but must be a change from something definite to some other definite thing. So in this case it must be the opposite change, viz. convalescence. It is only accidentally that [30] there can be change of change, e.g. there is a change from remembering to forgetting only because the subject of this change changes at one time to knowledge, at another to ignorance.

Again, if there is to be change of change and becoming of becoming, we shall have an infinite regress. Thus if one of a series of changes is to be a change of [226<sup>a</sup>1] change, the preceding change must also be so: e.g. if simple becoming was ever in process of becoming, then that which was becoming was also in process of becoming, so that we should not yet have arrived at what was in process of simple becoming but only at what was already in process of becoming in process of becoming. And this again was sometime in process of becoming, so that it is not yet in process of becoming in process of becoming. And since in an infinite series there [5] is no first term, here there will be no first stage and therefore no following stage either. On this hypothesis, then, nothing can become or be moved or change.

Again, if a thing is capable of any particular motion, it is also capable of the corresponding contrary motion or the corresponding coming to rest, and a thing that is capable of becoming is also capable of perishing: consequently, what is in process of becoming in process of becoming is in process of perishing at the very moment when it is in process of becoming in process of becoming; since it cannot be in process of perishing when it is just beginning to become or after it has ceased to become; for that which is in process of perishing must be in existence.

[10] Again, there must be matter underlying all processes of becoming and changing. What can this be in the present case? It is either the body or the soul that undergoes alteration: what is it that correspondingly becomes motion or becoming? And again what is the goal of their motion? It must be the motion or becoming of something from something to something else. But in what sense can this be so? For [15] the becoming of learning cannot be learning: so neither can the becoming of becoming be becoming, nor can the becoming of any process be that process.

Again, since there are three kinds of motion, the subject and the goal of motion must be one or other of these, e.g. locomotion will have to be altered or to be locally moved.

To sum up, then, since everything that is moved is moved in one of

three ways, [20] either accidentally, or partially, or essentially, change can change only accidentally, as e.g. when a man who is being restored to health runs or learns: and accidental change we have earlier decided to leave out of account.

Since, then, motion can belong neither to substance nor to relation nor to agent and patient, it remains that there can be motion only in respect of quality, quantity, [25] and place; for with each of these we have a pair of contraries. Motion in respect of quality let us call alteration, a general designation that is used to include both contraries; and by quality I do not here mean a property of substance (in that sense that which constitutes a specific distinction is a quality) but a passive quality in virtue of which a thing is said to be acted on or to be incapable of being acted on. Motion in respect of quantity has no name that includes both contraries, but it is called increase or decrease according as one or the other is designated: that is to say motion in the direction of complete magnitude is increase, motion in the contrary [30] direction is decrease. Motion in respect of place has no name either general or particular; but we may designate it by the general name of locomotion, though strictly the term locomotion is applicable to things that change their place only when they have not the power to come to a stand, and to things that do not move *themselves* locally.<sup>35</sup>

Change within the same kind from a lesser to a greater or from a greater to a [226<sup>b</sup>1] lesser degree is alteration; for it is motion either from a contrary or to a contrary, whether in an unqualified or in a qualified sense; for change to a lesser degree of a quality will be called change to the contrary of that quality, and change to a greater degree of a quality will be regarded as change from the contrary of that quality to [5] the quality itself. It makes no difference whether the change be qualified or unqualified, except that in the former case the contraries will have to be contrary to one another only in a qualified sense; and a thing's possessing a quality in a greater or in a lesser degree means the presence or absence in it of more or less of the opposite quality. It is now clear, then, that there are only these three kinds of motion.

The term 'immovable' we apply in the first place to that which is absolutely [10] incapable of being moved (just as we correspondingly apply the term invisible to sound); in the second place to that which is moved with difficulty after a long time or whose movement is slow at the start—in fact, what we describe as hard to move; and in the third place to that which is naturally designed for and capable of motion, but is not in motion when, where, and as it naturally would be so. This last is the only

kind of immovable thing of which I use the term 'being at rest'; for rest is [15] contrary to motion, so that rest will be privation of motion in that which is capable of admitting motion.

The foregoing remarks are sufficient to explain the essential nature of motion and rest, the number of kinds of change, and the different varieties of motion.

3 · Let us now proceed to say what it is to be together and apart, in contact, between, in succession, contiguous, and continuous, and to show in what circumstances [20] each of these terms is naturally applicable.

Things are said to be together in place when they are in one primary place and to be apart when they are in different places. Things are said to be in contact when their extremities are together.

Every change involves opposites, and opposites are either contraries or [227<sup>a</sup>7] contradictories; since a contradiction admits of nothing in the middle, it is evident that what is between must involve contraries. What is between involves three things at least; for the contrary is a last point in change, and that which a changing thing, changing continuously and naturally, naturally reaches before it reaches that to which it changes last, is between.<sup>36</sup> A thing is moved continuously if it leaves no gap [10] or only the smallest possible gap in the material—not in the time (for a gap in the time does not prevent things moving continuously, while, on the other hand, there [226<sup>b</sup>25] is nothing to prevent the highest note sounding immediately after the lowest) but in the material in which the motion takes place. This is manifestly true not only in [30] local changes but in every other kind as well. That is locally contrary which is most distant in a straight line; for the shortest line is definitely limited, and that which is definitely limited constitutes a measure.

A thing is in succession when it is after the beginning in position or in form or in some other respect in which it is definitely so regarded, and when further there is [227<sup>a</sup>1] nothing of the *same* kind as itself between it and that to which it is in succession, e.g. a line or lines if it is a line, a unit or units if it is a unit, a house if it is a house (there is nothing to prevent something of a *different* kind being between). For that which is in succession is in succession to a particular thing, and is something posterior; for [5] one is not in succession to two, nor is the first day of the month to the second: in each case the latter is in succession to the former.

[10] A thing that is in succession and touches is contiguous. The continuous is a subdivision of the contiguous: things are called

continuous when the touching limits of each become one and the same and are, as the word implies, contained in each other: continuity is impossible if these extremities are two. This definition makes it plain that continuity belongs to things that naturally in virtue of their mutual [15] contact form a unity. And in whatever way that which holds them together is one, so too will the whole be one, e.g. by a rivet or glue or contact or organic union.

It is obvious that of these terms 'in succession' is primary; for that which touches is necessarily in succession, but not everything that is in succession touches: [20] and so succession is a property of things prior in definition, e.g. numbers, while contact is not. And if there is continuity there is necessarily contact, but if there is contact, that alone does not imply continuity; for the extremities of things may be together without necessarily being one; but they cannot be one without necessarily being together. So natural union is last in coming to be; for the extremities must necessarily come into contact if they are to be naturally united; but things that are [25] in contact are not all naturally united, while where there is no contact clearly there is no natural union either. Hence, if as some say points and units have an independent existence of their own, it is impossible for the two to be identical; for [30] points can touch while units can only be in succession. Moreover, there can always be something between points (for all lines are intermediate between points), whereas it is not necessary that there should be anything between units; for there is nothing between the numbers one and two.

[227<sup>b</sup>1] We have now said what it is to be together and apart, in contact, between and in succession, contiguous and continuous; and we have shown in what circumstances each of these terms is applicable.

4 · There are many ways in which motion is said to be one; for we use the term 'one' in many ways.

Motion is one *generically* according to the different categories to which it may [5] be assigned: thus any locomotion is one generically with any other locomotion, whereas alteration is different generically from locomotion.

Motion is one *specifically* when besides being one generically it also takes place in a species incapable of subdivision: e.g. colour has specific differences; therefore blackening and whitening differ specifically [but at all events every whitening will be specifically the same with every other whitening and every [10] blackening with every other blackening].<sup>37</sup> But



whiteness is not further subdivided by specific differences: hence any whitening is specifically one with any other whitening. Where it happens that the genus is at the same time a species, it is clear that the motion will then in a sense be one specifically though not in an unqualified sense: learning is an example of this, knowledge being on the one hand a species of apprehension and on the other hand a genus including the various knowledges. A difficulty, however, may be raised as to whether a motion is specifically one when [15] the same thing changes from the same to the same, e.g. when one point changes again and again from a particular place to a particular place: if this motion is specifically one, circular motion will be the same as rectilinear motion, and rolling the same as walking. But is not this difficulty removed by the principle already laid down that if that in which the motion takes place is specifically different (as in the present instance the circular path is specifically different from the straight) the motion itself is also different? We have explained, then, what is meant by saying that motion is one generically or one specifically. [20]

Motion is one in an unqualified sense when it is one essentially or numerically; and the following distinctions will make clear what this is. There are three textures in connexion with which we speak of motion—what, where, when. I mean that there must be something that is in motion, e.g. a man or gold, and it must be in motion *in* [25] something, e.g. a place or an affection, and at some time (for all motion takes place in time). Of these three it is the thing in which the motion takes place that makes it one generically or specifically, it is the thing moved that makes the motion one in subject, and it is the time that makes it consecutive; but it is the three together that make it one without qualification—for that in which the motion takes place (the species) must be one and incapable of subdivision, that during which it takes place [30] (the time) must be one and unintermittent, and that which is in motion must be one—not in an accidental sense (i.e. it must be one as the white that blackens is one or Coriscus who walks is one, not in the accidental sense in which Coriscus and the white may be one), nor if it is done in common (for there might be a case of two men [228<sup>a</sup>1] being restored to health at the same time in the same way, e.g. from inflammation of the eye, yet this motion is not one, but only specifically one).

Suppose, however, that Socrates undergoes an alteration specifically the same but at one time and again at another: in this case if it is possible for that which ceased to be again to come into being and remain numerically the same, then this [5] motion too will be one: otherwise it

will be the same but not one. And akin to this difficulty there is another; viz. is health one? and generally are the states and affections in bodies one in essence although (as is clear) the things that contain them are obviously in motion and in flux? Thus if a person's health at daybreak and [10] at the present moment is one and the same, why should not this health be numerically one with that which he recovers after an interval? The same argument applies in each case, but with this difference: that if the states are two then it follows simply from this fact that the actuality must also in point of number be two (for only that which is numerically one can give rise to an actuality that is numerically one); but if the state is one, this is not in itself enough to make us regard the actuality also [15] as one (for when a man ceases walking, the walking no longer is, but it will again be if he begins to walk again). But, be this as it may, if the health is one and the same, then it must be possible for that which is one and the same to come to be and to cease to be many times. However, these difficulties lie outside our present inquiry.

[20] Since every motion is continuous, a motion that is one in an unqualified sense must (since every motion is divisible) be continuous, and a continuous motion must be one. There will not be continuity between any motion and any other any more than there is between any two things chosen at random in any other sphere: there can be continuity only when the extremities of the two things are one. Now some things have no extremities at all; and the extremities of others differ specifically [25] although we give them the same name: how should e.g. the end of a line and the end of walking touch or come to be one? Motions that are not the same either specifically or generically may, it is true, be *consecutive* (e.g. a man may run and then at once fall ill of a fever), and again, in the torch-race we have consecutive but not continuous locomotion; for according to our definition there can be continuity [30] only when the ends of the two things are one. Hence motions may be consecutive or successive in virtue of the time being continuous, but there can be continuity only in virtue of the motions themselves being continuous, that is when the end of each is [228<sup>b</sup>1] one with the end of the other. Motion, therefore, that is in an unqualified sense continuous and one must be specifically the same, of one thing, and in one time. Unity is required in respect of time in order that there may be no interval of immobility, for where there is intermission of motion there must be rest, and a [5] motion that includes intervals of rest will be not one but many, so that a motion that is interrupted by stationariness is not one or continuous, and it is so interrupted if there is an interval of time. And

though of a motion that is not specifically one (even if it is not intermittent) the time is one, the motion is specifically different; for motion that is one must be specifically one, though motion that is specifically one is [10] not necessarily one in an unqualified sense. We have now explained what we mean when we call a motion one without qualification.

Further, a motion is also said to be one generically, specifically, or essentially when it is complete, just as in other cases completeness and wholeness are characteristics of what is one; and sometimes a motion even if incomplete is said to be one, provided only that it is continuous.

[15] And besides the cases already mentioned there is another in which a motion is said to be one, viz. when it is regular; for in a sense a motion that is irregular is not regarded as one, that title belonging rather to that which is regular, as a straight line is regular, the irregular being divisible. But the difference would seem to be one of degree. In every kind of motion we may have regularity or irregularity: thus there [20] may be regular alteration, and locomotion in a regular path, e.g. in a circle or on a straight line, and it is the same with regard to increase and decrease. The difference that makes a motion irregular is sometimes to be found in its path: thus a motion cannot be regular if its path is an irregular magnitude, e.g. a broken line, a spiral, or [25] any other magnitude that is not such that any part of it fits on to any other that may be chosen. Sometimes it is found neither in the subject nor in the time nor in the goal but in the manner of the motion; for in some cases the motion is differentiated by quickness and slowness: thus if its velocity is uniform a motion is regular, if not it is irregular. So quickness and slowness are not species of motion nor do they constitute specific differences of motion, because this distinction occurs in connexion with all the distinct species of motion. The same is true of heaviness and lightness when they refer to the same thing: e.g. they do not specifically distinguish [30] earth from itself or fire from itself. Irregular motion, therefore, while in virtue of being continuous it is one, is so in a lesser degree, as is the case with locomotion in a [229a1] broken line; and a lesser degree of something always means an admixture of its contrary. And since every motion that is one can be both regular and irregular, motions that are consecutive but not specifically the same cannot be one and continuous; for how should a motion composed of alteration and locomotion be [5] regular? If a motion is to be regular its parts ought to fit one another.

5 · We have further to determine what motions are contrary to each other, and to determine similarly how it is with rest. And we have first to decide whether contrary motions are motions respectively from and to the same thing, e.g. a motion from health and a motion to health (where the opposition, it would seem, is of the same kind as that between coming to be and ceasing to be); or motions respectively [10] from contraries, e.g. a motion from health and a motion from disease; or motions respectively to contraries, e.g. a motion to health and a motion to disease; or motions respectively from a contrary and to the opposite contrary, e.g. a motion from health and a motion to disease; or motions respectively from a contrary to the opposite contrary and from the latter to the former, e.g. a motion from health to disease and a motion from disease to health; for motions must be contrary to one another in one [15] or more of these ways, as there is no other way in which they can be opposed.

Now motions respectively from a contrary and to the opposite contrary, e.g. a motion from health and a motion to disease, are not contrary motions; for they are one and the same. (Yet their being is not the same, just as changing from health is different from changing to disease.) Nor are motions respectively from a contrary [20] and from the opposite contrary contrary motions; for a motion from a contrary is at the same time a motion to a contrary or to an intermediate (of this, however, we shall speak later), but changing to a contrary rather than changing from a contrary would seem to be the cause of the contrariety of motions, the latter being the loss, the former the gain, of contrariness. Moreover, each several motion takes its name rather from the goal than from the starting-point of change, e.g. motion to health [25] we call convalescence, motion to disease sickening. Thus we are left with motions respectively to contraries, and motions respectively to contraries from the opposite contraries. Now it would seem that motions to contraries are at the same time motions from contraries (though their being may not be the same; 'to health' is distinct, I mean, from 'from disease', and 'from health' from 'to disease'). [30]

Since then change differs from motion (motion being change from a particular subject to a particular subject), it follows that contrary motions are motions respectively from a contrary to the opposite contrary and from the latter to the [229<sup>b</sup>1] former, e.g. a motion from health to disease and a motion from disease to health. Moreover, the consideration of particular examples will also show what kinds of processes are generally recognized as contrary: thus falling ill is regarded as contrary to

recovering one's health, and being taught as contrary to being led into [5] error by another; for their goals are contrary. (It is possible to acquire error, like knowledge, either by one's own agency or by that of another.) Similarly we have upward locomotion and downward locomotion, which are contrary lengthwise, locomotion to the right and locomotion to the left, which are contrary breadthwise, and forward locomotion and backward locomotion, which too are contraries.

On the other hand, a process simply to a contrary (e.g. becoming white, where [10] no starting-point is specified) is a change but not a motion. And in all cases of a thing that has no contrary we have as contraries change from and change to the same thing. Thus coming to be is contrary to ceasing to be, and losing to gaining. But these are changes and not motions. And wherever a pair of contraries admits of [15] an intermediate, motions to that intermediate must be held to be in a sense motions to one or other of the contraries; for the intermediate serves as a contrary for the purposes of the motion, in whichever direction the change may be, e.g. grey in a motion from grey to white takes the place of black as starting-point, in a motion from white to grey it takes the place of black as goal, and in a motion from black to grey it takes the place of white as goal; for the middle is opposed in a sense to either [20] of the extremes, as has been said above. Thus two motions are contrary to each other only when one is a motion from a contrary to the opposite contrary and the other is a motion from the latter to the former.

6 · But since a motion appears to have contrary to it not only another motion but also a state of rest, we must determine how this is so. A motion has for its [25] contrary in the unqualified sense another motion, but it also has for an opposite a state of rest (for rest is the privation of motion and the privation of anything may be called its contrary), and motion of one kind has for its opposite rest of that kind, e.g. local motion has local rest. This statement, however, needs further qualification: there remains the question, is the opposite of remaining at a particular place motion from or motion to that place? It is surely clear that since there are two subjects [30] between which motion takes place, motion from one of these to its contrary has for its opposite remaining there, while the reverse motion has for its opposite remaining in the contrary. At the same time these two are also contrary to each other; for it would be absurd to suppose that there are contrary motions and not opposite states [230<sup>a</sup>1] of rest. States of rest in contraries *are* opposed. To take an example, a

state of rest in health is contrary to a state of rest in disease, and the motion to which it is contrary is that from health to disease. For it would be absurd that its contrary motion should be that from disease to health, since motion to that in which a thing is at rest is [5] rather a coming to rest, or at any rate the coming to rest is found to come into being simultaneously with the motion; and one of these two motions it must be. And rest in *whiteness* is not contrary to rest in health.

Of all things that have no contraries there are opposite *changes* (viz. change from the thing and change to the thing, e.g. change from being and change to being), but no *motion*. So, too, of such things there is no remaining though there is absence of change. Should there be a particular subject, absence of change in its [10] being will be contrary to absence of change in its not-being. And here a difficulty may be raised: if what is not is not a particular something, what is it that is contrary to absence of change in a thing's being? and is this absence of change a state of rest? If it is, then either it is not true that every state of rest is contrary to a motion or else coming to be and ceasing to be are motion. It is clear then that, since we exclude [15] these from among motions, we must not say that this absence of change is a state of rest: we must say that it is similar to a state of rest and call it absence of change. And it will have for its contrary either nothing or absence of change in the thing's not-being, or the ceasing to be of the thing; for such ceasing to be is change from it and the thing's coming to be is change to it.

Again, a further difficulty may be raised. How is it that whereas in local change both remaining and moving may be natural or unnatural, in the other [20] changes this is not so? e.g. alteration is not now natural and now unnatural; for convalescence is no more natural or unnatural than falling ill, whitening no more natural or unnatural than blackening; so, too, with increase and decrease: these are not contrary to each other in the sense that either of them is natural while the other [25] is unnatural, nor is one increase contrary to another in this sense; and the same account may be given of becoming and perishing: it is not true that becoming is natural and perishing unnatural (for growing old is natural), nor do we observe one becoming to be natural and another unnatural. We answer that if what happens under violence is unnatural, then violent perishing is unnatural and as such contrary [30] to natural perishing. Are there then also some becomings that are violent and not ordained, and are therefore contrary to natural becomings, and violent increases and decreases, e.g. the rapid growth to maturity of profligates and the rapid [230<sup>b</sup>1] ripening of corn when not packed close in the earth? And how is

it with alterations? Surely just the same: we may say that some alterations are violent while others are natural, e.g. patients alter naturally or unnaturally according as they throw off [5] fevers on the critical days or not. But then we shall have perishings contrary to one another, not to becomings. And, why should not this in a sense be so? Thus it is so if one is pleasant and another painful: and so one perishing will be contrary to another not in an unqualified sense, but in so far as one has this quality and the other that.

Generally, then, motions and states of rest exhibit contrariety in the manner [10] described above, e.g. upward to downward, these being instances of local contrariety; and upward locomotion belongs naturally to fire and downward to earth, and the locomotions of the two are certainly contrary to each other. And again, fire moves up naturally and down unnaturally; and its natural motion is certainly contrary to its unnatural motion. Similarly with remaining: remaining above is [15] contrary to motion from above downwards, and to earth this remaining comes unnaturally, this motion naturally. So the unnatural remaining of a thing is contrary to its natural motion, just as we find a similar contrariety in the motion of the same thing: one of its motions, the upward or the downward, is natural, the other [20] unnatural.

Here, however, the question arises, has every state of rest that is not permanent a becoming, and is this becoming a coming to a standstill? If so, there must be a becoming of that which is at rest unnaturally, e.g. of earth at rest above; and therefore this earth during that time that it was being carried violently upward was [25] coming to a standstill. But whereas the velocity of that which comes to a standstill seems always to increase, the velocity of that which is carried violently seems always to decrease: so it will *be* in a state of rest without having *become* so. Moreover coming to a standstill seems to be identical or at least concomitant with the locomotion of a thing to its proper place.

There is also another difficulty involved in the view that remaining in a particular place is contrary to motion from that place. For when a thing is moving [30] from or discarding something, it still appears to have that which is being discarded, so that if this state of rest is contrary to the motion from here to its contrary, the contraries will simultaneously belong to the same thing. May we not say, however, that in so far as the thing is still stationary it is in a state of rest in a qualified sense, and in general that whenever a thing is in motion, part of it is at the starting-point [231<sup>a</sup>1] while part is at the goal to which it is changing? And consequently a motion finds its contrary rather in another motion than in

a state of rest.

With regard to motion and rest, then, we have now explained in what sense each of them is one and under what conditions they exhibit contrariety.

[5] [With regard to coming to a standstill the question may be raised whether there is an opposite state of rest to unnatural as well as to natural motions. It would be absurd if this were not the case; for a thing may remain still merely under violence: thus we shall have a thing being in a non-permanent state of rest without having become so. But it is clear that it must be the case; for just as there is unnatural motion, so, too, a thing may be in an unnatural state of rest. Further, [10] some things have a natural and an unnatural motion, e.g. fire has a natural upward motion and an unnatural downward motion: is it, then, this or the motion of earth that is contrary? For the earth naturally moves downwards. Surely it is clear that both are contrary to it though not in the same sense: the natural motion of earth is contrary inasmuch as the motion of fire is also natural, whereas the upward motion [15] of fire as being natural is contrary to the downward motion of fire as being unnatural. The same is true of the corresponding cases of remaining. But there would seem to be a sense in which a state of rest and a motion are opposites.]<sup>38</sup>



## BOOK VI

1 · Now if the terms ‘continuous’, ‘in contact’, and ‘in succession’ are understood as defined above—things being continuous if their extremities are one, in contact if their extremities are together, and in succession if there is nothing of their own kind intermediate between them—nothing that is continuous can be composed of indivisibles: e.g. a line cannot be composed of points, the line being continuous and the point indivisible. For the extremities of two points can neither be [25] *one* (since of an indivisible there can be no extremity as distinct from some other part) nor *together* (since that which has no parts can have no extremity, the extremity and the thing of which it is the extremity being distinct).

Moreover, if that which is continuous is composed of points, these points must be either *continuous* or *in contact* with one another: and the same reasoning applies [30] in the case of all indivisibles. Now for the reason given above they cannot be continuous; and one thing can be in contact with another only if whole is in contact [231<sup>b</sup>1] with whole or part with part or part with whole. But since indivisibles have no parts, they must be in contact with one another as whole with whole. And if they are in contact with one another as whole with whole, they will not be continuous; for that which is continuous has distinct parts, and these parts into which it is divisible are [5] different in this way, i.e. spatially separate.

Nor, again, can a point be *in succession* to a point or a now to a now in such a way that length can be composed of points or time of nows; for things are in succession if there is nothing of their own kind intermediate between them, whereas intermediate between points there is always a line and between nows a period of time.

Again, they could be divided into indivisibles, since each is divisible into the [10] parts of which it is composed. But, as we saw, no continuous thing is divisible into things without parts. Nor can there be anything of any other kind between; for it would be either indivisible or divisible, and if it is divisible, divisible either into indivisibles or into divisible parts that are always divisible, in which case it is continuous. [15]

Moreover, it is plain that everything continuous is divisible into divisible parts that are always divisible; for if it were divisible into indivisibles, we should have an indivisible in contact with an indivisible,

since the extremities of things that are continuous with one another are one and are in contact.

The same reasoning applies equally to magnitude, to time, and to motion: either all of these are composed of indivisibles and are divisible into indivisibles, or none. This may be made clear as follows. If a magnitude is composed of indivisibles, [20] the motion over that magnitude must be composed of corresponding indivisible motions: e.g. if the magnitude ABC is composed of the indivisibles A, B, C, each corresponding part of the motion DEF of Z over ABC is indivisible. Therefore, since where there is motion there must be something that is in motion, and where there is [25] something in motion there must be motion, therefore the being-moved will also be composed of indivisibles. So Z traversed A when its motion was D, B when its motion was E, and C similarly when its motion was F. Now a thing that is in motion from one place to another cannot at the moment when it was in motion both be in motion and at the same time have completed its motion at the place to which it was in motion (e.g. if a man is walking to Thebes, he cannot be walking to Thebes and at [30] the same time have completed his walk to Thebes); and, as we saw, Z traverses the partless section A in virtue of the presence of the motion D. Consequently, if Z [232<sup>a</sup>1] actually passed through A *after* being in process of passing through, the motion must be divisible; for at the time when Z was passing through, it neither was at rest nor had completed its passage but was in an intermediate state; while if it is passing through and has completed its passage at the same time, then that which is walking [5] will at the moment when it is walking have completed its walk and will be in the place to which it is walking; that is to say, it will have completed its motion at the place to which it is in motion. And if a thing is in motion over the whole ABC and its motion is DEF, and if it is not in motion at all over the partless section A but has completed its motion over it, then the motion will consist not of motions but of movings, and will take place by a thing's having completed a motion without being in motion; for on this assumption it has completed its passage through A without [10] passing through it. So it will be possible for a thing to have completed a walk without ever walking; for on this assumption it has completed a walk over a particular distance without walking over that distance. Since, then, everything must be either at rest or in motion, and it is therefore at rest in each of A, B, and C, it follows that a thing can be at the same time continuously at rest and in motion; for, as we saw, it is in motion over the whole ABC and at rest in any part (and [15] consequently in the whole) of it. Moreover, if the

indivisibles composing DEF are motions, it would be possible for a thing in spite of the presence in it of motion to be not in motion but at rest; while if they are not motions, it would be possible for motion to be composed of something other than motions.

And if length and motion are thus indivisible, it is similarly necessary that time also be indivisible, that is to say be composed of indivisible nows; for if every motion [20] is divisible and bodies of equal velocity will move less in less time, the time must also be divisible; and if the time in which a thing is carried over A is divisible, A must also be divisible.

2 · And since every magnitude is divisible into magnitudes—for we have shown that it is impossible for anything continuous to be composed of indivisible [25] parts, and every magnitude is continuous—it necessarily follows that the quicker of two things traverses a greater magnitude in an equal time, an equal magnitude in less time, and a greater magnitude in less time, in conformity with the definition sometimes given of the quicker. Suppose that A is quicker than B. Now since of two [30] things that which changes sooner is quicker, in the time FG, in which A has changed from C to D, B will not yet have arrived at D but will be short of it: so that in an equal time the quicker will pass over a greater magnitude. More than this, it will pass over a greater magnitude in less time; for in the time in which A has arrived at D, B being the slower has arrived, let us say, at E. Then since A has [232<sup>b</sup>1] occupied the whole time FG in arriving at D, it will have arrived at H in less time than this, say FJ. Now the magnitude CH that A has passed over is greater than the magnitude CE, and the time FJ is less than the whole time FG; so that the quicker [5] will pass over a greater magnitude in less time. And from this it is also clear that the quicker will pass over an equal magnitude in less time than the slower. For since it passes over the greater magnitude in less time than the slower, and (regarded by itself) passes over the greater in more time than the lesser—LM than LN—, the time PR in which it passes over LM will be more than the times PS in which it [10] passes over LN: so that, the time PR being less than the time T in which the slower passes over LN, PS will also be less than T; for it is less than PR, and that which is less than something less is also itself less. Hence it will traverse an equal magnitude in less time. Again, since the motion of anything must always occupy either an equal [15] time or less or more time, and since, whereas a thing is slower if its motion occupies more time and of equal velocity if its motion occupies an equal time, the

quicker is neither of equal velocity nor slower, it follows that the motion of the quicker can occupy neither an equal time nor more time. It can only be, then, that it occupies less time, and thus it is necessary that the quicker will pass over an equal magnitude too in less time.

And since every motion is in time and a motion may occupy any time, and the [20] motion of everything that is in motion may be either quicker or slower, both quicker motion and slower motion may occupy any time: and this being so, it necessarily follows that time also is continuous. By continuous I mean that which is divisible into divisibles that are always divisible: and if we take this as the definition of continuous, it follows necessarily that time is continuous. For since it has been [25] shown that the quicker will pass over an equal magnitude in less time than the slower, suppose that A is quicker and B slower, and that the slower has traversed the magnitude CD in the time FG. Now it is clear that the quicker will traverse the [30] same magnitude in less time than this: let us say in the time FH. Again, since the quicker has passed over the whole CD in the time FH, the slower will in the same time pass over CJ, say, which is less than CD. And since B, the slower, has passed [233<sup>a</sup>1] over CJ in the time FH, the quicker will pass over it in less time: so that the time FH will again be divided. And if this is divided the magnitude CJ will also be divided in the same ratio; and again, if the magnitude is divided, the time will also be divided. And we can carry on this process for ever, taking the slower after the quicker and the quicker after the slower, and using what has been demonstrated; for the quicker [5] will divide the time and the slower will divide the length. If, then, this alternation always holds good, and at every turn involves a division, it is evident that all time must be continuous. And at the same time it is clear that all magnitude is also [10] continuous; for the divisions of which time and magnitude respectively are susceptible are the same and equal.

Moreover, the current arguments make it plain that, if time is continuous, magnitude is continuous also, inasmuch as a thing passes over half a given [15] magnitude in half the time, and in general over a less magnitude in less time; for the divisions of time and of magnitude will be the same. And if either is infinite, so is the other, and the one is so in the same way as the other; i.e. if time is infinite in respect of its extremities, length is also infinite in respect of its extremities; if time is infinite in respect of divisibility, length is also infinite in respect of divisibility; and if time is [20] infinite in both respects, magnitude is also infinite in both respects.

Hence Zeno's argument makes a false assumption in asserting that it

is impossible for a thing to pass over or severally to come in contact with infinite things in a finite time. For there are two ways in which length and time and generally [25] anything continuous are called infinite: they are called so either in respect of divisibility or in respect of their extremities. So while a thing in a finite time cannot come in contact with things quantitatively infinite, it can come in contact with things infinite in respect of divisibility; for in this sense the time itself is also infinite: and so we find that the time occupied by the passage over the infinite is not a finite [30] but an infinite time, and the contact with the infinities is made by means of moments not finite but infinite in number.

The passage over the infinite, then, cannot occupy a finite time, and the passage over the finite cannot occupy an infinite time: if the time is infinite the magnitude must be infinite also, and if the magnitude is infinite, so also is the time. [233<sup>b</sup>1] Let AB be a finite magnitude, and an infinite time C, and let a finite period CD of the time be taken. Now in this period the thing will pass over a certain segment of the magnitude: let BE be the segment that it has thus passed over. (This will be either an exact measure of AB or less or greater than an exact measure: it makes no difference which it is.) Then, since a magnitude equal to BE will always be passed [5] over in an equal time, and BE measures the whole magnitude, the whole time occupied in passing over AB will be finite; for it will be divisible into periods equal in number to the segments into which the magnitude is divisible. Moreover, if it is the case that infinite time is not occupied in passing over every magnitude, but it is possible to pass over some magnitude, say BE, in a finite time, and if this measures [10] the whole, and if an equal magnitude is passed over in an equal time, then it follows that the time too is finite. That infinite time will not be occupied in passing over BE is evident if the time be taken as limited in one direction; for as the part will be passed over in less time than the whole, this must be finite, the limit in one direction being given. The same demonstration will also show the falsity of the assumption [15] that infinite length can be traversed in a finite time. It is evident, then, from what has been said that neither a line nor a surface nor in fact anything continuous can be indivisible.

This conclusion follows not only from the present argument but from the consideration that the opposite assumption implies the divisibility of the indivisible. For since the distinction of quicker and slower may apply to motions occupying any [20] period of time and in an equal time the quicker passes over a greater length, it may happen that it will pass over a length twice, or one and a half times, as great as that passed over by the

slower; for their respective velocities may stand to one another in this proportion. Suppose, then, that the quicker has in the same time been carried over a length one and a half times as great, and that the respective magnitudes are divided, that of the quicker into three indivisibles, AB, BC, CD, and that of the [25] slower into two, EF, FG. Then the time may also be divided into three indivisibles; for an equal magnitude will be passed over in an equal time. Suppose then that it is thus divided into KL, LM, MN. Again, since in the same time the slower has been carried over EZ, ZH, the time may also be divided into two. Thus the indivisible will [30] be divisible, and that which has no parts will be passed over not in an indivisible but in a greater time. It is evident, therefore, that nothing continuous is without parts.

3 · Necessarily, too, the now—the now so-called not derivatively but in its own right and primarily—is indivisible and is inherent in all time. For the now is an extremity of the past (no part of the [234<sup>a</sup>1] future being on this side of it), and again of the future (no part of the past being on that side of it): it is, we maintain, a limit of both. And if it is proved that it is of this character and one and the same, it will at once be evident also that it is indivisible.

Now the now that is the extremity of both times must be one and the same; for [5] if each extremity were different, the one could not be in succession to the other, because nothing continuous can be composed of things having no parts; and if the one is apart from the other, there will be time between them, because everything continuous is such that there is something between its limits described by the same name as itself. But if the intermediate thing is time, it will be divisible; for all [10] time has been shown to be divisible. Thus on this assumption the now is divisible. But if the now is divisible, there will be part of the past in the future and part of the future in the past; for past time will be marked off from future time at the actual point of division. Also the now will be a now not in its own right but derivatively, for [15] the division will not be a division in its own right. Furthermore, there will be a part of the now that is past and a part that is future, and it will not always be the same part that is past or future. Nor, then, will the now be the same; for the time may be divided at many points. If, therefore, the now cannot possibly have these characteristics, it follows that it must be the same now that belongs to each of the two times. [20] But if it is the same, it is evident that it is also indivisible; for if it is divisible it will be involved in the same implications

as before. It is clear, then, from what has been said that time contains something indivisible, and this is what we call the now.

We will now show that nothing can be in motion in a now. For if this is possible, there can be both quicker and slower motion. Suppose then that in the now N the [25] quicker has traversed the distance AB. That being so, the slower will in the same now have traversed a distance less than AB, say AC. But since the slower will have occupied the whole now in traversing AC, the quicker will occupy less than this in traversing it. Thus we shall have a division of the now, whereas we found it to be [30] indivisible. It is impossible, therefore, for anything to be in motion in a now.

Nor can anything be at rest; for we assert that, that only can be at rest which is of such a nature to be in motion but is not in motion when, where, or as it would naturally be so; since, therefore, nothing is of such a nature as to be in motion in a now, it is clear that nothing can be at rest either.

Moreover, inasmuch as it is the same now that belongs to both the times, and it is possible for a thing to be in motion throughout one time and to be at rest [234b1] throughout the other, and that which is in motion or at rest for the whole of a time will be in motion or at rest in any part of it in which it is of such a nature as to be in motion or at rest: it will follow that the same thing can at the same time be at rest and in motion; for both the times have the same extremity, viz. the now.

Again, we say that a thing is at rest if its condition in whole and in part is [5] uniform now and before; but the now contains no before; consequently, there can be no rest in it.

It follows then that the motion of that which is in motion and the rest of that which is at rest must occupy time.

[10] **4** · Further, everything that changes must be divisible. For since every change is from something to something, and when a thing is at the point to which it was changing it is no longer changing, and when both it itself and all its parts are at the point from which it was changing it is not<sup>39</sup> changing (for that which is in whole and in part in an unvarying condition is not in a state of change); it follows, [15] therefore, that part of that which is changing must be at the starting-point and part at the goal; for it cannot be in both or in neither. (Here by ‘goal of change’ I mean that which comes first in the process of change: e.g. in a process of change from white the goal in question will be grey, not black; for it is

not necessary that that which is changing should be at either of the extremes.) It is evident, therefore, that [20] everything that changes must be divisible.

Now motion is divisible in two ways—in virtue of the time that it occupies, according to the motions of the parts of that which is in motion: e.g. if the whole AC is in motion, there will be a motion of AB and a motion of BC. Let DE be the motion [25] of the part AB and EF the motion of the part BC. Then the whole DF must be the motion of AC; for it must constitute its motion inasmuch as they severally constitute the motions of each of its parts. But the motion of a thing can never be constituted by the motion of something else; consequently the whole motion is the motion of the whole magnitude.

[30] Again, since every motion is a motion of something, and the whole motion DF is not the motion of either of the parts (for each of the parts is the motion of one of the parts) or of anything else (for, the whole motion being the motion of a whole, the parts of the motion are the motions of the parts of that whole; and the parts are the motions of AB, BC and of nothing else; for, as we saw, a motion that is one cannot be the motion of more things than one): since this is so, the whole motion will be the motion of the magnitude ABC.

Again, if there is a motion of the whole other than DF, say HI, the motion of [235<sup>a</sup>1] each of the parts may be subtracted from it; and these motions will be equal to DE, EF; for the motion of that which is one must be one. So if the whole motion HI may be divided into the motions of the parts, HI will be equal to DF; if on the other hand there is any remainder, say KI, this will be a motion of nothing; for it can be the [5] motion neither of the whole nor of the parts (as the motion of that which is one must be one) nor of anything else (for a motion that is continuous must be the motion of things that are continuous). And the same result follows if the division of HI reveals a surplus. Consequently, if this is impossible, the whole motion must be the same as and equal to DF.

This then is what is meant by the division of motion according to the motions of [10] the parts; and it must be applicable to everything that is divisible into parts.

Motion is also susceptible of another kind of division, that according to time. For since all motion is in time and all time is divisible, and in less time the motion is less, it follows that every motion must be divisible according to time. And since everything that is in motion is in motion in a certain sphere and for a certain time and has a motion belonging to it, it follows that the time, the motion, the [15] being-in-motion, the thing that



is in motion, and the sphere of the motion must all be susceptible of the same divisions (though spheres of motion are not all divisible in a like manner: thus place is essentially, quality accidentally divisible). For suppose that A is the time occupied by the motion B. Then if all the time has been occupied by the whole motion, it will take less of the motion to occupy half the time, less [20] again to occupy a further subdivision of the time, and so on always. Similarly, if the motion is divisible, the time too will be divisible; for if the whole motion occupies all the time half the motion will occupy half the time, and less of the motion again will occupy less of the time.

In the same way the being-in-motion will also be divisible. For let C be the [25] whole being-in-motion. Then the being-in-motion that corresponds to half the motion will be less than the whole being-in-motion, that which corresponds to a quarter of the motion will be less again, and so on always. Moreover by setting out the being-in-motion corresponding to each of the two motions DC (say) and CE, we may argue that the whole being-in-motion will correspond to the whole motion (for [30] if something else did, there would be more than one being-in-motion corresponding to the same motion), the argument being the same as that whereby we showed that the motion of a thing is divisible into the motions of the parts of the thing; for if we take the being-in-motion corresponding to each of the two motions, we shall see that the whole is continuous.

The same reasoning will show the divisibility of the length, and in fact of everything that forms a sphere of change (though some of these are only [35] accidentally divisible because that which changes is so); for the division of one term will involve the division of all. So, too, in the matter of their being finite or infinite, they will all alike be either the one or the other. And we now see that in most cases [235<sup>b</sup>1] the fact that all the terms are divisible or infinite is a direct consequence of the fact that the thing that changes is divisible or infinite; for the attributes 'divisible' and 'infinite' belong in the first instance to the thing that changes. That divisibility does so we have already shown; that infinity does so will be made clear in what [5] follows.

5 · Since everything that changes changes from something to something, that which has changed must at the moment when it has first changed be in that to which it has changed. For that which changes retires from or leaves that from which it changes; and leaving, if not

identical with changing, is at any rate a consequence [10] of it. And if leaving is a consequence of changing, having left is a consequence of having changed; for there is a like relation between the two in each case.

One kind of change, then, being change in a relation of contradiction, where a thing has changed from not-being to being it has left not-being. Therefore it will be [15] in being; for everything must either be or not be. It is evident, then, that in contradictory change that which has changed must be in that to which it has changed. And if this is true in this kind of change, it will be true in all other kinds as well; for what holds good in the case of one will hold good likewise in the case of the rest.

Moreover, if we take each kind of change separately, the truth of our conclusion will be equally evident, on the ground that that which has changed must [20] be somewhere or in something. For, since it has left that from which it has changed and must be somewhere, it must be either in that to which it has changed or in something else. If, then, that which has changed to B is in something other than B, say C, it must again be changing from C to B; for B was not assumed to be contiguous, and change is continuous. Thus we have the result that the thing that [25] has changed, at the moment when it has changed, is changing to that to which it has changed, which is impossible: that which has changed, therefore, must be in that to which it has changed. So it is evident likewise that that which has come to be, at the moment when it has come to be, will *be*, and that which has ceased to be will *not be*; for what we have said applies universally to every kind of change, and its truth is [30] most obvious in the case of contradictory change. It is clear, then, that that which has changed, at the moment when it has first changed, is in that to which it has changed.

Now the time primarily in which that which has changed has changed must be indivisible, where by 'primary' I mean a thing's being such-and-such not because [35] some part of it is such-and-such. For let AC be divisible, and let it be divided at B. If then it has changed in AB or again in BC, AC cannot be the primary thing in which it has changed. If, on the other hand, it has been changing in both AB and BC (for it [236<sup>a</sup>1] must either have changed or be changing in each of them), it must have been changing in the whole too; but our assumption was that it *had* changed in that. The same argument applies if we suppose that it changes in one part and has changed in the other; for then we shall have something prior to what is primary. So that in [5] which a thing has changed must be indivisible. It is also evident, therefore, that that in which that which has ceased to be has ceased to be and that in which that

which has come to be has come to be are indivisible.

But there are two ways of talking about that primarily in which something has changed. On the one hand it may mean the primary time at which the change is completed—the moment when it is correct to say ‘it has changed’; on the other hand it may mean the primary time at which it began to change. Now the primary time [10] that has reference to the *end* of the change is something really existent; for a change may be completed, and there is such a thing as an end of change, which we have in fact shown to be indivisible because it is a limit. But that which has reference to the beginning is not existent at all; for there is no such thing as a beginning of change, [15] nor any primary time at which it was changing. For suppose that AD is such a primary time. Then it cannot be indivisible; for, if it were, the nows will be consecutive. Again, if the changing thing is at rest in the whole time CA (for we may suppose that it is at rest), it is at rest in A also; so if AC is without parts, it will [20] simultaneously be at rest and have changed; for it is at rest in A and has changed in D. Since then AD is not without parts, it must be divisible, and the changing thing must have changed in every part of it (for if it has changed in neither of the two parts into which AD is divided, it has not changed in the whole either; if, on the other hand, it is changing in both parts, it is likewise changing in the whole; and if, again,<sup>40</sup> it has changed in one of the two parts, the whole is not the primary time in which it has changed: it must therefore have changed in every part). It is evident, [25] then, that there is no primary time in which it has changed; for the divisions are infinite.

So, too, of that which has changed there is no primary part that has changed. For suppose that of DE the primary part that has changed is DF (everything that changes having been shown to be divisible); and let HI be the time in which DF has [30] changed. If, then, in the whole time DF has changed, in half the time there will be a part that has changed, less than and prior to DF; and again there will be another part prior to this, and yet another, and so on always. Thus of that which changes there cannot be any primary part that has changed. It is evident, then, from what has been said, that neither of that which changes nor of the time in which it changes is there any primary part. [35]

With regard, however, to the actual subject of change—that is to say that in respect of which a thing changes—there is a difference to be observed. For in a [236<sup>b</sup>1] process of change we may distinguish three terms—that which changes, that in which it changes, and that to which it changes, e.g. the man, the time, and the pallor. Of these the man and the

time are divisible; but with the pallor it is otherwise [5] (though they are all divisible accidentally; for that of which the pallor or any other quality is an accident is divisible). For things which are divisible in their own right and not accidentally have no primary part. Take the case of magnitudes: let AB [10] be a magnitude, and suppose that it has moved from B to a primary C. Then if BC is taken to be indivisible, two things without parts will have to be contiguous; if on the other hand it is taken to be divisible, there will be something prior to C to which the magnitude has changed, and something else again prior to that, and so on to always, because the process of division never gives out. Thus there can be no primary thing [15] to which a thing has changed. And if we take the case of quantitative change, we shall get a like result; for here too the change is in something continuous. It is evident, then, that only in qualitative motion can there be anything indivisible in its own right.

6 · Now everything that changes changes in time, and that in two senses may be the primary time, or it may be derivative, as e.g. when we say that a thing [20] changes in a particular year because it changes in a particular day. That being so, that which changes must be changing in any part of the primary time in which it changes. This is clear from our definition of primary, in which the word is said to express just this; it may also, however, be made evident by the following argument. Let TR be the primary time in which that which is in motion is in motion; and (as all [25] time is divisible) let it be divided at K. Now in the time TK it either is in motion or is not in motion, and the same is likewise true of the time KR. Then if it is in motion in neither of the two parts, it will be at rest in the whole; for it is impossible that it [30] should be in motion in a time in no part of which it is in motion. If on the other hand it is in motion in only one of the two parts of the time, TR cannot be the primary time in which it is in motion; for its motion will have reference to a time other than TR. It must, then, be moving in any part of TR.

And now that this has been proved, it is evident that everything that is in motion must have been in motion before. For if that which is in motion has traversed [35] the distance KL in the primary time TR, in half the time a thing that is in motion with equal velocity and began its motion at the same time will have traversed half [237<sup>a</sup>1] the distance. But if the thing whose velocity is equal has traversed a certain distance in the same time, the original thing that is in motion must have traversed the same distance. Hence that which is in motion must have been in

motion before.

[5] Again, if by taking the extreme now of the time—for it is the now that defines the time, and time is that which is intermediate between nows—we are enabled to say that motion has taken place in the whole time TR or in fact in any period of it, motion may likewise be said to have taken place in every other such period. But half the time finds an extreme in the point of division. Therefore motion will have taken place in half the time and in fact in any part of it; for as soon as any division is made there is always a time defined by nows. If, then, all time is divisible, and that which [10] is intermediate between nows is time, everything that is changing must have completed an infinite number of changes.

Again, since a thing that changes continuously and has not perished or ceased from its change must either be changing or have changed in any part of the time of its change, and since it cannot be changing in a now, it follows that it must have [15] changed at every now in the time: consequently, since the nows are infinite in number, everything that is changing must have completed an infinite number of changes.

And not only must that which is changing have changed, but that which has changed must also previously have been changing, since everything that has changed from something to something has changed in a period of time. For suppose [20] that a thing has changed from A to B in a now. Now the now in which it has changed cannot be the same as that in which it is at A (since in that case it would be in A and B at once); for we have shown above that that which has changed, when it has changed, is not in that from which it has changed. If, on the other hand, it is a different now, there will be a period of time intermediate between the two; for, as we [25] saw, nows are not consecutive. Since, then, it has changed in a period of time, and all time is divisible, in half the time it will have completed another change, in a quarter another, and so on always: consequently it must have previously been changing.

Moreover, the truth of what has been said is more evident in the case of magnitude, because the magnitude over which what is changing is continuous. For [30] suppose that a thing has changed from C to D. Then if CD is indivisible, two things without parts will be consecutive. But since this is impossible, that which is intermediate between them must be a magnitude and divisible into an infinite number of segments: consequently, it has previously been changing to those segments. Everything that has changed, therefore, must previously have been changing; for the same demonstration also holds good of change with respect to [237<sup>b</sup>1] what is not continuous, changes, that is to say,

between contraries and between contradictories. In such cases we have only to take the time in which a thing has changed and again apply the same reasoning. So that which has changed must have been changing and that which is changing must have changed, and a process of [5] change is preceded by a completion of change and a completion by a process; and we can never take any first stage. The cause of this is that no two things without parts can be contiguous; for the division is infinite, as in the case of lines which are increasing and decreasing.

So it is evident also that that which has become must previously have been [10] becoming, and that which is becoming must previously have become, everything (that is) that is divisible and continuous; though it is not always the actual thing that is becoming of which this is true: sometimes it is something else, that is to say, some part of the thing in question, e.g. the foundation-stone of a house. So, too, in the case of that which is perishing and that which has perished; for that which becomes and that which perishes must contain an element of infiniteness since [15] they are continuous things; and so a thing cannot be becoming without having become or have become without having been becoming. So, too, in the case of perishing and having perished: perishing must be preceded by having perished, and having perished by perishing. It is evident, then, that that which has become must previously have been becoming, and that which is becoming must previously have [20] become; for all magnitudes and all periods of time are always divisible. Consequently, whatever a thing may be in, it is not in it primarily.

7 · Now since the motion of everything that is in motion occupies a period of time, and a greater magnitude is traversed in a longer time, it is impossible that a thing should undergo a finite motion in an infinite time, if this is understood to mean not that the same motion or a part of it is continually repeated, but that the [25] whole is occupied by the whole. In all cases where a thing is in motion with uniform velocity it is clear that the finite magnitude is traversed in a finite time. For if we take a part of the motion which shall be a measure of the whole, the whole motion is completed in as many equal periods of the time as there are parts of the motion. Consequently, since these parts are finite, both in size individually and in number [30] collectively, the whole time must also be finite; for it will be a multiple equal to the time occupied in completing the part multiplied by the number of the parts.

But it makes no difference even if the velocity is not uniform. For let

us suppose that the line AB represents a finite stretch over which a thing has been moved in the infinite time, and let CD be the infinite time. Now if one part of the [238<sup>a</sup>1] stretch must have been traversed before another part (this is clear, that in the earlier and in the later part of the time a different part of the stretch has been traversed; for as the time lengthens a different part of the motion will always be completed in it, whether it changes with uniform velocity or not; and whether the [5] motion increases or diminishes or remains stationary this is none the less so), let us then take AE a part of the interval AB which shall be a measure of AB. Now this occupies a certain period of the infinite time: it cannot itself occupy an infinite time, [10] for that is occupied by the whole AB. And if again I take another part equal to AE, that also must occupy a finite time in consequence of the same assumption. And if I go on taking parts in this way, since there is no part which will be a measure of the infinite time (for the infinite cannot be composed of finite parts whether equal or unequal, because there must be some unity which will be a measure of things finite [15] in multitude or in magnitude, which, whether they are equal or unequal, are none the less limited in magnitude), and the finite interval is measured by the quantities AE: consequently the motion AB must be accomplished in a finite time. (It is the same with coming to rest.) And so it is impossible for one and the same thing to be always in process of becoming or of perishing.

[20] The same reasoning will prove that in a finite time there cannot be an infinite extent of motion or of coming to rest, whether the motion is regular or irregular. For if we take a part which shall be a measure of the whole time, in this part a certain fraction, not the whole, of the magnitude will be traversed, because the whole occupies all the time. Again, in another equal part of the time another part of the magnitude will be traversed; and similarly in each part of the time that we take, [25] whether equal or unequal to the part originally taken. It makes no difference whether the parts are equal or not, if only each is finite; for it is clear that while the time is exhausted, the infinite magnitude will not be exhausted, since the process of subtraction is finite both in respect of the quantity subtracted and of the number of times a subtraction is made. Consequently the infinite magnitude will not be [30] traversed in a finite time; and it makes no difference whether the magnitude is infinite in only one direction or in both; for the same reasoning will hold good.

This having been proved, it is evident that neither can a finite magnitude traverse an infinite magnitude in a finite time, the reason being the same as that given above: in part of the time it will traverse a

finite magnitude and in each [35] several part likewise, so that in the whole time it will traverse a finite magnitude.

And since a finite magnitude will not traverse an infinite in a finite time, it is [238<sup>b</sup>1] clear that neither will an infinite traverse a finite. For if the infinite could traverse the finite, the finite could traverse the infinite; for it makes no difference which of the two is the thing in motion: either case involves the traversing of the infinite by [5] the finite. For when the infinite magnitude A is in motion a part of it, say CD, will occupy the finite B, and then another, and then another, and so on to always. Thus the two results will coincide: the infinite will have completed a motion over the finite and the finite will have traversed the infinite; for it would seem to be impossible for [10] the motion of the infinite over the finite to occur in any way other than by the finite traversing the infinite either by locomotion over it or by measuring it. Therefore, since this is impossible, the infinite cannot traverse the finite.

Nor again will the infinite traverse the infinite in a finite time. Otherwise it [15] would also traverse the finite, for the infinite includes the finite. We can further prove this in the same way by taking the time as our starting-point.

Since, then, in a finite time neither will the finite traverse the infinite, nor the infinite the finite, nor the infinite the infinite, it is evident also that in a finite time there cannot be infinite motion; for what difference does it make whether we take [20] the motion or the magnitude to be infinite? If either of the two is infinite, the other must be so too; for all locomotion is in place.

8 · Since everything to which motion or rest is natural is in motion or at rest in the natural time, place, and manner, that which is coming to a stand, when it is coming to a stand, must be in motion; for if it is not in motion it must be at rest; but [25] that which is at rest cannot be coming to rest. From this it evidently follows that coming to a stand must occupy a period of time; for the motion of that which is in motion occupies a period of time, and that which is coming to a stand has been shown to be in motion: consequently coming to a stand must occupy a period of time.

Again, since the terms 'quicker' and 'slower' are used only of that which occupies a period of time, and the process of coming to a stand may be quicker or [30] slower, the same conclusion follows.

And that which is coming to a stand must be coming to a stand in any part of the primary time in which it is coming to a stand. For if it is



coming to a stand in neither of two parts into which the time may be divided, it cannot be coming to a stand in the whole time, with the result that that which is coming to a stand will not be coming to a stand. If on the other hand it is coming to a stand in only one of the two parts, the whole cannot be the primary time in which it is coming to a stand; for it is coming to a stand in this derivatively, as we said before in the case of things in [35] motion.

And just as there is no primary time in which that which is in motion is in motion, so too there is no primary time in which that which is coming to a stand is [239<sup>a</sup>1] coming to a stand, there being no primary stage either of being in motion or of coming to a stand. For let AB be the primary time in which a thing is coming to a stand. Now AB cannot be without parts; for there cannot be motion in that which is without parts, because a moving thing would have moved for a part of it, and that which is coming to a stand has been shown to be in motion. But since AB is divisible, [5] the thing is coming to a stand in every one of its parts; for we have shown above that it is coming to a stand in every one of the parts in which it is primarily coming to a stand. Since, then, that in which primarily a thing is coming to a stand must be a period of time and not something indivisible, and since all time is infinitely divisible, there cannot be anything in which primarily it is coming to a stand [10].

Nor again can there be a primary time at which a thing at rest was resting; for it cannot have been resting in that which has no parts, because there cannot be motion in that which is indivisible, and that in which rest takes place is the same as that in which motion takes place (for we said that rest occurs if a thing which naturally moves is not moving when and at a time in which motion would be natural to it). Again, we say that a thing rests when it is now in the same state as it was in [15] earlier, judging rest not by any one point but by at least two: consequently that in which a thing is at rest cannot be without parts. Since, then, it is divisible, it must be a period of time, and the thing must be at rest in every one of its parts, as may be shown by the same method as that used above.

[20] So there can be no primary time; and the reason is that rest and motion are always in time, and there is no primary time—nor magnitude nor in fact anything continuous; for everything continuous is divisible into an infinite number of parts.

And since everything that is in motion is in motion in time and changes from something to something, in the time in which in its own right (i.e. not merely in a [25] part of the time) something moves, it is

impossible that that which is in motion should be over against some particular thing primarily. For if a thing—itsself and each of its parts—occupies the same space for a definite period of time, it is at rest; for it is in just these circumstances that we use the term ‘being at rest’—when at one now after another it can be said with truth that a thing, itsself and its parts, occupies [30] the same space. So if this is being at rest it is impossible for that which is changing to be as a whole, at the time when it is primarily changing, over against any particular thing (for the whole period of time is divisible), so that in one part of it after another it will be true to say that the thing, itsself and its parts, occupies the same space. If this is not so and the aforesaid proposition is true only at a single now, then the thing will be over against a particular thing not for any period of time but only at a moment that limits the time. It is true that at any now it is always over against something; but it is not at rest; for at a now it is not possible for anything to [239<sup>b</sup>1] be either in motion or at rest. So while it is true to say that that which is in motion is at a now not in motion and is opposite some particular thing, it cannot in a period of time be at rest over against anything; for that would involve the conclusion that that which is in locomotion is at rest.

[5] 9 · Zeno’s reasoning, however, is fallacious, when he says that if everything when it occupies an equal space is at rest, and if that which is in locomotion is always in a now, the flying arrow is therefore motionless. This is false; for time is not composed of indivisible nows any more than any other magnitude is composed of indivisibles.

[10] Zeno’s arguments about motion, which cause so much trouble to those who try to answer them, are four in number. The first asserts the non-existence of motion on the ground that that which is in locomotion must arrive at the half-way stage before it arrives at the goal. This we have discussed above.<sup>41</sup>

The second is the so-called Achilles, and it amounts to this, that in a race the [15] quickest runner can never overtake the slowest, since the pursuer must first reach the point whence the pursued started, so that the slower must always hold a lead. This argument is the same in principle as that which depends on bisection, though it differs from it in that the spaces with which we have successively to deal are not [20] divided into halves. The result of the argument is that the slower is not overtaken; but it proceeds along the same lines as the bisection-argument (for in both a division of the space in a certain way leads to the result that the goal is

not reached, though the Achilles goes further in that it affirms that even the runner most famed for his speed must fail in his pursuit of the slowest), so that the solution too must be the [25] same. And the claim that that which holds a lead is never overtaken is false: it is not overtaken while it holds a lead; but it is overtaken nevertheless if it is granted that it traverses the finite distance. These then are two of his arguments.

The third is that already given above, to the effect that the flying arrow is at [30] rest, which result follows from the assumption that time is composed of moments: if this assumption is not granted, the conclusion will not follow.

The fourth argument is that concerning equal bodies which move alongside equal bodies in the stadium from opposite directions—the ones from the end of the stadium, the others from the middle—at equal speeds, in which he thinks it follows that half the time is equal to its double. The fallacy consists in requiring that a body [240<sup>a</sup>1] travelling at an equal speed travels for an equal time past a moving body and a body of the same size at rest. That is false. E.g. let the stationary equal bodies be AA; let BB be those starting from the middle of the A's<sup>42</sup> (equal in number and in [5] magnitude to them); and let CC be those starting from the end (equal in number and magnitude to them, and equal in speed to the B's). Now it follows that the first B and the first C are at the end at the same time, as they are moving past one another. And it follows that the C has passed all the A's<sup>43</sup> and the B half; so that the [10] time is half, for each of the two is alongside each for an equal time. And at the same time it follows that the first B has passed all the C's. For at the same time the first B and the first C will be at opposite ends,\* being an equal time alongside each of the B's as alongside each of the A's, as he says,\*<sup>44</sup> because both are an equal time [15] alongside the A's. That is the argument, and it rests on the stated falsity.

Nor in reference to contradictory change shall we find anything impossible—e.g. if it is argued that if a thing is changing from not-white to white, and is in [20] neither condition, then it will be neither white nor not-white; for the fact that it is not *wholly* in either condition will not preclude us from calling it white or not-white. We call a thing white or not-white not because it is wholly either one or the other, but because most of its parts or the most essential parts of it are so: not being in a certain condition is different from not being wholly in that condition. So, too, in the [25] case of being and not-being and all other conditions which stand in a contradictory relation: while the changing thing must of necessity be in one of the two opposites, it is never wholly in either.

Again, in the case of circles and spheres and everything that moves within its [30] own dimensions, it is argued that they will be at rest, on the ground that such things, themselves and their parts, will occupy the same position for a period of time, and that therefore they will be at once at rest and in motion. For, first, the parts do not occupy the same place for any period of time; and secondly, the whole also is always [240<sup>b</sup>1] changing to a different position; for the circumference from A is not the same as that from B or C or any other point except accidentally, as a musical man is the [5] same as a man. Thus one is always changing into another, and the thing will never be at rest. And it is the same with the sphere and everything else which moves within its own dimensions.

10 · That having been demonstrated, we next assert that that which is without parts cannot be in motion except accidentally, i.e. in so far as the body or [10] the magnitude to which it belongs is in motion, just as that which is in a boat may be in motion in consequence of the locomotion of the boat, or a part may be in motion in virtue of the motion of the whole. (By ‘that which is without parts’ I mean that which is quantitatively indivisible.) For parts have different motions—those in virtue of themselves, and those in virtue of the motion of the whole. The distinction [15] may be seen most clearly in the case of a sphere, in which the velocities of the parts near the centre and of those on the surface are different from one another and from that of the whole; this implies that there is not one motion. As we have said, then, that which is without parts can be in motion in the sense in which a man sitting in a boat is in motion when the boat is travelling, but it cannot be in motion of itself. For [20] suppose that it is changing from AB to BC—either from one magnitude to another, or from one form to another, or from some state to its contradictory—and let D be the primary time in which it undergoes the change. Then in the time in which it is changing it must be either in AB or in BC or partly in one and partly in the other; [25] for this, as we saw, is true of everything that is changing. Now it cannot be partly in each of the two; for then it would be divisible into parts. Nor again can it be in BC; for then it will have changed, whereas the assumption is that it is changing. It remains, then, that in the time in which it is changing, it is in AB. That being so, it [30] will be at rest; for, as we saw, to be in the same condition for a period of time is to be at rest. So it is not possible for that which has no parts to be in motion or to change in any way; for only one condition could have made it possible for it to have motion, viz. that time should be composed ofnows, in which

case at any now it would have [241<sup>a</sup>1] moved or changed, so that it would never be in motion, but would always have been moving. But this we have already shown to be impossible: time is not composed of nows, just as a line is not composed of points, and motion is not composed of movings; for this theory simply makes motion consist of indivisibles in exactly the [5] same way as time is made to consist of nows or a length of points.

Again, it may be shown in the following way that there can be no motion of a point or of any other indivisible. That which is in motion can never traverse a space greater than itself without first traversing a space equal to or less than itself. That being so, it is evident that the point also must first traverse a space equal to or less [10] than itself. But since it is indivisible, it is impossible for it to traverse a lesser space first: so it will have to traverse a distance equal to itself. Thus the line will be composed of points; for the point, as it continually traverses a distance equal to itself, will be a measure of the whole line. But since this is impossible, it is likewise impossible for the indivisible to be in motion.

[15] Again, since motion is always in time and never in a now, and all time is divisible, for everything that is in motion there must be a time less than that in which it traverses a distance as great as itself. For that in which it is in motion will be a time, because all motion is in time; and all time has been shown above to be divisible. Therefore, if a point is in motion, there must be a time less than that in which it has itself traversed its own length. But this is impossible; for in less time it [20] must traverse less distance, and thus the indivisible will be divisible into something less, just as the time is so divisible; for that which is without parts and indivisible could be in motion only if it were possible to move in an indivisible now; for in the two questions—that of motion in a now and that of motion of something indivisible—the same principle is involved [25].

No change is infinite; for every change, whether between contradictories or between contraries, is a change from something to something. Thus in contradictory changes the positive or the negative is the limit, e.g. being is the limit of coming to be and not-being is the limit of ceasing to be; and in contrary changes the particular [30] contraries are the limits, since these are the extreme points of the change, and consequently of every alteration; for alteration is always dependent upon some contraries. Similarly for increase and decrease: the limit of increase is to be found in the complete magnitude proper to the peculiar nature of the thing, while the limit of [241<sup>b</sup>1] decrease is the loss of such

magnitude. Locomotion, it is true, we cannot show to be finite in this way, since it is not always between contraries. But since that which cannot be cut (in the sense that it is not possible that it should be cut, the term 'cannot' being used in several ways)—since it is not possible that that which in this [5] sense cannot be cut should be being cut, and generally that that which cannot come to be should be coming to be, it follows that it is not possible that that which cannot have changed should be changing to that to which it cannot have changed. If, then, that which is in locomotion is to be changing to something, it must be capable of having changed. Consequently its motion is not infinite, and it will not be in [10] locomotion over an infinite distance; for it cannot have traversed such a distance.

It is evident, then, that a change cannot be infinite in the sense that it is not defined by limits. But it remains to be considered whether it is possible in the sense that one and the same change may be infinite in respect of the time which it occupies. If it is not one change, it would seem that there is nothing to prevent its being infinite; e.g. if a locomotion be succeeded by an alteration and that by an [15] increase and that again by a coming to be: in this way there may be motion for ever so far as the time is concerned; but it will not be one motion, because all these motions do not compose one. If it is to be one, no motion can be infinite in respect of the time that it occupies, with the single exception of rotatory locomotion [20].

## BOOK VII

1 · Everything that is in motion must be moved by something. For if it has not the source of its motion in itself it is evident that it is moved by something other [35] than itself, for there must be something else that moves it. If on the other hand it has the source of its motion in itself, let AB be taken to represent that which is in motion of itself and not in virtue of the fact that something belonging to it is in motion. Now in the first place to assume that AB, because it is in motion as a whole and is not [40] moved by anything external to itself, is therefore moved by itself—this is just as if, supposing that KL is moving LM and is also itself in motion, we were to deny that KM is moved by anything on the ground that it is not evident which is the part that is moving it and which the part that is moved. In the second place that which is in [242<sup>a</sup>35] motion without being moved by anything does not necessarily cease from its motion because something else is at rest; but a thing must be moved by something if the fact of something else having ceased from its motion causes it to be at rest. If this is accepted, everything that is in motion must be moved by something. For if AB is [40] assumed to be in motion, it must be divisible, since everything that is in motion is divisible. Let it be divided, then, at C. Now if CB is not in motion, then AB will not be in motion; for if it is, it is clear that AC would be in motion while BC is at rest, and thus AB cannot be in motion in its own right and primarily. But *ex hypothesi* [45] AB is in motion in its own right and primarily. Therefore if CB is not in motion AB will be at rest. But we have agreed that that which is at rest if something is not in motion must be moved by something. Consequently, everything that is in motion must be moved by something; for that which is in motion will always be divisible, and if a part of it is not in motion the whole must be at rest.

[50] Since everything that is in motion must be moved by something, let us take the case in which a thing is in locomotion and is moved by something that is itself in motion, and that again is moved by something else that is in motion, and that by something else, and so on continually: then the series cannot go on to infinity, but there must be some first mover. For let us suppose that this is not so and take the [55] series to be infinite. Let A then be moved by B, B by C, C by D, and so on, each member of the series being moved by that which comes next to it. Then

since *ex hypothesi* the mover while causing motion is also itself in motion, the motion of the moved and the motion of the mover must proceed simultaneously (for the mover is [60] causing motion and the moved is being moved simultaneously); so it is evident that the motions of A, B, C, and each of the other moved movers are simultaneous. Let us take the motion of each separately and let E be the motion of A, F of B, and G and H respectively the motions of C and D; for though they are all moved severally [65] one by another, yet we may still take the motion of each as numerically one, since every motion is from something to something and is not infinite in respect of its extreme points. By a motion that is numerically one I mean a motion that proceeds from something numerically one and the same to something numerically one and the same in a period of time numerically one and the same; for a motion may be the [242<sup>b</sup>35] same generically, specifically, or numerically: it is generically the same if it is of the same category, e.g. substance or quality; it is specifically the same if it proceeds from something specifically the same to something specifically the same, e.g. from white to black or from good to bad, which is not of a kind specifically distinct; it is numerically the same if it proceeds from something numerically one to something numerically one in the same time, e.g. from a particular white to a particular black, or from a particular place to a particular place, in a particular time; for if the time [40] were not one and the same, the motion would no longer be numerically one though it would still be specifically one. We have dealt with this question above.<sup>45</sup> Now let us further take the time in which A has completed its motion, and let it be represented by K. Then since the motion of A is finite the time will also be finite. But since the movers and the things moved are infinite, the motion EFGH, i.e. the motion that is [45] composed of all the individual motions, must be infinite. For the motions of A, B, and the others may be equal, or the motions of the others may be greater; but assuming what is possible, we find that whether they are equal or some are greater, in both cases the whole motion is infinite. And since the motion of A and that of [50] each of the others are simultaneous, the whole motion must occupy the same time as the motion of A; but the time occupied by the motion of A is finite: consequently the motion will be infinite in a finite time, which is impossible.

It might be thought that what we set out to prove has thus been shown, but our argument so far does not prove it, because it does not yet prove that anything [55] impossible results; for in a finite time there may be an infinite motion, though not of one thing, but of many: and in the



case that we are considering this is so; for each thing accomplishes its own motion, and there is no impossibility in many things being in motion simultaneously. But if (as we see to be universally the case) that which primarily moves locally and corporeally must be either in contact with or continuous with that which is moved, the things moved and the movers must be [60] continuous or in contact with one another, so that together they all form a unity: whether this unity is finite or infinite makes no difference to our present argument; for in any case since the things in motion are infinite in number the motion will be [65] infinite, if it is possible for the motions to be either equal to or greater than one another; for we shall take as actual that which is possible. If, then, A, B, C, D form, either finite or infinite magnitude that passes through the motion EFGH in the finite time K, it follows that an infinite motion is passed through in a finite time: and [70] whether the magnitude in question is finite or infinite this is in either case impossible. Therefore the series must come to an end, and there must be a first mover and a first moved; for the fact that this impossibility rests on an assumption is immaterial, since the case assumed is possible, and the assumption of a possible case [243<sup>a</sup>30] ought not to give rise to any impossible result.

2 · That which is the first mover of a thing—in the sense that it supplies not that for the sake of which but the source of the motion—is always together with that which is moved by it (by ‘together’ I mean that there is nothing between them). This is universally true wherever one thing is moved by another. And since there are [35] three kinds of motion, local, qualitative, and quantitative, there must also be three kinds of mover, that which causes locomotion, that which causes alteration, and that which causes increase or decrease.

Let us begin with locomotion, for this is the primary motion. Everything that is [10] in locomotion is moved either by itself or by something else. In the case of things that are moved by themselves it is evident that the moved and the mover are together; for they contain within themselves their first mover, so that there is [15] nothing in between. The motion of things that are moved by something else must proceed in one of four ways; for there are four kinds of locomotion caused by something other than that which is in motion, viz. pulling, pushing, carrying, and twirling. All forms of locomotion are reducible to these. Thus pushing on is a form of pushing in which that which is causing motion away from itself follows up that which it pushes and

continues to push it; pushing off occurs when the mover does not follow up the thing that it has moved; throwing when the mover causes a motion [243<sup>b</sup>1] away from itself more violent than the natural locomotion of the thing moved, which continues its course so long as it is controlled by the motion imparted to it. Again, pushing apart and pushing together are forms respectively of pushing off and pulling: pushing apart is pushing off, which may be a motion either away from [5] the pusher or away from something else, while pushing together is pulling, which may be a motion towards something else as well as towards the puller. We may similarly classify all the varieties of these last two, e.g. packing and combing: the former is a form of pushing together, the latter a form of pushing apart. The same is true of the other processes of combination and separation (they will all be found to be forms of pushing apart or of pushing together), except such as are involved in the [10] processes of becoming and perishing. (At the same time it is evident that combination and separation are not a different kind of motion; for they may all be apportioned to one or other of those already mentioned.) Again, inhaling is a form of pulling, exhaling a form of pushing; and the same is true of spitting and of all other motions that proceed through the body, whether excretive or assimilative, the [15] assimilative being forms of pulling, the excretive of pushing off. All other kinds of locomotion must be similarly reduced; for they all fall under one or other of our four heads. And again, of these four, carrying and twirling are reducible to pulling and pushing. For carrying always follows one of the other three methods; for that which is carried is in motion accidentally, because it is in or upon something that is in motion, and that which carries it is in doing so being either pulled or pushed or [244<sup>a</sup>1] twirled; thus carrying belongs to all the other three kinds of motion in common. And twirling is a compound of pulling and pushing; for that which is twirling a thing must be pulling one part of the thing and pushing another part, since it impels one part away from itself and another part towards itself. If, therefore, it can be shown that that which is pushing and that which is pulling are together with that which is [5] being pushed and that which is being pulled, it will be evident that in all locomotion there is nothing between moved and mover.

But the former fact is clear even from the definitions; for pushing is motion to something else from oneself or from something else, and pulling is motion from something else to oneself or to something else, when the motion of that which is [10] pulling is quicker than the motion that would separate from one another the two things that are continuous;

for it is this that causes one thing to be pulled on along with the other. (It might indeed be thought that there is a form of pulling that arises in another way: that wood, e.g. pulls fire in a manner different from the described above. But it makes no difference whether that which pulls is in motion or is stationary when it is pulling: in the latter case it pulls to the place where it is, while in the former it pulls to the place where it was.) Now it is impossible to move anything either from oneself to something else or from something else to oneself [15] without being in contact with it: it is evident, therefore, that in all locomotion there [244<sup>b</sup>1] is nothing between moved and mover.

Nor again is there anything intermediate between that which undergoes and that which causes alteration: this can be shown by induction; for in every case we find that the respective extremities of that which causes and that which undergoes alteration are together. For our assumption is that things that are undergoing [5] alteration are altered in virtue of their being affected in respect of their so-called affective qualities; for every body differs from another in possessing a greater or lesser number of sensible characteristics or in possessing the same sensible characteristics in a greater or lesser degree. But the alteration of that which undergoes alteration is also caused by the above-mentioned characteristics, which are affections of some underlying quality. Thus we say that a thing is altered by becoming hot or sweet or thick or dry or white; and we make these assertions alike of what is inanimate and of what is animate, and further, where animate things are in question, we make them both of the parts that have no power of sense-perception and of the senses themselves. For in a way even the senses undergo alteration, since [10] actual perception is a motion through the body in the course of which the sense is affected in a certain way. Thus the animate is capable of every kind of alteration of which the inanimate is capable; but the inanimate is not capable of every kind of alteration of which the animate is capable, since it is not capable of alteration in respect of the senses: moreover the inanimate is unconscious of being affected, whereas the animate is conscious of it, though there is nothing to prevent the [245<sup>a</sup>1] animate also being unconscious of it when the alteration does not concern the senses. Since, then, the alteration of that which undergoes alteration is caused by sensible things, in every case of such alteration it is evident that the extremities of that which causes and that which undergoes alteration are together. For the air is continuous with the one and the body with the air. Again, the colour is continuous [5] with the light and the light with the sight. And the same is true of hearing and smelling; for

the primary mover in respect to the moved is the air. Similarly, in the case of tasting, the flavour is together with the sense of taste. And it is just the same in the case of things that are inanimate and incapable of sense-perception. Thus [10] there can be nothing between that which undergoes and that which causes alteration.

Nor, again, can there be anything between that which suffers and that which causes increase; for that which starts the increase does so by becoming attached in such a way that the whole becomes one. Again, the decrease of that which suffers decrease is caused by a part of the thing becoming detached. So both that which causes increase and that which causes decrease must be continuous; and if two [15] things are continuous there can be nothing between them.

[245<sup>b</sup>1] It is evident, therefore, that between the moved and the mover—the first and the last—in reference to the moved there is nothing intermediate.

3 · That everything which undergoes alteration is altered by sensible causes, and that there is alteration only in things that are said to be affected in their own [5] right by sensible things, can be seen from the following considerations. Of all other things it would be most natural to suppose that there is alteration in figures and shapes, and in states and in the processes of acquiring and losing these; but as a matter of fact in neither of these two cases is there alteration.

For when anything has been completely shaped or structured, we do not call it [10] by the name of its material: e.g. we do not call the statue bronze or the candle wax or the bed wood, but we use a paronymous expression and call them brazen, waxen, and wooden respectively. But when a thing has been affected and altered in any way we still call it by the original name: thus we speak of the bronze or the wax being [15] fluid or hard or hot (not only that—we also call the fluid and the hot stuff bronze), giving the matter the same name as the affection.

[246<sup>a</sup>1] Since, therefore, having regard to the figure or shape of a thing we no longer call that which has become of a certain figure by the name of the material that exhibits the figure, whereas having regard to a thing's affections or alterations we do, it is evident that becomings of the former kind<sup>46</sup> cannot be alterations.

Moreover it would seem absurd actually to speak in this way, to speak, that is [5] to say, of a man or house or anything else that has come into existence as having been altered. Though it may be true that every

such becoming is necessarily the result of something's being altered, the result, e.g. of the matter's being condensed or rarefied or heated or cooled, nevertheless it is not the things that are coming into existence that are altered, and their becoming is not an alteration.

[10] Again, states, whether of the body or of the soul, are not alterations. For some are excellences and others are defects, and neither excellence nor defect is an alteration: excellence is a perfection (for when anything acquires its proper excellence we call it perfect, since it is then really in its natural state: e.g. a circle is [15] perfect when it becomes really a circle and when it is best), while defect is a perishing of or departure from this condition. So just as when speaking of a house we do not call its arrival at perfection an alteration (for it would be absurd to suppose that the coping or the tiling is an alteration or that in receiving its coping or its tiling a house is altered and not perfected), the same also holds good in the case [246<sup>b</sup>1] of excellences and defects and of the things that possess or acquire them; for excellences are perfections and defects are departures: consequently they are not alterations.

Further, we say that all excellences depend upon particular relations. Thus bodily excellences such as health and fitness we regard as consisting in a blending of [5] hot and cold elements in due proportion, in relation either to one another within the body or to the surrounding; and in like manner we regard beauty, strength, and all the other excellences and defects. Each of them exists in virtue of a particular relation and puts that which possesses it in a good or bad condition with regard to its proper affections, where by 'proper' affections I mean those by which the thing is naturally produced or destroyed. Since, then, relatives are neither themselves [10] alterations nor the subjects of alterations or of becoming or in fact of any change whatever, it is evident that neither states nor the processes of losing and acquiring states are alterations, though it may be true that their becoming or perishing, like that of form and shape, necessarily involves the alteration of certain other things, [15] e.g. hot and cold or dry and wet elements or the elements, whatever they may be, on which the states primarily depend. For each defect or excellence involves a relation with those things from which the possessor is naturally subject to alteration: thus excellence disposes its possessor to be unaffected or to be affected thus and so, while defect disposes its possessor to be affected or to be unaffected in a contrary way.

And the case is similar in regard to the states of the soul, all of which too exist [247<sup>a</sup>1] in virtue of particular relations, the excellences being perfections and the defects departures. Moreover, excellence puts its

possessor in good condition, while defect puts its possessor in a bad condition, with regard to its proper affections. Consequently these cannot be alterations either, nor can the processes of losing and [5] acquiring them be so, though their becoming is necessarily the result of an alteration of the sensitive part of the soul, and this is altered by sensible objects; for all moral excellence is concerned with bodily pleasures and pains, which again depend either upon acting or upon remembering or upon anticipating. Now those that depend upon action are determined by sense-perception, and are moved by [10] something sensible; and those that depend upon memory or anticipation are likewise to be traced to sense-perception; for in these cases pleasure is felt either in remembering what one has experienced or in anticipating what one is going to experience. Thus all pleasure of this kind must be produced by sensible things; and since the presence of defect or excellence involves the presence of pleasure or pain (with which excellence and defect are always concerned), and pleasures and pains [15] are alterations of the sensitive part, it is evident that the loss and acquisition of these states too must be the result of the alteration of something. Consequently, though their becoming is accompanied by an alteration, they are not themselves alterations.

Again, the states of the intellectual part of the soul are not alterations, nor is [247<sup>b</sup>1] there any becoming of them. For the possession of knowledge most especially depends upon a particular relation. And further, it is evident that there is no becoming of these states. For that which is potentially possessed of knowledge becomes possessed of knowledge not by being moved itself but by reason of the presence of something else; for when it meets with the particular object, it knows in a [5] manner the universal through the particular. Again, there is no becoming of the actual use and activity of these states, unless it is thought that there is a becoming of vision and touching and that the use and activity in question is similar to these. And [10] the original acquisition of knowledge is not a becoming or an alteration; for we are said to know and to understand when our intellect has reached a state of rest and come to a standstill, and there is no becoming that leads to a state of rest, since, as we have said above, no change at all can have a becoming. Moreover, just as when anyone has passed from a state of intoxication or sleep or disease to the contrary [15] state, we do not say that he has become possessed of knowledge again, in spite of the fact that he was previously incapable of using his knowledge, so, too, when anyone originally acquires the state, we do not say that he becomes possessed of

knowledge; for the possession of understanding and knowledge is produced by the soul's settling down out of the restlessness natural to it. Hence, too, in learning and in forming judgements on matters relating to their sense-perceptions children are inferior to [248<sup>a</sup>1] adults owing to the great amount of restlessness and motion in their souls. Nature itself in some cases causes the soul to settle down and come to a state of rest, while in others other things do so; but in either case the result is brought about through the alteration of something in the body, as we see in the case of the use and activity of [5] the intellect arising from a man's becoming sober or being awakened. It is evident, then, from the preceding argument that alteration and being altered occur in sensible things and in the sensitive part of the soul and, except accidentally, in nothing else.

[10] 4 · A difficulty may be raised as to whether every motion is commensurable with every other or not. Now if they are all commensurable and if things that move an equal distance in an equal time have an equal speed, then we may have a circumference equal to a straight line, or, of course, the one may be greater or less than the other. Further, if one thing alters and another accomplishes a locomotion in an equal time, we may have an alteration and a locomotion equal to one another: [15] thus an affection will be equal to a length, which is impossible. But is it not only when an equal distance is moved in an equal time that the velocities are equal? But an affection cannot be equal to a length. Therefore there cannot be an alteration equal to or less than a locomotion; and consequently not every motion is commensurable.

But how will our conclusion work out in the case of the circle and the straight [20] line? It would be absurd to suppose that the motion of one thing in a circle and of another in a straight line cannot be similar, but that the one must inevitably move more quickly or more slowly than the other, just as if the course of one were downhill and of the other uphill. Moreover it does not make any difference to the argument to say that the one motion must be quicker or slower than the other; for then the circumference can be greater or less than the straight line; and if so it is possible for the two to be equal. For if in the time A one passes over the distance B [248<sup>b</sup>1] and the other C, B will be greater than C; for this is what we took 'quicker' to mean; and so it is also quicker if it traverses an equal distance in less time; consequently there will be a part of A in which B will pass over a part of the circle equal to the distance which C

will traverse in the whole of A. None the less, if the two are commensurable, we are confronted with the consequence stated above, viz. that [5] there may be a straight line equal to a circle. But these are not commensurable; and so the corresponding motions are not commensurable either, and things not synonymous are all incommensurable. E.g. a pen, a wine, and the highest note in a scale are not commensurable: we cannot say whether any one of them is sharper than any other; and why is this? they are incommensurable because they are homonymous. But the highest note in a scale is commensurable with the leading-note, because the term 'sharp' has the same meaning as applied to both. Can it be, [10] then, that the term 'quick' has not the same meaning in the two cases? If so, far less will it have the same meaning as applied to alteration and to locomotion.

Or shall we in the first place deny that things are always commensurable if they are not homonymous? For the term 'much' has the same meaning whether applied to water or to air, yet water and air are not commensurable; or, if this is not so, 'double' at any rate would seem to have the same meaning (denoting in each case the proportion of two to one), yet they are not commensurable. But here again may [15] we not use the same argument and say that the term 'much' is homonymous? In fact there are some terms of which even the definitions are homonymous; e.g. if 'much' were defined as 'so much and more', 'so much' would mean something different in different cases; 'equal' is similarly homonymous; and 'one' again is perhaps inevitably homonymous; and if 'one' is, so is 'two'. Otherwise why is it that some [20] things are commensurable while others are not, if the nature is one?

Is it because they are in different primary recipients? Thus horse and dog are so commensurable that we may say which is the whiter, since that which primarily contains the whiteness is the same in both, viz. the surface; and similarly they are commensurable in respect of size. But water and speech are not<sup>47</sup> since the primary recipients are different. But clearly we could thus make all things one and say that each is in a different recipient; thus equality, sweetness, and whiteness will be the [249<sup>a</sup>1] same, though that which contains them is different in different cases. Moreover, it is not any casual thing that is receptive of any attribute: each single thing is primarily receptive of a single attribute.

Must we then say that, if things are to be commensurable, not only must they be non-homonymous, but there must also be specific differences either in the attribute itself or in that which contains the attribute—that these, I mean, must not [5] be divisible in the way in



which colour is divided into kinds? Thus in this respect one thing will not be commensurable with another, i.e. we cannot say that one is more coloured than the other where only colour in general and not any particular colour is meant; but they are commensurable in respect of whiteness.

Similarly in the case of motion: two things are of the same velocity if in an equal time they perform a certain equal amount of motion. Suppose, then, that in a certain time an alteration is undergone by one half of a body's length and a locomotion is accomplished by the other half: can we say that in this case the alteration is equal to the locomotion and of the same velocity? That would be [10] absurd, and the reason is that there are different species of motion. And if two things are of equal velocity if they move over an equal distance in an equal time, we have to admit the equality of a straight line and a circumference. What, then, is the reason for this? Is it that locomotion is a genus or that line is a genus? (For the time [15] is the same.) If the lines are specifically different, the locomotions also differ specifically from one another; for locomotion is specifically differentiated according to the specific differentiation of that over which it takes place. (And also accordingly as the instrument of the locomotion is different: thus if feet are the instrument, it is walking, if wings it is flying. Or is that not so? Is locomotion different only according to the shape of the path?) Thus things are of equal velocity if in an equal time they traverse the same magnitude; and when I call it 'the same' I [20] mean that it contains no specific difference and therefore no difference in the motion that takes place over it. So we have now to consider how motion is differentiated; and this discussion serves to show that the genus is not a unity but contains a plurality latent in it and distinct from it, and that some homonymies are far removed from one another, some have a certain likeness, and some are nearly related either generically or analogically, with the result that they seem not to be [25] homonymies though they really are.

When, then, is there a difference of species? If the same thing is in different recipients? or if different things are in different recipients? And how are we to define the limits of a species? What will enable us to decide that particular instances of whiteness or sweetness are the same or different? Is it enough that it appears different in one subject from what it appears in another? Or must there be no sameness at all? And further, where alteration is in question, how is one alteration to be of equal velocity with another? One person may be cured quickly [249<sup>b</sup>1] and another slowly, and cures may also be simultaneous: so that, recovery of

health being an alteration, we have here alterations of equal velocity, since such alteration occupies an equal time. But what alteration? We cannot here speak of equality here: what is equality in the category of quantity is similarity here. However, let us say that there is equal velocity where the same change is accomplished in an equal time. Are we, then, to find the commensurability in the recipient of the affection or [5] in the affection itself? In the case that we have just been considering it is the fact that health is one and the same that enables us to arrive at the conclusion that the one alteration is neither more nor less than the other, but that both are alike. If on the other hand the affection is different in the two cases, e.g. when the alterations take the form of becoming white and becoming healthy respectively, here there is no sameness or equality or similarity inasmuch as the difference in the affections at [10] once makes the alterations specifically different, and there is no unity of alteration any more than there would be unity of locomotion under like conditions. So we must find out how many species there are of alteration and of locomotion respectively. Now if the things that are in motion—that is to say, the things to which the motions belong in their own right and not accidentally—differ specifically, then their motions will also differ specifically; and if they differ generically or numerically, the motions also will differ generically or numerically. But there still remains the question whether, supposing that two alterations are of equal velocity, we ought to look for this equality in the sameness or similarity of the affections, or in the things [15] altered, to see e.g. whether a certain quantity of each has become white. Or ought we not rather to look for it in both? That is to say, the alterations are the same or different according as the affections are the same or different, while they are equal or unequal according as the things altered are equal or unequal.

And now we must consider the same question in the case of becoming and perishing: how is one becoming of equal velocity with another? They are of equal [20] velocity if in an equal time there are produced two things that are the same and specifically inseparable, e.g. two men (not two animals). Similarly one is quicker than the other if in an equal time the product is different in the two cases. (For we have no pair of terms that will convey this difference in the way in which dissimilarity functions for qualities.) If substances were numbers, there would be a greater number and a lesser number within the same species; but there is no common term that will include both relations, nor are there terms to express each of them separately in the same way as we indicate a higher degree or preponderance of [25] an affection by ‘more’, of a quantity by

‘greater’.

5 · Now since a mover always moves something and is in something, and extends to something (by ‘is in something’ I mean that it occupies a time; and by ‘extends to something’ I mean that it involves a certain amount of distance—for at any moment when a thing is causing motion, it also has caused motion, so that there must always be a certain amount of distance that has been traversed and a certain amount of time that has been occupied). If, then, A is the mover, B the moved, C the distance moved, and D the time, then in the same time the same force A will move [250a1]  $\frac{1}{2}B$  twice the distance C, and in  $\frac{1}{2}D$  it will move  $\frac{1}{2}B$  the whole distance C; for thus the rules of proportion will be observed. Again if a given force moves a given object a certain distance in a certain time and half the distance in half the time, half the [5] motive power will move half the object the same distance in the same time. Let E represent half the motive power A and F half B: then they are similarly related, and the motive power is proportioned to the weight, so that each force will cause the same distance to be traversed in the same time.

But if E moves F a distance C in a time D, it does not necessarily follow that E [10] can move twice F half the distance C in the same time. If, then, A moves B a distance C in a time D, it does not follow that E, being half of A, will in the time D or in any fraction of it cause B to traverse a part of C the ratio between which and the whole of C is proportionate to that between A and E—in fact it might well be [15] that it will cause no motion at all; for it does not follow that, if a given motive power causes a certain amount of motion, half that power will cause motion either of any particular amount or in any length of time: otherwise one man might move a ship, since both the motive power of the ship-haulers and the distance that they all cause the ship to traverse are divisible into as many parts as there are men. Hence Zeno’s reasoning is false when he argues that there is no part of the millet that does not [20] make a sound; for there is no reason why any such part should not in any length of time fail to move the air that the whole bushel moves in falling. In fact it does not of itself move even such a quantity of the air as it would move if this part were by itself; for no part even exists otherwise than potentially in the whole.

[25] If there are two movers each of which separately moves one of two weights a given distance in a given time, then the forces in combination will move the combined weights an equal distance in an

equal time; for in this case the rules of proportion apply.

Then does this hold good of alteration and of increase also? Surely it does; for there is something that causes increase and something that suffers increase, and the [30] one causes and the other suffers a certain amount of increase in a certain amount of time. Similarly with what alters and what is altered—something is altered a certain [250<sup>b</sup>1] amount, or rather degree, in a certain amount of time: thus in twice as much time twice as much alteration will be completed and twice as much alteration will occupy twice as much time; and half in half the time, and in half half, or again, in the same amount of time it will be altered twice as much.

One the other hand if that which causes alteration or increase causes a certain [5] amount of increase or alteration in a certain amount of time, it does not necessarily follow that it will do half in half the time or in half the time half: it may happen that there will be no alteration or increase at all, the case being the same as with the weight.

## BOOK VIII

1 · Was there ever a becoming of motion before which it had no being, and is it perishing again so as to leave nothing in motion? Or are we to say that it never had any becoming and is not perishing, but always was and always will be? Is it in fact an immortal never-failing property of things that are, a sort of life as it were to all naturally constituted things?

[15] Now the *existence* of motion is asserted by all who have anything to say about nature, because they all<sup>48</sup> concern themselves with the construction of the world and study the question of becoming and perishing, which processes could not come about without the existence of motion. But those who say that there is an infinite number of worlds, some of which are in process of becoming while others are in [20] process of perishing, assert that there is always motion (for these processes of becoming and perishing of the worlds necessarily involve motion), whereas those who hold that there is only one world, whether everlasting or not, make corresponding assumptions in regard to motion. If then it is possible that at any time nothing should be in motion, this must come about in one of two ways: either in the manner [25] described by Anaxagoras, who says that all things were together and at rest for an infinite period of time, and that then Mind introduced motion and separated them; or in the manner described by Empedocles, according to whom the universe is alternately in motion and at rest—in motion, when Love is making the one out of many, or Strife is making many out of one, and at rest in the intermediate periods of time—his account being as follows:

Since One hath learned to spring from Manifold, [30]  
And One disjoined makes Manifold arise,  
Thus they Become, nor stable is their life: [251<sup>a</sup>1]  
But since their motion must alternate be,  
Thus have they ever Rest upon their round:<sup>49</sup>

for we must suppose that he means by ‘alternate’ that they change from the one motion to the other. We must consider, then, how this matter stands; for the [5] discovery of the truth about it is of importance, not only for the study of nature, but also for the investigation of the First Principle.

Let us take our start from what we have already laid down in our

course on Physics. Motion, we say, is the actuality of the movable in so far as it is movable. Each kind of motion, therefore, necessarily involves the presence of the things that [10] are capable of that motion. In fact, even apart from the definition of motion, every one would admit that in each kind of motion it is that which is capable of that motion that is in motion: thus it is that which is capable of alteration that is altered, and that which is capable of local change that is in locomotion; and so there must be something capable of being burned before there can be a process of being burned, [15] and something capable of burning before there can be a process of burning. Moreover, these things also must either have a beginning before which they had no being, or they must be eternal. Now if there was a becoming of every movable thing, it follows that before the motion in question another change or motion must have taken place in which that which was capable of being moved or of causing motion [20] had its becoming. To suppose, on the other hand, that these things were in being throughout all previous time without there being any motion appears unreasonable on a moment's thought, and still more unreasonable, we shall find, on further consideration. For if we are to say that, while there are on the one hand things that are movable, and on the other hand things that are motive, there is a time when there is a first mover and a first moved, and another time when there is no such thing but only something that is at rest, then this thing must previously have been in [25] process of change; for there must have been some cause of its rest, rest being the privation of motion. Therefore, before this first change there will be a previous change. For some things cause motion in only one way, while others can produce either of two contrary motions: thus fire causes heating but not cooling, whereas it would seem that knowledge may be directed to two contrary ends while remaining [30] one and the same. Even in the former class, however, there seems to be something similar; for a cold thing in a sense causes heating by turning away and retiring, just as one possessed of knowledge voluntarily makes an error when he uses his knowledge in the reverse way. But at any rate all things that are capable of affecting [251<sup>b</sup>1] and being affected, or of causing motion and being moved, are capable of it not under all conditions, but only when they are in a particular condition and approach one another: so it is on the approach of one thing to another that the one causes motion and the other is moved, and when they are present under such conditions as [5] rendered the one motive and the other movable. So if the motion was not always in process, it is clear that they cannot have been in a condition such as to render them capable respectively of being

moved and of causing motion, but one or other of them needed change; for in what is relative this is a necessary consequence: e.g. if one thing is double another when before it was not so, one or other of them, if not both, must have changed. It follows, then, that there will be a change previous to the [10] first.

(Further, how can there be any before and after without the existence of time? Or how can there be any time without the existence of motion? If, then, time is the number of motion or itself a kind of motion, it follows that, if there is always time, motion must also be eternal. But so far as time is concerned we see that all with one [15] exception are in agreement in saying that it is uncreated: in fact, it is just this that enables Democritus to show that all things cannot have had a becoming; for time, he says, is uncreated. Plato alone asserts the creation of time, saying that it is simultaneous with the world, and that the world came into being. Now since time [20] cannot exist and is unthinkable apart from the now, and the now is a kind of middle-point, uniting as it does in itself both a beginning and an end, a beginning of future time and an end of past time, it follows that there must always be time; for the extremity of the last period of time that we take must be found in some now, [25] since in time we can take nothing but nows. Therefore, since the now is both a beginning and an end, there must always be time on both sides of it. But if this is true of time, it is evident that it must also be true of motion, time being a kind of affection of motion.)

The same reasoning will also serve to show the imperishability of motion: just [30] as a becoming of motion would involve, as we saw, a change previous to the first, in the same way a perishing of motion would involve a change subsequent to the last: for when a thing ceases to be moved, it does not therefore at the same time cease to be movable—e.g. the cessation of being burned does not involve the cessation of the capacity of being burned, since a thing may be capable of being burned without being burned—nor, when a thing ceases to be a mover, does it therefore at the same [252<sup>a</sup>1] time cease to be motive. Again, the destructive agent will have to be destroyed when it has destroyed, and then that which has the capacity of destroying *it* will have to be destroyed afterwards; for being destroyed is a kind of change. If, then, this is impossible, it is clear that motion is eternal and cannot have existed at one time and [5] not at another: in fact, such a view can hardly be described as anything else than fantastic.

And much the same may be said of the view that such is how things naturally are and that this must be regarded as a principle, as would seem

to be the view of Empedocles when he says that the constitution of the world is of necessity such that Love and Strife alternately predominate and cause motion, while in the intermediate period of time there is a state of rest. Probably also those who, like Anaxagoras, assert a single principle would hold this view. But that which holds by [10] nature and is natural can never be anything disorderly; for nature is everywhere the cause of order. Moreover, there is no ratio in the relation of the infinite to the infinite, whereas order always means ratio. But if we say that there is first a state of rest for an infinite time, and then motion is started at some moment, and that the fact that it is this rather than a previous moment is of no importance, and that it [15] involves no order, then we can no longer say that it is nature's work; for if anything is of a certain character naturally, it either is so invariably and is not sometimes of this and sometimes of another character (e.g. fire, which travels upwards naturally, does not sometimes do so and sometimes not) or there is a ratio in the variation. It would be better, therefore, to say with Empedocles and anyone else who may have [20] maintained such a theory as his that the universe is alternately at rest and in motion; for in a system of this kind we have at once a certain order. But even here the holder of the theory ought not only to assert the fact: he ought also to explain the cause of it; i.e. he should not make any mere assumption or lay down any unreasoned axiom, but should employ either inductive or demonstrative reasoning. The Love and Strife [25] postulated are not in themselves causes, nor is it of the essence of either that it should be so, the essential function of the former being to unite, of the latter to separate. If he is to go on to explain this alternate predominance, he should adduce cases where such a state of things exists, as he points to the fact that among mankind we have something that unites men, namely Love, while on the other hand enemies avoid one another: thus from the observed fact that this occurs in certain cases comes the assumption that it occurs also in the universe. Then, again, some [30] argument is needed to explain why the predominance of each lasts for an equal period of time. But it is a wrong assumption to suppose universally that we have an adequate first principle in virtue of the fact that something always is so or always happens so. Thus Democritus reduces the causes that explain nature to the fact that things happened in the past in the same way as they happen now; but he does not think fit to seek for a principle to explain this 'always': so, while his theory is right in [252<sup>b</sup>1] so far as it is applied to certain individual cases, he is wrong in making it of universal application. Thus, a triangle always has its angles equal to two right angles, but there



is nevertheless an ulterior cause of the eternity, whereas principles are external and have no ulterior cause. Let this conclude what we have to say in [5] support of our contention that there never was a time when there was not motion, and never will be a time when there will not be motion.

2 · The arguments that may be advanced against this position are not difficult to dispose of. The chief considerations that might be thought to indicate that motion may exist though at one time it had not existed at all are the following:

First, it may be said that no change is eternal; for the nature of all change is [10] such that it proceeds *from* something *to* something, so that every change must be bounded by the contraries that mark its course, and no motion can go on to infinity.

Again, we see that a thing that neither is in motion nor contains any motion within itself can be set in motion; e.g. inanimate things that are (whether the whole [15] or some part is in question) not in motion but at rest, are at some moment set in motion; whereas, if motion cannot have a becoming before which it had no being, these things ought to be either always or never in motion.

The fact is evident above all in the case of animate beings; for it sometimes happens that there is no motion in us and we are quite still, and that nevertheless we are then at some moment set in motion, that is to say it sometimes happens that we [20] produce a beginning of motion in ourselves from within ourselves, without anything having set us in motion from without. We see nothing like this in the case of inanimate things, which are always set in motion by something else from without: the animal, on the other hand, we say, moves itself; therefore, if an animal is ever in a state of absolute rest, we have a motionless thing in which motion can be produced [25] from the thing itself, and not from without. Now if this can occur in an animal, why should not the same be true also of the universe as a whole? If it can occur in a small world it could also occur in a great one; and if it can occur in the world, it could also occur in the infinite; that is, if the infinite could as a whole possibly be in motion or at rest.

Of these objections, then, the first-mentioned—that motion to opposites is not [30] always the same and numerically one—is a correct statement; in fact, this may be said to be necessary, provided that it is possible for the motion of that which is one and the same to be not

always one and the same. (I mean that e.g. we may question whether the note given by a single string is one and the same, or is different, although the string is in the same condition and is moved in the same way.) But still, however this may be, there is nothing to prevent there being a motion that is the [253<sup>a</sup>1] same in virtue of being continuous and eternal: we shall have something to say later that will make this point clearer.

No absurdity is involved in the fact that something not in motion may be set in motion, that which is to cause motion from without being at one time present, and at another absent. Nevertheless, how this can be so remains matter for inquiry; how it [5] comes about, I mean, that the same motive force at one time causes a thing to be in motion, and at another does not do so; for the difficulty raised by our objector really amounts to this—why is it that some things are not always at rest, and others always in motion?

The third objection may be thought to present more difficulty than the others, namely, that which alleges that motion arises in things in which it did not exist before, and adduces in proof the case of animate things: thus an animal is first at [10] rest and afterwards walks, not having been set in motion apparently by anything from without. This, however, is false; for we observe that there is always some part of the animal's organism in motion, and the cause of the motion of this part is not the animal itself, but, it may be, its environment. Moreover, we say that the animal itself originates not all of its motions but its locomotion. So it may well be the [15] case—or rather perhaps it must be the case—that many motions are produced in the body by its environment, and some of these set in motion the intellect or the appetite, and this again then sets the whole animal in motion: this is what happens in sleep: though there is then no perceptive motion in them, there is some motion that causes them to wake up again. But we will leave this point also to be elucidated [20] at a later stage in our discussion.

3 · Our enquiry will resolve itself at the outset into a consideration of the above-mentioned problem—what can be the reason why some things in the world at one time are in motion and at another are at rest again? Now one of three things must be true: either all things are always at rest, or all things are always in motion, or some things are in motion and others at rest; and in this last case again either the [25] things that are in motion are always in motion and the things that are at rest are always at rest, or they are all naturally capable alike of motion and of rest; or there

is yet a third possibility remaining—it may be that some things in the world are always motionless, others always in motion, while others again admit of both conditions. This last is the account of the matter that we must give; for herein lies [30] the solution of all the difficulties raised and the conclusion of the investigation upon which we are engaged.

To maintain that all things are at rest, and to disregard sense-perception and attempt to show the theory to be reasonable, would be an instance of intellectual weakness: it would call in question a whole system, not a particular detail; moreover, it would be an attack not only on the physicist but on almost all sciences [253b1] and all opinions, since motion plays a part in all of them. Further, just as in arguments about mathematics objections that involve first principles do not affect the mathematician—and the other sciences are in similar case—so, too, objections involving the point that we have just raised do not affect the physicist; for it is a [5] hypothesis that nature is a principle of motion.

The assertion that all things are in motion we may fairly regard as false, though it is less subversive of physical science; for though in our course on physics it was laid down that nature is a principle of rest no less than of motion, nevertheless motion is the natural state; moreover, the view is actually held by some that not [10] merely some things but all things in the world are in motion and always in motion, though we cannot apprehend the fact by sense-perception. Although the supporters of this theory do not state clearly what kind of motion they mean, or whether they mean all kinds, it is no hard matter to reply to them. For there cannot be a continuous process either of increase or of decrease: that which comes between the two has to be included. The theory resembles that about the stone being worn away by the drop of water or split by plants growing out of it: if so much has been [15] extruded or removed by the drop, it does not follow that half the amount has previously been extruded or removed in half the time; but, as in the case of the hauled ship, so many drops set so much in motion, but a part of them will not set as much in motion in any period of time. The amount removed is, it is true, divisible into a number of parts, but no one of these was set in motion separately: they were [20] all set in motion together. It is evident, then, that from the fact that the decrease is divisible into an infinite number of parts it does not follow that some part must always be passing away: it all passes away at a particular moment. Similarly, too, in the case of any alteration whatever, if that which suffers alteration is infinitely divisible it does not follow from this that the same is true of the alteration itself, [25] which often occurs all at once, as in freezing. Again,

when any one has fallen ill, there must follow a period of time in which he will recover: the change cannot take place in an instant; and the change cannot be a change to anything else but health. The assertion, therefore, that alteration is continuous is too much at odds with the [30] evident facts; for alteration is from one contrary to another. Moreover, a stone becomes neither harder nor softer. Again, in the matter of locomotion, it would be a strange thing if a stone could be falling or resting on the ground without our being able to perceive the fact. Again, earth and all other bodies necessarily remain in their proper places and are moved from them only by violence; from the fact, then, that some of them are in their proper places it follows that in respect of place all things cannot be in motion. These and other similar arguments, then, should [254<sup>a</sup>] convince us that it is impossible either that all things are always in motion or that all things are always at rest.

Nor again can it be that some things are always at rest, others always in motion, and nothing sometimes at rest and sometimes in motion. This theory must [5] be pronounced impossible on the same grounds as those previously mentioned: viz. that we see the above-mentioned changes occurring in the case of the same things. We may further point out that the defender of this position is fighting against the evident facts; for there can be no increase and no compulsory motion, if it is impossible that a thing can be at rest before being set in motion unnaturally. This [10] theory, then, does away with becoming and perishing. Moreover, motion, it would seem, is generally thought to be a sort of becoming and perishing; for a thing comes to be that, or in that, to which it changes; and it ceases to be that, or in that, from which it changes. It is clear, therefore, that there are cases of occasional motion and occasional rest.

[15] We have now to take the assertion that all things are sometimes at rest and sometimes in motion and to confront it with the arguments previously advanced. We must take our start again, as we did before, from the possibilities that we distinguished just above. Either all things are at rest, or all things are in motion, or some things are at rest and others in motion. And if some things are at rest and [20] others in motion, then it must be that either all things are sometimes at rest and sometimes in motion, or some things are always at rest and the remainder always in motion, or some of the things are always at rest and others always in motion while others again are sometimes at rest and sometimes in motion. Now we have said before that it is impossible that all things should be at rest: nevertheless we may now [25] repeat the point. For even if it is really the case, as some assert, that what is is infinite and

motionless, it certainly does not appear to be so if we follow sense-perception: many things that exist appear to be in motion. Now if there is such a thing as false opinion or opinion at all, there is also motion; and similarly if there is such a thing as imagination, or if it is the case that anything seems to be [30] different at different times; for imagination and opinion are thought to be motions of a kind. But to investigate this question at all—to seek an argument in a case where we are too well off to require argument—implies bad judgement of what is better and what is worse, what commends itself to belief and what does not, what is a principle and what is not. It is likewise impossible that all things should be in motion or that some things should be always in motion and the remainder always at rest. We have sufficient ground for rejecting all these theories in the single fact that [254<sup>b</sup>1] we see some things sometimes in motion and sometimes at rest. It is evident, therefore, that it is no less impossible that some things should be always in motion and the remainder always at rest than that all things should be at rest or that all things should be in motion continuously. It remains, then, to consider whether all things are so constituted as to be capable both of being in motion and of being at rest, or whether, while some things are so constituted, some are always at rest and [5] some are always in motion; for it is this last view that we have to show to be true.

4 · Now of things that cause motion or suffer motion, some do so accidentally, others in their own right—accidentally if they merely belong to or contain as a part a thing that causes motion or suffers motion, in their own right if they cause [10] motion or suffer motion not merely by belonging to such a thing or containing it as a part.

Of things which move in their own right, some derive their motion from themselves, others from something else: and in some cases their motion is natural, in others violent and unnatural. Thus in things that derive their motion from themselves, e.g. all animals, the motion is natural. (For when an animal is in motion [15] its motion is derived from itself; and whenever the source of the motion of a thing is in the thing itself we say that the motion of that thing is natural. Therefore the animal as a whole moves itself naturally; but the body of the animal may be in motion unnaturally as well as naturally: it depends upon the kind of motion that it may chance to be suffering and the kind of element of which it is composed.) And [20] the motion of things that derive their motion from something else is in some cases natural, in others unnatural: e.g. upward motion of earthy things and downward motion of fire are

unnatural. Moreover the parts of animals are often in motion in an unnatural way, their positions and the character of the motion being abnormal. The fact that a thing that is in motion derives its motion from something is most [25] evident in things that are in motion unnaturally, because in such cases it is clear that the motion is derived from something other than the thing itself. Next to things that are in motion unnaturally those whose motion while natural is derived from themselves—e.g. animals—make this fact clear; for here the uncertainty is not as to whether the motion is derived from something but as to how we ought to distinguish in the thing between the mover and the moved. It would seem that in animals, just as in ships and things not naturally constituted, that which causes motion is [30] separate from that which suffers motion, and that in this way the animal as a whole causes its own motion.

The greatest difficulty, however, is presented by the remaining case of those that we last distinguished. Where things derive their motion from something else, we laid it down that some move contrary to nature: the others remain to be [255<sup>a</sup>1] contrasted with them, as moving by nature. It is in these cases that difficulty would be experienced in deciding whence the motion is derived, e.g. in the case of light and heavy things. When these things are in motion to positions the reverse of those they would properly occupy, their motion is violent: when they are in motion to their proper positions—the light thing up and the heavy thing down—their motion is [5] natural; but in this case it is no longer evident, as it is when the motion is unnatural, whence their motion is derived. It is impossible to say that their motion is derived from themselves: this is a characteristic of life and peculiar to living things. Further, if it were, it would have been in their power to stop themselves (I mean that if e.g. a thing can cause itself to walk it can also cause itself not to walk), and so, if fire itself possesses the power of upward locomotion, it is clear that it should also possess the [10] power of downward locomotion. Moreover if things move themselves, it would be unreasonable to suppose that in only one kind of motion is their motion derived from themselves. Again, how can anything continuous and naturally unified move itself? In so far as a thing is one and continuous not merely in virtue of contact, it is impassive: it is only in so far as a thing is divided that one part of it is by nature [15] active and another passive. Therefore none of these things move themselves (for they are naturally unified), nor does anything else that is continuous: in each case the mover must be separate from the moved, as we see to be the case with inanimate things when an animate thing moves them. It is the fact that these things also always derive their

motion from something: what it is would become evident if we were to distinguish the different kinds of cause.

[20] The above-mentioned distinctions can also be made in the case of things that cause motion: some of them are capable of causing motion unnaturally (e.g. the lever is not naturally capable of moving the weight), others naturally (e.g. what is actually hot is naturally capable of moving what is potentially hot); and similarly in the case of all other things of this kind.

In the same way, too, what is potentially of a certain quality or of a certain [25] quantity or in a certain place is naturally movable when it contains the corresponding principle in itself and not accidentally (for the same thing may be both of a certain quality and of a certain quantity, but the one is an accidental, not an essential property of the other). So when fire or earth is moved by something the motion is violent when it is unnatural, and natural when it brings to actuality the [30] proper activities that they potentially possess. But the fact that the term 'potentially' is used in more than one way is the reason why it is not evident whence such motions as the upward motion of fire and the downward motion of earth are derived. One who is learning a science knows potentially in a different way from one who while already possessing the knowledge is not actually exercising it. Wherever something capable of acting and something capable of being acted on are together, [255<sup>b</sup>1] what is potential becomes actual: e.g. the learner becomes from one potential something another potential something (for one who possesses knowledge of a science but is not actually exercising it knows the science potentially in a sense, though not in the same sense as before he learnt it). And when he is in this condition, if something does not prevent him, he actively exercises his knowledge: otherwise he would be in the contradictory state of not knowing. In regard to natural bodies also the case is similar. Thus what is cold is potentially hot: then a [5] change takes place and it is fire, and it burns, unless something prevents and hinders it. So, too, with heavy and light: light is generated from heavy, e.g. air from water (for water is first such potentially), and air is actually light, and will at once realize [10] its proper activity unless something prevents it. The activity of lightness consists in the light thing being in a certain place, namely high up: when it is in the contrary place, it is being prevented. The case is similar also in regard to quantity and quality. But, be it noted, this is the question we are trying to answer—how can we account for the motion of light things and heavy things to their proper places? The reason for it is that they have a natural tendency

towards a certain position; and this [15] is what it is to be light or heavy, the former being determined by an upward, the latter by a downward, tendency. As we have said, a thing may be potentially light or heavy in more ways than one. Thus not only when a thing is water is it in a sense potentially light, but when it has become air it may be still potentially light; for it may be that through some hindrance it does not occupy an upper position, whereas, [20] if what hinders it is removed, it realizes its activity and continues to rise higher. The process whereby what is of a certain quality changes to a condition of actuality is similar: thus the exercise of knowledge follows at once upon the possession of it unless something prevents it. So, too, what is of a certain quantity extends itself over a certain space unless something prevents it. The thing in a sense is and in a sense is not moved by one who moves what is obstructing and preventing its motion—e.g. one who pulls away a pillar or one who removes the stone from a wineskin in the [25] water is the accidental cause of motion; and in the same way the rebounding ball is moved not by the wall but by the thrower. So it is clear that in all these cases the thing does not move itself, but it contains within itself the source of motion—not of [30] moving something or of causing motion, but of suffering it.

If then the motion of all things that are in motion is either natural or unnatural and violent, and all things whose motion is violent and unnatural are moved by something, and something other than themselves, and again all things whose motion is natural are moved by something—both those that are moved by themselves and those that are not moved by themselves (e.g. light things and heavy things, which are moved either by that which brought the thing into existence and made it light [256<sup>a</sup>1] and heavy, or by that which released what was hindering and preventing it); then all things that are in motion must be moved by something.

5 · Now this may come about in either of two ways, either not because of the mover itself, but because of something else which moves the mover, or because of [5] the mover itself. Further, in the latter case, either the mover immediately precedes the last thing in the series, or there may be one or more intermediate links: e.g. the stick moves the stone and is moved by the hand, which again is moved by the man; in the man, however, we have reached a mover that is not so in virtue of being moved by something else. Now we say that the thing is moved both by



the last and by the [10] first of the movers, but more strictly by the first, since the first moves the last, whereas the last does not move the first, and the first will move the thing without the last, but the last will not move it without the first: e.g. the stick will not move anything unless it is itself moved by the man. If then everything that is in motion must be moved by something, and by something either moved by something else or [15] not, and in the former case there must be some first mover that is not itself moved by anything else, while in the case of the first mover being of this kind there is no need of another (for it is impossible that there should be an infinite series of movers, each of which is itself moved by something else, since in an infinite series there is no first [20] term)—if then everything that is in motion is moved by something, and the first mover is moved but not by anything else, it must be moved by itself.

This same argument may also be stated in another way as follows. Every mover moves something and moves it with something, either with itself or with something else: e.g. a man moves a thing either himself or with a stick, and a thing is knocked down either by the wind itself or by a stone propelled by the wind. But it is [25] impossible for that with which a thing is moved to move it without being moved by that which imparts motion by its own agency; but if a thing imparts motion by its own agency, it is not necessary that there should be anything else with which it imparts motion, whereas if there is a different thing with which it imparts motion, there must be something that imparts motion not with something else but with itself, or else there will be an infinite series. If, then, anything is a mover while being itself moved, the series must stop somewhere and not be infinite. Thus, if the stick [30] moves something in virtue of being moved by the hand, the hand moves the stick; and if something else moves with the hand the hand also is moved by something different from itself. So when motion by means of an instrument is at each stage caused by something different from the instrument, this must always be preceded by something else which imparts motion with itself. Therefore, if this is moving and [256<sup>b</sup>1] there is nothing else that moves it, it must move itself. So this reasoning also shows that, when a thing is moved, if it is not moved immediately by something that moves itself, the series brings us at some time or other to a mover of this kind.

And if we consider the matter in yet another way we shall get this same result. If everything that is in motion is moved by something that is in motion, either this is [5] an accidental attribute of the things (so that each of them moves something while being itself in motion, but not because it is itself in motion) or it belongs to them in their own right. If,

then, it is an accidental attribute, it is not necessary that that which causes motion should be in motion; and if this is so it is clear that there may [10] be a time when nothing that exists is in motion, since the accidental is not necessary but contingent. Now if we assume something possible, nothing impossible will follow (though something false may). But the non-existence of motion is an impossibility; for we have shown above that there must always be motion.

Moreover, the conclusion to which we have been led is a reasonable one. For there must be three things—the moved, the mover, and the instrument of motion. [15] Now the moved must be in motion, but it need not move anything else; the instrument of motion must both move something else and be itself in motion (for it changes together with the moved, with which it is in contact and continuous, as is clear in the case of things that move other things locally, in which case the two things must up to a certain point be in contact); and the mover—that is to say, that which causes motion in such a manner that it is not merely the instrument of [20] motion—must be unmoved. Now we see the last things, which have the capacity of being in motion, but do not contain a motive principle, and also things which are in motion but are moved by themselves and not by anything else: it is reasonable, therefore, not to say necessary, to suppose the existence of the third term also, that which causes motion but is itself unmoved. So, too, Anaxagoras is right when he [25] says that Mind is impassive and unmixed, since he makes it the principle of motion; for it could cause motion in this way only by being itself unmoved, and have control only by being unmixed.

Now if the mover is not accidentally but necessarily in motion—so that, if it were not in motion, it would not move anything—then the mover, in so far as it is in motion, must be moved either with the same kind of motion, or with a different [30] kind—either that which is heating, I mean, is itself becoming hot, that which is making healthy becoming healthy, and that which is causing locomotion in process of locomotion, or else that which is making healthy is in process of locomotion, and that which is causing locomotion in process of increase. But it is evident that this is impossible. For we must apply this to the very lowest species into which motion can [257<sup>a</sup>1] be divided: e.g. we must say that if someone is teaching some lesson in geometry, he is also being taught that same lesson in geometry, and that if he is throwing he is being thrown in just the same manner. Or if we reject this assumption we must say that one kind of motion is derived from another; e.g. that that which is causing locomotion is in process of increase, that which is

causing this increase is being [5] altered by something else, and that which is causing this alteration is suffering some different kind of motion. But the series must stop somewhere, since the kinds of motion are limited; and if we say that the series bends back, i.e. that that which is causing alteration is in process of locomotion, we do no more than if we had said at the outset that that which is causing locomotion is in process of locomotion, and that one who is teaching is being taught; for it is clear that everything that is moved is [10] also moved by the mover that is further back in the series—in fact the earlier mover is that which more strictly moves it. But this is of course impossible; for it involves the consequence that one who is teaching is learning whereas teaching necessarily implies possessing knowledge, and learning not possessing it. Still more unreasonable is the consequence that, since everything that is moved is moved by something [15] that is itself moved, everything that has a capacity for causing motion is capable of being moved: i.e. it will have a capacity for being moved in the sense in which one might say that everything that has a capacity for making healthy has a capacity for being made healthy, and that which has a capacity for building has a capacity for being built, either immediately or through one or more links (as it will if, while everything that has a capacity for causing motion has a capacity for being moved by something else, the motion that it has the capacity for suffering is not that with [20] which it affects what is next to it, but a motion of a different kind; e.g. that which has a capacity for making healthy might have a capacity for learning: the series, however, could be traced back, as we said before, until at some time or other we arrive at the same kind of motion). Now the first alternative is impossible, and the second is fantastic: it is absurd that that which has a capacity for causing alteration [25] should necessarily have a capacity for increase. It is not necessary, therefore, that that which is moved should always be moved by something else that is itself moved: so there will be an end to the series. Consequently the first thing that is in motion will derive its motion either from something that is at rest or from itself. But if there *were* any need to consider which of the two, that which moves itself or that which is moved by something else, is the cause and principle of motion, everyone would [30] decide for the former; for that which is in itself a cause is always prior to that which is so in virtue of something else.

We must therefore make a fresh start and consider the question: if a thing moves itself, in what sense and in what manner does it do so? Now everything that is in motion must be infinitely divisible; for it has been shown already in our general [257<sup>a</sup>1] course on *Physics*, that everything

that is in motion in its own right is continuous. Now it is impossible that that which moves itself should in its entirety move itself; for then, while being specifically one and indivisible, it would as a whole both undergo and cause the same locomotion or alteration; thus it would at the same time [5] be both teaching and being taught, or both restoring to and being restored to the same health. Moreover, we have established the fact that it is the movable that is moved; and this moves potentially, not in fulfilment, and the potential is in process to fulfilment, and motion is an incomplete fulfilment of the movable. The mover on the other hand is already in actuality: e.g. it is that which is hot that produces heat, [10] and in general that which produces the form possesses it. Consequently, the same thing in respect of the same thing will be at the same time both hot and not hot. So, too, in every other case where the mover must have the synonymous property. Therefore when a thing moves itself it is one part of it that is the mover and another part that is moved. But it is not self-moving in the sense that each of the two parts is [15] moved by the other part: the following considerations make this evident. If each of the two parts is to move the other, there will be no first mover; for that which is earlier in the series is more the cause of its being moved than that which comes next, and will be more truly the mover; for we found that there are two kinds of mover, that which is itself moved by something else and that which derives its motion from itself; and that which is further from the thing that is moved is nearer to the [20] principle of motion than that which is intermediate. Again, there is no necessity for the mover to be moved by anything but itself; so it can only be accidentally that the other part moves it in return. I take then the possible case of its not moving it: then there will be a part that is moved and a part that is an unmoved mover. Again, there is no necessity for the mover to be moved in return: on the contrary the necessity [25] that there should always be motion makes it necessary that there should be some mover that is either unmoved or moved by itself. Again, we should then have a thing undergoing the same motion that it is causing—that which is producing heat, therefore, being heated. But as a matter of fact that which primarily moves itself cannot contain either a single part that moves itself or a number of parts each of which moves itself. For, if the whole is moved by itself, it must be moved either by [30] some part of itself or as a whole by itself as a whole. If, then, it is moved in virtue of some part of it being moved by that part itself, it is this part that will be the primary self-mover, since, if this part is separated from the whole, the part will still move itself, but the whole will do so no longer. If on the

other hand the whole is moved by itself as a whole, it must be accidentally that the parts move themselves; and therefore, their self-motion not being necessary, we may take the case of their not being moved by themselves. Therefore in the whole of the thing we may distinguish [258<sup>a</sup>1] that which imparts motion without itself being moved and that which is moved; for only in this way is it possible for a thing to be self-moved. Further, if the whole moves itself we may distinguish in it that which imparts the motion and that which is moved: so while we say that AB is moved by itself, we may also say that it is moved by A. And since that which imparts motion may be either a thing that is [5] moved by something else or a thing that is unmoved, and that which is moved may be either a thing that imparts motion to something else or a thing that does not, that which moves itself must be composed of something that is unmoved but imparts motion and also of something that is moved but does not necessarily impart motion but may or may not do so. Thus let A be something that imparts motion but is unmoved, B something that is moved by A and moves C, C something that is moved [10] by B but moves nothing (granted that we eventually arrive at C we may take it that there is only one intermediate term, though there may be more). Then the whole ABC moves itself. But if I take away C, AB will move itself, A imparting motion and B being moved, whereas C will not move itself or in fact be moved at all. Nor [15] again will BC move itself apart from A; for B imparts motion only through being moved by something else, not through being moved by any part of itself. So only AB moves itself. That which moves itself, therefore, must comprise something that imparts motion but is unmoved and something that is moved but does not necessarily move anything else; and each of these two things, or at any rate one of [20] them, must be in contact with the other. If, then, that which imparts motion is continuous—that which is moved must of course be so—the one will be in contact with the other. So it is clear that it is not through some part of the whole being of such a nature as to be capable of moving itself that the whole moves itself: it moves itself as a whole, both being moved and imparting motion through containing a part that imparts motion and a part that is moved. It does not impart motion as a whole [25] nor is it moved as a whole: it is A that imparts motion and B alone that is moved.

Here a difficulty arises: if something is taken away from A (supposing that that which imparts motion but is unmoved is continuous), or from B, the part that is moved, will the remainder of A continue to impart motion or the remainder of B continue to be moved? If so, it will not be AB

primarily that is moved by itself, since, [30] when something is taken away from AB, the remainder of AB will continue to move itself. Perhaps there is nothing to prevent each of the two parts, or at any rate one of [258<sup>b</sup>1] them, that which is moved, being potentially divided though actually undivided, so that if it is divided it will not continue in the possession of the same nature; and so there is nothing to prevent self-motion residing primarily in things that are potentially divisible.

From what has been said, then, it is evident that that which primarily imparts [5] motion is unmoved; for, whether that which is in motion but moved by something leads straight to the first unmoved, or whether it leads to what is in motion but moves itself and stops its own motion, on both suppositions we have the result that in all cases of things being in motion that which primarily imparts motion is unmoved.

[10] **6** · Since there must always be motion without intermission, there must necessarily be something eternal, whether one or many, that first imparts motion, and this first mover must be unmoved. Now the question whether each of the things that are unmoved but impart motion is eternal is irrelevant to our present argument; but the following considerations will make it clear that there must necessarily be some such thing, which, while it has the capacity of moving something else, is itself [15] unmoved and exempt from all change, both unqualified and accidental. Let us suppose, if you will, that in the case of certain things it is possible for them at different times to be and not to be, without any process of becoming and perishing (in fact it would seem to be necessary, if a thing that has not parts at one time is and at another time is not, that any such thing should without undergoing any change at [20] one time be and at another time not be). And let us further suppose it possible that some principles that are unmoved but capable of imparting motion at one time are and at another time are not. Even so, this cannot be true of *all* such principles, since there must clearly be something that *causes* things that move themselves at one time to be and at another not to be. For, since nothing that has not parts can be in [25] motion, everything which moves itself must have magnitude, though nothing that we have said makes this necessarily true of every mover. So the fact that some things become and others perish, and that this is so continuously, cannot be caused by any one of those things that, though they are unmoved, do not always exist; nor again some be caused by some and others by others. The eternity and continuity of [30] the process cannot be caused either by any

one of them singly or by the sum of them, because this causal relation must be eternal and necessary, whereas the sum of these movers is infinite and they do not all exist together. It is clear, then, that though [259<sup>a</sup>1] there may be countless instances of the perishing of movers unmoved, and though many things that move themselves perish and are succeeded by others that come into being, and though one thing that is unmoved moves one thing while another moves another, nevertheless there is something that comprehends them all, and that as something apart from each one of them, and this it is that is the cause of the fact [5] that some things are and others are not and of the continuous process of change; and this causes the motion of the other movers, while they are the causes of the motion of other things. Motion, then, being eternal, the first mover, if there is but one, will be eternal also; if there are more than one, there will be a plurality of such eternal movers. We ought, however, to suppose that there is one rather than many, and a finite rather than an infinite number. When the consequences of either assumption are the same, we should always assume that things are finite rather than infinite in [10] number, since in things constituted by nature that which is finite and that which is better ought, if possible, to be present rather than the reverse; and here it is sufficient to assume only one mover, the first of unmoved things, which being eternal will be the principle of motion to everything else.

The following argument also makes it evident that the first mover must be something that is one and eternal. We have shown that there must always be [15] motion. That being so, motion must be continuous, because what is always is continuous, whereas what is in succession is not continuous. But further, if motion is continuous, it is one; and it is one only if the mover and the moved are each of them one, since in the event of a thing's being moved now by one thing and now by another the whole motion will not be continuous but successive.

Moreover a conviction that there is a first unmoved something may be reached [20] not only from the foregoing arguments, but also by considering again the principles operative in movers.<sup>50</sup> Now it is evident that among existing things there are some that are sometimes in motion and sometimes at rest. This fact has served to make it clear that it is not true either that all things are in motion or that all things are at rest or that some things are always at rest and the remainder always in motion: on this matter proof is supplied by things that fluctuate between the two and have the [25] capacity of being sometimes in motion and sometimes at rest. The existence of things of this kind is clear to all; but we wish to

explain also the nature of each of the other two kinds and show that there are some things that are always unmoved and some things that are always in motion. In the course of our argument directed to this end we established the fact that everything that is in motion is moved by [30] something, and that the mover is either unmoved or in motion, and that, if it is in motion, it is moved at each stage either by itself or by something else; and so we proceeded to the position that of things that are moved, the principle of things that are in motion is that which moves itself, and the principle of the whole series is the [259b1] unmoved. Further it is evident from actual observation that there are things that have the characteristic of moving themselves, e.g. the animal kingdom and the whole class of living things. This being so, then, the view was suggested that perhaps it may be possible for motion to come to be in a thing without having been in existence at all before, because we see this actually occurring in animals: they are [5] unmoved at one time and then again they are in motion, as it seems. We must grasp the fact, therefore, that animals move themselves only with one kind of motion, and that this is not strictly originated by them. The cause of it is not derived from the animal itself: there are other natural motions in animals, which they do not experience through their own instrumentality, e.g. increase, decrease, and respiration: these are experienced by every animal while it is at rest and not in motion in [10] respect of the motion set up by its own agency; here the motion is caused by the environment and by many things that enter into the animal: thus in some cases the cause is nourishment—when it is being digested animals sleep, and when it is being distributed they awake and move themselves, the first principle of this motion being thus originally derived from outside. Therefore animals are not always in continuous [15] motion by their own agency: it is something else that moves them, itself being in motion and changing as it comes into relation with each several thing that moves itself. (Moreover in all these things the first mover and cause of their self-motion is itself moved by itself, though in an accidental sense: that is to say, the body changes its place, so that that which is in the body changes its place also and moves itself by [20] leverage.) Hence we may be sure that if a thing belongs to the class of unmoved things which move themselves accidentally, it is impossible that it should cause continuous motion. So the necessity that there should be motion continuously requires that there should be a first mover that is unmoved even accidentally, if, as [25] we have said, there is to be in the world of things an unceasing and undying motion, and the world is to remain self-contained and within the same limits; for if the



principle is permanent, the universe must also be permanent, since it is continuous with the principle. (We must distinguish, however, between accidental motion of a thing by itself and such motion by something else, the former being confined to [30] perishable things, whereas the latter belongs also to certain principles of heavenly bodies, of all those, that is to say, that experience more than one locomotion.)

And further, if there is always something of this nature, a mover that is itself unmoved and eternal, then that which is first moved by it must also be eternal. [260<sup>a</sup>1] Indeed this is clear also from the consideration that there would otherwise be no becoming and perishing and no change of any kind in other things, if there were nothing in motion to move them; for the motion imparted by the unmoved will always be imparted in the same way and be one and the same, since the unmoved [5] does not itself change in relation to that which is moved by it. But that which is moved by something that, though it is in motion, is moved directly by the unmoved stands in varying relations to the things that it moves, so that the motion that it causes will not be always the same: by reason of the fact that it occupies contrary positions or assumes contrary forms it will produce contrary motions in each several [10] thing that it moves and will cause it to be at one time at rest and at another time in motion.

The foregoing argument, then, has served to clear up the point about which we raised a difficulty at the outset—why is it that instead of all things being either in motion or at rest, or some things being always in motion and the remainder always at rest, there are things that are sometimes in motion and sometimes not? The cause [15] of this is now plain: it is because, while some things are moved by an eternal unmoved mover and are therefore always in motion, other things are moved by something that is in motion and changing, so that they too must change. But the unmoved mover, as has been said, since it remains simple and unvarying and in the same state, will cause motion that is one and simple.

[20] **7** · This matter will be made clearer, however, if we start afresh from another point. We must consider whether it is or is not possible that there should be a continuous motion, and, if it is possible, which this motion is, and which is the primary motion; for it is plain that if there must always be motion, and a particular motion is primary and continuous, then it is this motion that is imparted by the first [25] mover, and so it is necessarily one and the same and continuous and primary.

Now of the three kinds of motion that there are—motion in respect of

magnitude, motion in respect of affection, and motion in respect of place—it is this last, which we call locomotion, that must be primary. For it is impossible that there should be increase without the previous occurrence of alteration; for that which is [30] increased, although in a sense it is increased by what is like itself, is in a sense increased by what is unlike itself: thus it is said that contrary is nourishment to contrary; but one thing gets attached to another by becoming like it. There must be alteration then, in that there is this change from contrary to contrary. But the fact that a thing is altered requires that there should be something that alters it, [260<sup>b</sup>1] something that makes the potentially hot actually hot: so it is plain that the mover does not maintain a uniform relation to it but is at one time nearer to and at another farther from that which is altered; and we cannot have this without locomotion. If, therefore, there must always be motion, there must also always be locomotion as the [5] primary motion, and, if there is a primary as distinguished from a secondary form of locomotion, it must be the primary form. Again, all affections have their origin in condensation and rarefaction: thus heavy and light, soft and hard, hot and cold, are considered to be forms of density and rarity. But condensation and rarefaction are [10] combination and separation, processes in virtue of which substances are said to become and perish; and in being combined and separated things must change in respect of place. And further, when a thing is increased or decreased its magnitude changes in respect of place.

Again, there is another point of view from which it will be clearly seen that [15] locomotion is primary. As in the case of other things so too in the case of motion the word ‘primary’ may be used in several ways. A thing is said to be prior to other things when, if it does not exist, the others will not exist, whereas it can exist without the others; and there is also priority in time and priority in being. Now there must be motion continuously, and it may exist continuously either by being continuous or by [20] being successive but rather by being continuous; and it is better that it should be continuous rather than successive motion, and we always assume the presence in nature of the better, if it be possible: since, then, continuous motion is possible (this will be proved later: for the present let us take it for granted), and no other motion can be continuous except locomotion, locomotion must be primary. For there is no [25] necessity for the subject of locomotion to be the subject either of increase or of alteration, nor need it become or perish; on the other hand there cannot be any one of these processes without the existence of the continuous motion imparted by the first mover.

Again, locomotion must be primary in time; for this is the only motion possible for eternal things. It is true indeed that, in the case of any individual thing that has a [30] becoming, locomotion must be the last of its motions; for after its becoming it first experiences alteration and increase, and locomotion is a motion that belongs to such things only when they are perfected. But there must previously be something else that is in process of locomotion to be the cause of the becoming of things that [261<sup>a</sup>1] become, without itself being in process of becoming, as e.g. the begotten is preceded by what begot it; otherwise becoming might be thought to be the primary motion on the ground that the thing must first become. But though this is so in the case of any [5] individual thing that becomes, nevertheless before anything becomes, something else must be in motion, not itself becoming but being, and before this there must again be something else. And since becoming cannot be primary—for, if it were, everything that is in motion would be perishable—it is plain that no one of the [10] motions next in order can be prior to locomotion. By the motions next in order I mean increase and then alteration, decrease, and perishing. All these are posterior to becoming; consequently, if not even becoming is prior to locomotion, then no one of the other processes of change is so either.

In general, that which is becoming appears as something imperfect and proceeding to a principle; and so what is posterior in the order of becoming is prior in the order of nature. Now all things that go through the process of becoming [15] acquire locomotion last. It is this that accounts for the fact that some living things, e.g. plants and many kinds of animals, owing to lack of the requisite organ,<sup>51</sup> are entirely without motion, whereas others acquire it in the course of their being perfected. Therefore, if the degree in which things possess locomotion corresponds to the degree in which they have realized their natural development, then this motion must be prior to all others in respect of being; and not only for this reason [20] but also because a thing that is in motion loses its being less in the process of locomotion than in any other kind of motion: it is the only motion that does not involve a change of being in the sense in which there is a change in quality when a thing is altered and a change in quantity when a thing is increased or decreased. Above all it is plain that this motion, motion in respect of place, is what is in the strictest sense produced by that which moves itself; but it is the self-mover that we [25] declare to be the principle of things that are moved and impart motion and the primary source for things that are in motion.

It is clear, then, from the foregoing arguments that locomotion is the

primary motion. We have now to show which kind of locomotion is primary. The same [30] process of reasoning will also make clear at the same time the truth of the assumption we have made both now and at a previous stage that it is possible that there should be a motion that is continuous and eternal. Now it is clear from the following considerations that no other motion can be continuous. Every other motion and change is from an opposite to an opposite: thus for the processes of [35] becoming and perishing the limits are what is and what is not, for alteration the contrary affections, and for increase and decrease either greatness and smallness or perfection and imperfection of magnitude; and changes to contraries are contrary changes. Now a thing that is undergoing any particular kind of motion, but though [261<sup>b</sup>1] previously existent has not always undergone it, must previously have been at rest. It is clear, then, that for the changing thing the contraries will be states of rest. And we have a similar result in the case of changes; for becoming and perishing, whether regarded without qualification or as affecting something in particular, are opposites: therefore provided it is impossible for a thing to undergo opposite changes [5] at the same time, the change will not be continuous, but a period of time will intervene between the opposite processes. The question whether these contradictory changes are contraries or not makes no difference, provided only it is impossible for them both to be present to the same thing at the same time: the point is of no importance to the argument. Nor does it matter if the thing need not *rest* in the [10] contradictory state, or if there is no change contrary to rest: it may be true that what is not is not at rest, and that perishing is a process to what is not. All that matters is the intervention of a time: it is this that prevents the change from being continuous; so, too, in our previous instances the important thing was not the relation of contrariety but the impossibility of the two processes being present at the same [15] time. And there is no need to be disturbed by the fact that there may be more than one contrary to the same thing, that motion will be contrary both to rest and to motion in the contrary direction. We have only to grasp the fact that motion is in a sense the opposite both of a state of rest and of the contrary motion, in the same way as the equal and the mean is the opposite both of that which surpasses it and of that [20] which it surpasses, and that it is impossible for the opposite motions or changes to be present to a thing at the same time. Furthermore, in the case of becoming and perishing it would seem to be an utterly absurd thing if as soon as anything has become it must necessarily perish and cannot continue to exist for any time; and this might generate a similar belief in

the other cases, since it is natural that they should [25] all be uniform.

8 · Let us now proceed to maintain that it is possible that there should be an infinite motion that is single and continuous, and that this motion is rotatory motion. The motion of everything that is in process of locomotion is either rotatory or rectilinear or a compound of the two: consequently, if one of the former two is not [30] continuous, that which is composed of them both cannot be continuous either. Now it is plain that if the locomotion of a thing is rectilinear and finite it is not continuous locomotion; for the thing must turn back, and that which turns back in a straight line undergoes two contrary locomotions, since, so far as place is concerned, upward motion is the contrary of downward motion, forward motion of backward, and [35] motion to the left of motion to the right, these being the pairs of contraries in the sphere of place. But we have already defined single and continuous motion to be [262<sup>a</sup>1] motion of a single thing in a single period of time and operating within a sphere admitting of no further specific differentiation (for we have three things to consider, first that which is in motion, e.g. a man or a god, secondly the 'when', that is to say, the time, and thirdly the sphere within which it operates, which may be either place or affection or form or magnitude). Now contraries are specifically different and [5] not one; and within the sphere of place we have the above-mentioned distinctions. Moreover we have an indication that motion from A to B is the contrary of motion from B to A in the fact that, if they occur at the same time, they arrest and stop each other. And the same is true in the case of a circle: the motion from A towards B is the contrary of the motion from A towards C; for even if they are continuous and [10] there is no turning back they arrest each other, because contraries annihilate or obstruct one another. On the other hand lateral motion is not the contrary of upward motion. But what shows most clearly that rectilinear motion cannot be continuous is the fact that turning back necessarily implies coming to a stand, not only when it is a straight line that is traversed, but also in the case of locomotion in a [15] circle (which is not the same thing as rotatory locomotion; for a thing may either proceed on its course without a break or turn back again when it has reached the same point from which it started). We may assure ourselves of the necessity of this coming to a stand not only by perception but also by argument. We may start as follows: we have three points, beginning, middle, and end; and the middle is both [20] beginning and end relatively to each of the others, being one in number but two in definition. We have further the

distinction between the potential and the actual. So in the straight line any one of the points lying between the two extremes is potentially a middle-point; but it is not actually so unless that which is in motion divides the line by coming to a stand at that point and beginning its motion again: [25] thus the middle-point becomes both a beginning and an end, a beginning of the latter part and an end of the first part. This is the case e.g. when A in the course of its locomotion comes to a stand at B and starts again towards C; but when its motion is continuous A cannot either have come to be or have ceased to be at the point B: it [30] can only have been there at a now, and not in any period of time except the whole<sup>52</sup> of which the now is a dividing-point. To maintain that it has come to be and ceased to be there will involve the consequence that A in the course of its locomotion will [262<sup>b</sup>1] always be coming to a stand; for it is impossible that A should simultaneously have come to be at B and ceased to be there, so that the two things must have happened at different points of time, and therefore there will be the intervening period of time: consequently A will be in a state of rest at B, and similarly at all other points, since the same reasoning holds good in every case. When to A, that which is in the process [5] of locomotion, B, the middle-point, serves both as an end and as a beginning, A must come to a stand at B, because it makes it two just as one might do in thought. However, the point A is the beginning at which it has ceased to be, and it is at C that it has come to be when its course is finished and it comes to a stand. So this is how we must meet the difficulty that then arises, which is as follows. Suppose the line E [10] is equal to F, that A proceeds in continuous locomotion from the extreme point to C, and that, at the moment when A is at the point B, D is proceeding in uniform locomotion and with the same velocity as A from the extremity of F to G: then D will have reached G before A has reached C; for that which makes an earlier start [15] and departure must make an earlier arrival. For A has not simultaneously come to be and ceased to be at B, which is why it is late. For if it does both simultaneously, it will not be late—for this to happen it will be necessary that it should come to a stand there. Therefore we must not hold that when A came to be at B, D was at the same time in motion from the extremity of F; for the fact of A's having come to be at B [20] will involve its ceasing to be there, and the two events will not be simultaneous, whereas the truth is that A is at B at a sectional point of time and does not occupy time there. In this case, therefore, where the motion of a thing is continuous, it is impossible to use this form of expression. On the other hand in the case of a thing that turns back in its

course we must do so. For suppose G in the course of its locomotion proceeds to D and then turns back and proceeds downwards again: then the extreme point D has served as beginning and end for it, one point thus serving as two: therefore A must have come to a stand there; it cannot have [25] come to be at D and departed from D simultaneously, for in that case it would simultaneously be there and not be there at the same now. And here we cannot apply the same solution: we cannot argue that G is at D at a sectional point of time and has not come to be or ceased to be there. For here the goal that is reached is [30] necessarily one that is actual, not potential. Now the points in the middle are potential; but this one is actual, and regarded from below it is an end, while regarded from above it is a beginning, so that it stands in these same relations to the [263<sup>a</sup>1] motions. Therefore that which turns back in traversing a rectilinear course must come to a stand. Consequently there cannot be a continuous rectilinear motion that is eternal.

The same method should also be adopted in replying to those who ask, in the terms of Zeno's argument, whether we admit that before any distance can be [5] traversed half the distance must be traversed, that these half-distances are infinite in number, and that it is impossible to traverse distances infinite in number—or some put the same argument in another form, and would have us grant that in the time during which a motion is in progress we should first count the half-motion for every half-distance that we get, so that we have the result that when the whole distance is traversed we have counted an infinite number, which is admittedly [10] impossible. Now in our first discussions of motion we put forward a solution of this difficulty turning on the fact that the period of time contains within itself an infinite number of units: there is no absurdity, we said, in supposing the traversing of infinite distances in infinite time, and the element of infinity is present in the time no less than in the distance. But, although this solution is adequate as a reply to the [15] questioner (the question asked being whether it is impossible in a finite time to traverse or count an infinite number of units), nevertheless as an account of the fact and the truth it is inadequate. For suppose the distance to be left out of account and the question asked to be no longer whether it is possible in a finite time to traverse an infinite number of distances, and suppose that the inquiry is made to refer to the [20] time itself (for the time contains an infinite number of divisions): then this solution will no longer be adequate, and we must apply the truth that we enunciated in our recent discussion. In the act of dividing the continuous distance into two halves one point is treated as two, since

we make it a beginning and an end; and this same result is produced by the act of counting halves as well as by the act of dividing into halves. [25] But if divisions are made in this way, neither the distance nor the motion will be continuous; for motion if it is to be continuous must relate to what is continuous; and though what is continuous contains an infinite number of halves, they are not actual but potential halves. If he makes the halves actual, he will get not a continuous but an intermittent motion. In the case of counting the halves, it is clear that this result [263<sup>b</sup>1] follows; for then one point must be reckoned as two: it will be the end of the one half and the beginning of the other, if he counts not the one continuous whole but the two halves. Therefore to the question whether it is possible to pass through an infinite number of units either of time or of distance we must reply that in a sense it is and in [5] a sense it is not. If the units are actual, it is not possible; if they are potential, it is possible. For in the course of a continuous motion the traveller has traversed an infinite number of units in an accidental sense but not in an unqualified sense; for though it is an accidental characteristic of the distance to be an infinite number of half-distances, it is different in essence and being.

It is also plain that unless we hold that the point of time that divides earlier [10] from later always belongs only to the later so far as the thing is concerned, we shall be involved in the consequence that the same thing at the same moment is and is not, and that a thing is not at the moment when it has become. It is true that the point is common to both times, the earlier as well as the later, and that, while numerically one and the same, it is not so in definition, being the end of the one and the beginning of the other; but so far as the thing is concerned it always belongs to [15] the later affection. Let us suppose a time ACB and a thing D, D being white in the time A and not white in the time B. Then D is at C white and not white; for if we were right in saying that it is white during the whole time A, it is true to call it white at any moment of A, and not white in B, and C is in both A and B. We must not [20] allow, therefore, that it is white in the whole of A, but must say that it is so in all of it except the last now C. C already belongs to the later period, and if in the whole of A not white was becoming and white perishing, at C it had become or perished. And so either that is the first moment at which it is true to call the thing not white;<sup>53</sup> or a thing may not be at the moment when it has become and may be at the moment [25] when it has perished; or else things must at the same time be white and not white and in general be and not be. Further, if anything that is after having previously not been must become being and is not when it is becoming, time cannot be divisible into



indivisible times. For suppose that D was becoming white at A and that at another indivisible time B, consecutive with A, D has already become white and so is white at that moment: then, inasmuch as at A it was becoming white and so was [30] not white and at B it is white, there must have been a becoming between A and B and therefore also a time in which the becoming took place. On the other hand, [264<sup>a</sup>1] those who deny indivisibles are not affected by this argument: according to them it has become and is white at the last point of the actual time in which it was becoming white; and this point has no other point consecutive with or in succession to it, whereas indivisible times are successive. Moreover it is clear that if it was becoming [5] white in the whole time A, there was no more time in which it had become and was becoming than the total of the time in which it was merely becoming.

These and such-like, then, are the arguments on which one might rely as being appropriate to the subject matter. If we look at the question generally, the same result would also appear to be indicated by the following arguments. Everything whose motion is continuous must, on arriving at any point in the course of its [10] locomotion, have been previously also in process of locomotion to that point, if it is not forced out of its path by anything: e.g. on arriving at B a thing must also have been in process of locomotion to B, and that not merely when it was near to B, but from the moment of its starting on its course, since there can be no reason for its being so at any particular stage rather than at an earlier one. So, too, in the case of the other kinds of motion. Now we are to suppose that a thing proceeds in locomotion from A and that when it arrives at C it comes again, moving [15] continuously, to A. Then when it is undergoing locomotion from A to C it is at the same time undergoing also its locomotion to A from C: consequently, it is simultaneously undergoing two contrary motions, since the two motions that follow the same straight line are contrary to each other. At the same time it changes from a state in which it is not: so, inasmuch as this is impossible, the thing must come to a stand at C. Therefore the motion is not a single motion, since motion that is [20] interrupted by stationariness is not single.

Further, the following argument will serve better to make this point clear universally in respect of every kind of motion. If the motion undergone by that which is in motion is always one of those already enumerated, and the state of rest that it undergoes is one of those that are the opposites of the motions (for we found no other besides these), and moreover that which is undergoing but does not always undergo a

particular motion (by this I mean one of the various specifically distinct [25] motions, not some particular part of the whole motion) must have been previously undergoing the state of rest that is the opposite of the motion, the state of rest being privation of motion; then, inasmuch as the two motions that follow the same straight line are contrary motions, and it is impossible for a thing to undergo simultaneously two contrary motions, that which is undergoing locomotion from A to C cannot also simultaneously be undergoing locomotion from C to A; and since the latter [30] locomotion is not simultaneous with the former but is still to be undergone, before it is undergone there must occur a state of rest at C; for this, as we found, is the state of rest that is the opposite of the motion from C. The foregoing argument, then, makes it plain that the motion is not continuous. [264<sup>b</sup>1]

Again, there is the following argument, more appropriate than its predecessors. At the same time something has ceased to be not white and has become white. Then if the alteration to white and from white is continuous and does not persist for any time, at the same time it has ceased to be not white and [5] has become white and has become not white; for the time of the three will be the same.

Again, from the continuity of the time in which the motion takes place we cannot infer continuity in the motion, but only successiveness: in fact, how could contraries, e.g. whiteness and blackness, meet in the same extreme point?

On the other hand, motion on a circular line will be one and continuous; for here we are met by no impossible consequence: that which is in motion from A will [10] in virtue of the same direction of energy be simultaneously in motion to A (since it is in motion to the point at which it will finally arrive), and yet will not be undergoing two contrary or opposite motions; for a motion to a point and a motion from that point are not always contraries or opposites: they are contraries only if they are on [15] the same straight line (for this has points contrary in place, e.g. the points on a diameter—for they are furthest from one another), and they are opposites only if they are along the same line. Therefore there is nothing to prevent the motion being continuous and free from all intermission; for rotatory motion is motion of a thing from its place to its place, whereas rectilinear motion is motion from its place to another place.

[20] Moreover rotatory motion is never at the same points, whereas rectilinear motion repeatedly is so. Now a motion that is always shifting its ground can be continuous; but a motion that is repeatedly at the same

points cannot be so, since then the same thing would have to undergo simultaneously two opposite motions. [25] So, too, there cannot be continuous motion in a semicircle or in any other arc of a circle, since here also the same ground must be traversed repeatedly and two contrary processes of change must occur. For the beginning and the termination do not coincide, whereas in motion over a circle they do coincide, and so this is the only perfect motion.

This analysis shows that the other kinds of motion cannot be continuous either; [30] for in all of them we find that there is the same ground to be traversed repeatedly: thus in alteration there are the intermediate stages, and in quantitative change there are the intervening degrees of magnitude; and in becoming and perishing the same thing is true. It makes no difference whether we take the intermediate stages [265<sup>a</sup>1] of the change to be few or many, or whether we add or subtract one; for in either case we find that there is still the same ground to be traversed repeatedly. Thus it is plain from what has been said that those physicists who assert that all sensible things are always in motion are wrong; for their motion must be one or other of the motions just mentioned: in fact they mostly conceive it as alteration (things are always in flux and decay, they say), and they go so far as to speak even of [5] becoming and perishing as a process of alteration. On the other hand, our argument has shown universally of all motions, that no motion admits of continuity except rotatory motion: consequently neither alteration nor increase admits of continuity. [10] So much for the view that there is no change that admits of infinity or continuity except rotatory locomotion.

9 · It can now be shown plainly that rotation is the primary locomotion. Every locomotion, as we said before, is either rotatory or rectilinear or a compound [15] of the two; and the two former must be prior to the last, since they are the elements of which the latter consists. Moreover rotatory locomotion is prior to rectilinear locomotion, because it is more simple and complete. For the line traversed in rectilinear motion cannot be infinite; for there is no such thing as an infinite straight line; and even if there were, it would not be traversed by anything in motion; for the [20] impossible does not happen and it is impossible to traverse an infinite distance. On the other hand rectilinear motion on a finite line is composite if it turns back, i.e. two motions, while if it does not turn back it is incomplete and perishable; and in the order of nature, of definition, and of time alike the complete is prior to the incomplete

and the imperishable to the perishable. Again, a motion that admits of being eternal is prior to one that does not. Now rotatory motion can be eternal; but [25] no other motion, whether locomotion or motion of any other kind, can be so, since in all of them rest must occur, and with the occurrence of rest the motion has perished.

The result at which we have arrived, that rotatory motion is single and continuous, and rectilinear motion is not, is a reasonable one. In rectilinear motion we have a definite beginning, end and middle, which all have their place in it in such [30] a way that there is a point from which that which is in motion will begin and a point at which it will end (for when anything is at the limits of its course, whether at the whence or at the whither, it is in a state of rest). On the other hand in circular motion there are no such definite points; for why should any one point on the line be a limit rather than any other? Any one point as much as any other is alike beginning, middle, and end, so that they are both always and never at a beginning [265<sup>b</sup>1] and at an end (so that a sphere is in a way both in motion and at rest; for it continues to occupy the same place). The reason of this is that in this case all these characteristics belong to the centre: that is to say, the centre is alike beginning, middle, and end of the space traversed; consequently since this point is not a point on the circular line, there is no point at which that which is in process of locomotion [5] can be in a state of rest as having traversed its course, because in its locomotion it is proceeding always about a central point and not to an extreme point; and because this remains still, the whole is in a sense always at rest as well as continuously in motion. Our next point gives a convertible result: on the one hand, because rotation is the measure of motions it must be the primary motion (for all things are measured [10] by what is primary); on the other hand, because rotation is the primary motion it is the measure of all other motions. Again, rotatory motion is also the only motion that admits of being regular. In rectilinear locomotion the motion of things in leaving the beginning is not uniform with their motion in approaching the end, since the velocity of a thing always increases proportionately as it removes itself farther from its position of rest; on the other hand rotatory motion alone has by nature no [15] beginning or end in itself but only outside.

As to locomotion being the primary motion, this is a truth that is attested by all who have ever made mention of motion: they all assign their principles of motion to things that impart motion of this kind. Thus separation and combination are motions in respect of place, and the motion imparted by Love and Strife takes these [20] forms, the latter

separating and the former combining. Anaxagoras, too, says that Mind, his first mover, separates. Similarly those who assert no cause of this kind but say that void accounts for motion—they also hold that the motion of natural substance is motion in respect of place; for their motion that is accounted for by void [25] is locomotion, and its sphere of operation may be said to be place. Moreover they are of opinion that the primary substances are not subject to any of the other motions, though the things that are compounds of these substances are so subject: the processes of increase and decrease and alteration, they say, are effects of the combination and separation of atoms. It is the same, too, with those who make out [30] that the becoming or perishing of a thing is accounted for by density or rarity; for it is by combination and separation that the place of these things in their systems is determined. Moreover to these we may add those who make soul the cause of motion; for they say that things that undergo motion have as their first principle [266<sup>a</sup>1] that which moves itself; and when animals and all living things move themselves, the motion is motion in respect of place. Finally, we say that a thing is in motion in the strict sense of the term only when its motion is motion in respect of place: if a thing is in process of increase or decrease or is undergoing some alteration while remaining at rest in the same place, we say that it is in motion in some particular [5] respect: we do not say that it is in motion without qualification.

We have argued that there always was motion and always will be motion throughout all time, and we have explained what is the first principle of this eternal motion; we have explained further which is the primary motion and which is the only motion that can be eternal; and we have pronounced the first mover to be unmoved.

[10] **10** · We have now to assert that the first mover must be without parts and without magnitude, beginning with the establishment of the premisses on which this conclusion depends.

One of these premisses is that nothing finite can cause motion during an infinite time. We have three things, the mover, the moved, and thirdly that in which the motion takes place, namely the time; and these are either all infinite or all finite [15] or some—that is to say two of them or one of them—finite and some infinite. Let A be the mover, B the moved, and C infinite time. Now let us suppose that D moves E, a part of B. Then the time occupied by this motion cannot be equal to C; for the greater the amount moved, the longer the time occupied. It follows that the time F is

not infinite. Now we see that by continuing to add to D I shall use up A and by [20] continuing to add to E I shall use up B; but I shall not use up the time by continually subtracting a corresponding amount from it, because it is infinite. Consequently the part of C which is occupied by all A in moving the whole of B, will be finite. Therefore a finite thing cannot impart to anything an infinite motion. It is clear, then, that it is impossible for the finite to cause motion during an infinite time.

[25] That in no case is it possible for an infinite force to reside in a finite magnitude, can be shown as follows: we take it for granted that the greater force is always that which in less time does an equal amount of work—heating, for example, or sweetening or throwing, or in general causing motion. Then that on which the forces act must be affected to some extent by the finite magnitude possessing an infinite [30] force—in fact to a greater extent than by anything else, since the infinite force is greater than any other. But then there cannot be any time in which its action could take place. Suppose that A is the time occupied by the infinite power in the performance of an act of heating or pushing, and that AB is the time occupied by a [266<sup>b</sup>1] finite power in the performance of the same act: then by adding to the latter another finite power and continually increasing the magnitude of the power so added I shall at some time or other reach a point at which the finite power has completed the motive act in the time A; for by continual addition to a finite magnitude I must arrive at a magnitude that exceeds any assigned limit, and in the same way by continual subtraction I must arrive at one that falls short of any assigned limit. So we get the result that the finite force will occupy the same amount of time in performing the motive act as the infinite force. But this is impossible. Therefore [5] nothing finite can possess an infinite force. So it is also impossible for a finite force to reside in an infinite magnitude. It is true that a greater force can reside in a lesser magnitude; but then a still greater force will reside in a greater. Now let AB be an infinite magnitude. Then BC possesses a certain force that occupies a certain time, let us say the time EF, in moving D. Now if I take a magnitude twice as great as BC, [10] the time occupied by this magnitude in moving D will be half of EF (assuming this to be the proportion): so we may call this time FG. That being so, by continually taking a greater magnitude in this way I shall never arrive at AB, whereas I shall always be getting a lesser fraction of the time originally given. Therefore the force must be infinite; for it exceeds any finite force if the time occupied by the action of [15] any finite force must also be finite (for if a given force moves something in a certain time, a greater force

will do so in a lesser time, but still a definite time, in inverse proportion). But a force must always be infinite—just as a number or a magnitude is—if it exceeds all definite limits. This point may also be proved in another [20] way—by taking a finite magnitude in which there resides a force the same in kind as that which resides in the infinite magnitude, so that this force will be a measure of the finite force residing in the infinite magnitude.

It is plain, then, from the foregoing arguments that it is impossible for an [25] infinite force to reside in a finite magnitude or for a finite force to reside in an infinite magnitude. But first it will be well to discuss a difficulty that arises in connexion with locomotion. If everything that is in motion with the exception of things that move themselves is moved by something, how is it that some things, e.g. things thrown, continue to be in motion when their mover is no longer in contact [30] with them? If we say that the mover in such cases moves something else at the same time, e.g. the air, and that this in being moved is also a mover, then it will similarly be impossible for this to be in motion when the original mover is not in contact with it or moving it: all the things moved would have to be in motion simultaneously and also to have ceased simultaneously to be in motion when the original mover ceases to [267<sup>a</sup>1] move them, even if, like the magnet, it makes that which it has moved capable of being a mover. Therefore, we must say that the original mover gives the power of being a mover either to air or to water or to something else of the kind, naturally adapted for imparting and undergoing motion; but this thing does not cease simultaneously to impart motion and to undergo motion: it ceases to be in motion at [5] the moment when its mover ceases to move it, but it still remains a mover, and so it causes something else consecutive with it to be in motion, and of this again the same may be said. The motion ceases when the motive force produced in one member of the consecutive series is at each stage less, and it finally ceases when one member no longer causes the next member to be a mover but only causes it to be in motion. The [10] motion of these last two—of the one as mover and of the other as moved—must cease simultaneously, and with this the whole motion ceases. Now the things in which this motion is produced are things that admit of being sometimes in motion and sometimes at rest, and the motion is not continuous but only appears so; for it is motion of things that are either successive or in contact, there being not one mover [15] but a number consecutive with one another. That is why motion of this kind takes place in air and water. Some say that it is mutual replacement; but the difficulty raised cannot be solved

otherwise than in the way we have described. Mutual replacement makes all the members of the series move and impart motion simultaneously, so that their motions also cease simultaneously; but there appears to be continuous motion in a single thing, and therefore, since it cannot be moved by [20] the same mover, the question is, what moves it?

Since there must be continuous motion in the world of things, and this is a single motion, and a single motion must be a motion of a magnitude (for that which is without magnitude cannot be in motion), and of a single magnitude moved by a single mover (for otherwise there will not be continuous motion but a consecutive [25] series of separate motions), then if the mover is a single thing, it is either in motion or unmoved: if, then, it is in motion, it will have to keep pace with that which it moves and itself be in process of change, and it will also have to be moved by [267<sup>b</sup>1] something: so we have a series that must come to an end, and a point will be reached at which motion is imparted by something that is unmoved. Thus we have a mover that has no need to change along with that which it moves but will be able to cause motion always (for the causing of motion under these conditions involves no effort); and this motion alone is regular, or at least it is so in a higher degree than any other, [5] since the mover is never subject to any change. So, too, in order that the motion may continue to be of the same character, the moved must not be subject to change in relation to it. So it must occupy either the centre or the circumference, since these are the principles. But the things nearest the mover are those whose motion is quickest, and in this case it is the motion of the circumference that is the quickest: therefore the mover occupies the circumference.

There is a difficulty in supposing it to be possible for anything that is in motion [10] to cause motion continuously and not merely in the way in which it is caused by something repeatedly pushing (in which case the continuity amounts to no more than successiveness). Such a mover must either itself continue to push or pull or perform both these actions, or else the action must be taken up by something else and be passed on from one mover to another (the process that we described before as occurring in the case of things thrown, since the air, being divisible, is a mover in virtue of the fact that different parts of the air are moved one after another); and in [15] either case the motion cannot be a single motion, but only a consecutive series of motions. The only continuous motion, then, is that which is caused by the unmoved mover; for it remains always invariable, so that its relation to that which it moves remains also invariable and continuous.



Now that these points are settled, it is clear that the first unmoved mover cannot have any magnitude. For if it has magnitude, this must be either a finite or [20] an infinite magnitude. Now we have already proved in our course on *Physics* that there cannot be an infinite magnitude; and we have now proved that it is impossible for a finite magnitude to have an infinite force, and also that it is impossible for a thing to be moved by a finite magnitude during an infinite time. But the first mover [25] causes a motion that is eternal and causes it during an infinite time. It is clear, therefore, that it is indivisible and is without parts and without magnitude.

<sup>1</sup>The bracketed words are probably wrongly inserted from 185<sup>a</sup>9–12.

<sup>2</sup>I.e. water, air, fire.

<sup>3</sup>Retaining the MS text; Ross reads: κεχωρισμένα μέντοι ἀπ’ ἀλλήλων ἡοῦά  
(‘not, however, separated from one another’).

<sup>4</sup>Ross excises ‘time’.

<sup>5</sup>Ross omits ‘the matter and’.

<sup>6</sup>Reading μὴ τὸ εἶδος ἢ ὁ λόγος (Bonitz).

<sup>7</sup>See *Metaphysics* Δ 7, and Θ.

<sup>8</sup>I.e. Plato.

<sup>9</sup>Reading τέχνη, with the MSS, for Ross’ φύσις.

<sup>10</sup>Reading τοῦτο ἔσχατον.

<sup>11</sup>Omitting ἡ ἀρχιτεκτονική.

<sup>12</sup>Reading μέχρι του. τίνος γάρ (Jaeger).

<sup>13</sup>Frag. 53 Diels-Kranz.

<sup>14</sup>Reading κοιζόμενος, with one MS, for Ross’s κοιζομένου.

<sup>15</sup>Omitting τοῦ κοιμισσθαι ἔνεκα (Bonitz).

<sup>16</sup>Reading τῷ ἔνεκα ἄλλου ἐκεῖνο οὐ (Prantl).

<sup>17</sup>‘The spontaneous’: τὸ αὐτόματον; ‘the thing itself happens in vain’: αὐτὸ μάτην  
γένηται.

<sup>18</sup>Frag. 61 Diels-Kranz.

<sup>19</sup>Empedocles, frag. 62 Diels-Kranz.

<sup>20</sup>See VIII 1–6.

<sup>21</sup>Compare the Pythagorean columns at *Metaphysics* A 5, 986<sup>a</sup>25.

<sup>22</sup>Ross excises the bracketed sentence as an alternative version of 206<sup>a</sup>18–29.

<sup>23</sup>Rings are ἄπειροι in the sense of having no ends (πέρατα).

<sup>24</sup>Frag. 8, line 44, Diels-Kranz.

<sup>25</sup>*Theogony* 116.

<sup>26</sup>Aristotle's remarks rest on the use of the Greek preposition 'έν', to which (evidently) the English 'in' does not precisely correspond.

<sup>27</sup>Ross excises the bracketed lines as an alternative version of 211<sup>a</sup>29–36.

<sup>28</sup>See *On Generation and Corruption* I 3.

<sup>29</sup>These lines are bracketed by editors as a later addition.

<sup>30</sup>The words in brackets are excised as an alternative version of 217<sup>b</sup>2-11.

<sup>31</sup>Change = μεταβολά, in which Aristotle construes 'μετά' in the sense of 'after'.

<sup>32</sup>Ross excises the clause in brackets.

<sup>33</sup>Ross brackets καά τῷ ποτέ.

<sup>34</sup>Transposed by Ross.

<sup>35</sup>'φορά' ('locomotion') means, taken strictly, 'being carried'.

<sup>36</sup>Ross transposes 227<sup>a</sup>7–9 and 226<sup>b</sup>26–7 to follow 226<sup>b</sup>22.

<sup>37</sup>Ross excises this sentence as a doublet of 227<sup>b</sup>11.

<sup>38</sup>The final paragraph, which several MSS omit, is regarded as an alternative version of 230<sup>b</sup>10–28 by Ross and others.

<sup>39</sup>Retaining οὐ (MSS) for Ross's οὐπω.

<sup>40</sup>Retaining the MSS reading ἐά δ' for Ross's ἐάτ'.

<sup>41</sup>See 233<sup>a</sup>21ff.

<sup>42</sup>Reading τοῦ μέσου τῶν A (τοῦ μέσου, Ross).

<sup>43</sup>Reading πάντα τὰ A (πάντα, Ross).

<sup>44</sup>Ross excises the clause marked \*...\* .

<sup>45</sup>See 227<sup>b</sup>3ff.

<sup>46</sup>Reading αἱ γενέσεις αὖται (αἱ γενέσεις, Ross).

<sup>47</sup>Both water and speech can be called λευκός or limpid.

<sup>48</sup>Reading  $\pi\tilde{\alpha}\sigma\iota\nu$ , with the MSS ( $\pi\tilde{\alpha}\sigma\alpha\nu$ , Ross).

<sup>49</sup>Frag. 17, lines 9–13, Diels-Kranz.

<sup>50</sup>Retaining  $\tau\tilde{\omega}\nu$   $\kappa\iota\nu\omicron\upsilon\acute{\nu}\tau\omega\nu$ , excised by Ross.

<sup>51</sup>Retaining  $\tau\omicron\tilde{\upsilon}$   $\acute{\omicron}\rho\gamma\acute{\alpha}\nu\omicron\upsilon$ , which Ross excises.

<sup>52</sup>Omitting  $\tau\tilde{\omega}$  ABΓ in line 31.

<sup>53</sup>Omitting  $\lambda\epsilon\upsilon\kappa\acute{\omicron}\nu$  at line 23; the received text reads: ‘. . . call the thing white or not white’.

# ON THE HEAVENS\*\*

*J. L. Stocks*

## BOOK I

1 · The science which has to do with nature clearly concerns itself for the [268<sup>a</sup>1] most part with bodies and magnitudes and their properties and movements, but also with the principles of this sort of substance, as many as they may be. For of things constituted by nature some are bodies and magnitudes, some possess body and [5] magnitude, and some are principles of things which possess these. Now a continuum is that which is divisible into parts always capable of subdivision, and a body is that which is every way divisible. A magnitude if divisible one way is a line, if two ways a surface, and if three a body. Beyond these there is no other magnitude, because the three dimensions are all that there are, and that which is divisible in three directions is divisible in all. For, as the Pythagoreans say, the universe and all that is in it is [10] determined by the number three, since beginning and middle and end give the number of the universe, and the number they give is the triad. And so, having taken these three from nature as (so to speak) laws of it, we make further use of the number three in the worship of the Gods. Further, we use the terms in practice in [15] this way. Of two things, or men, we say ‘both’, but not ‘all’: three is the first number to which the term ‘all’ is applied. And in this, as we have said, we do but follow the lead which nature herself gives. Therefore, since ‘every’ and ‘all’ and ‘complete’ do [20] not differ from one another in respect of form, but only, if at all, in their matter and in that to which they are applied, body alone among magnitudes can be complete. For it alone is determined by the three dimensions, that is, is an ‘all’. But if it is divisible in three dimensions it is every way divisible, while the other magnitudes are divisible in one dimension or in two; for the divisibility and continuity of [25] magnitudes depend upon the number of the dimensions, one sort being

continuous in one direction, another in two, another in all. All magnitudes, then, which are divisible are also continuous. Whether we can also say that whatever is continuous is divisible does not yet, on our present grounds, appear. One thing, however, is clear. We cannot pass beyond body to a further kind, as we passed from length to [268<sup>b</sup>1] surface, and from surface to body. For if we could, it would cease to be true that body is complete magnitude. We could pass beyond it only in virtue of a defect in it and that which is complete cannot be defective, since it extends in every direction. [5] Now bodies which are classed as parts of the whole are each complete according to our formula, since each possesses every dimension. But each is determined relatively to that part which is next to it by contact, for which reason each of them is in a sense many bodies. But the whole of which they are parts must necessarily be complete, and must, as the term indicates, extend in every direction and not just in [10] some.

2 · The question as to the nature of the whole, whether it is infinite in size or limited in its total mass, is a matter for subsequent inquiry. We will now speak of those parts of the whole which are specifically distinct. Let us take this as our [15] starting-point. All natural bodies and magnitudes we hold to be, as such, capable of locomotion; for nature, we say, is their principle of movement. But all movement that is in place, all locomotion, as we term it, is either straight or circular or a combination of these two which are the only simple movements. And the reason is [20] that these two, the straight and the circular line, are the only simple magnitudes. Now revolution about the centre is circular motion, while the upward and downward movements are in a straight line, ‘upward’ meaning motion away from the centre, and ‘downward’ motion towards it. All simple motion, then, must be motion either away from or towards or about the centre. This seems to be in exact [25] accord with what we said above: as body found its completion in three dimensions, so its movement completes itself in three forms.

Bodies are either simple or compounded of such; and by simple bodies I mean those which possess a principle of movement in their own nature, such as fire and earth with their kinds, and whatever is akin to them. Necessarily, then, movements [269<sup>a</sup>1] also will be either simple or in some sort compound—simple in the case of the simple bodies, compound in that of the composite—and the motion is according to the prevailing element. Supposing, then, that there is such a thing as simple

movement, and that circular movement is simple, and that both movement of a simple body is simple and simple movement is of a simple body (for if it is movement [5] of a compound it will be in virtue of a prevailing element), then there must necessarily be some simple body which moves naturally and in virtue of its own nature with a circular movement. By constraint, of course, it may be brought to move with the motion of something else different from itself, but it cannot so move naturally, since there is one sort of movement natural to each of the simple bodies. Again, if the unnatural movement is the contrary of the natural and a thing can [10] have no more than one contrary, it will follow that circular movement, being a simple motion, must be unnatural, if it is not natural, to the body moved. If then the body whose movement is circular is fire or some other element, its natural motion must be the contrary of the circular motion. But a single thing has a single contrary; and upward and downward motion are the contraries of one another. If, on the other hand, the body moving with this circular motion which is unnatural to it is [15] something different from the elements, there will be some other motion which is natural to it. But this cannot be. For if the natural motion is upward, it will be fire or air, and if downward, water or earth. Further, this circular motion is necessarily primary. For the complete is naturally prior to the incomplete, and the circle is a complete thing. This cannot be said of any straight line:—not of an infinite line; for [20] then it would have a limit and an end: nor of any finite line; for in every case there is something beyond it, since any finite line can be extended. And so, since the prior movement belongs to the body which is naturally prior, and circular movement is prior to straight, and movement in a straight line belongs to simple bodies—fire [25] moving straight upward and earthy bodies straight downward towards the centre—since this is so, it follows that circular movement also must be the movement of some simple body. For the movement of composite bodies is, as we said, determined by that simple body which prevails in the composition. From this it is clear that there is in nature some bodily substance other than the formations we [30] know, prior to them all and more divine than they. Or again, we may take it that all movement is either natural or unnatural, and that the movement which is unnatural to one body is natural to another—as for instance, is the case with the upward and downward movements, which are natural and unnatural to fire and earth respectively. It necessarily follows that circular movement, being unnatural to these [269b1] bodies, is the natural movement of some other. Further, if, on the one hand, circular movement is *natural* to

something, it must surely be some simple and primary body which naturally moves with a natural circular motion, as fire moves up and earth [5] down. If, on the other hand, the movement of the rotating bodies about the centre is *unnatural*, it would be remarkable and indeed quite inconceivable that this movement alone should be continuous and eternal, given that it is unnatural. At any rate the evidence of all other cases goes to show that it is the unnatural which quickest passes away. And so, if, as some say, the body so moved is fire, this [10] movement is just as unnatural to it as downward movement; for any one can see that fire moves in a straight line away from the centre. On all these grounds, therefore, we may infer with confidence that there is something beyond the bodies that are about us on this earth, different and separate from them; and that the superior glory [15] of its nature is proportionate to its distance from this world of ours.

3 · In consequence of what has been said, in part by way of assumption and in part by way of demonstration, it is clear that not every body possesses either lightness or heaviness. We must explain in what sense we are using the words [20] ‘heavy’ and ‘light’, sufficiently, at least, for our present purposes: we can examine the terms more precisely later, when we come to consider their essential nature. Let us then apply the term ‘heavy’ to that which naturally moves towards the centre, and ‘light’ to that which moves naturally away from the centre. The heaviest thing will be that which sinks to the bottom of all things that move downward, and the [25] lightest that which rises to the surface of everything that moves upward. Now, necessarily, everything which moves either up or down possesses lightness or heaviness or both—but not both relatively to the same thing; for things are heavy and light relatively to one another; air, for instance, is light relatively to water, and water light relatively to earth. But the body which moves in a circle cannot possibly [30] possess heaviness or lightness. For neither naturally nor unnaturally can it move either towards or away from the centre. Movement in a straight line certainly does not belong to it *naturally*, since one sort of movement is, as we saw, appropriate to each simple body, and so we should be compelled to identify it with one of the bodies which move in this way. Suppose, then, that the movement is *unnatural*. In that [270<sup>a</sup>1] case, if it is the downward movement which is unnatural, the upward movement will be natural; and if it is the upward which is unnatural, the downward will be natural. For we decided that of contrary movements, if the one is unnatural to anything, the other will be natural to it. But since the



natural movement of the whole and of its [5] part—of earth, for instance, as a whole and of a small clod—have one and the same direction, it results, in the first place, that this body can possess no lightness or heaviness at all (for that would mean that it could move by its own nature either from or towards the centre); and, secondly, that it cannot possibly move in the way of locomotion by being dragged upwards or pulled downwards. For neither [10] naturally nor unnaturally can it move with any other motion but its own, either itself or any part of it, since the reasoning which applies to the whole applies also to the part.

It is equally reasonable to assume that this body will be ungenerated and indestructible and exempt from increase and alteration, since everything that comes [15] to be comes into being from a contrary and some substrate, and passes away likewise in a substrate by the action of a contrary into a contrary, as we explained in our opening discussions.<sup>1</sup> Now the motions of contraries are contrary. If then this body can have no contrary, because there can be no contrary motion to the circular, [20] nature seems justly to have exempted from contraries the body which was to be ungenerated and indestructible. For it is on contraries that generation and destruction depend. Again, that which is subject to increase increases upon contact with a kindred body, which is resolved into its matter. But there is nothing out of [25] which this body can have been generated. And if it is exempt from increase and destruction, the same reasoning leads us to suppose that it is also unalterable. For alteration is movement in respect of quality; and qualitative states and dispositions, such as health and disease, do not come into being without changes of properties. [30] But all natural bodies which change their properties we see to be subject to increase and diminution. This is the case, for instance, with the bodies of animals and their parts and with vegetable bodies, and similarly also with those of the elements. And so, if the body which moves with a circular motion cannot admit of increase or diminution, it is reasonable to suppose that it is also unalterable.

[270<sup>b</sup>1] The reasons why the primary body is eternal and not subject to increase or diminution, but unaging and unalterable and unmodified, will be clear from what has been said to any one who believes in our assumptions. Our theory seems to [5] confirm the phenomena and to be confirmed by them. For all men have some conception of the nature of the gods, and all who believe in the existence of gods at all, whether barbarian or Greek, agree in allotting the highest place to the deity, surely because they suppose that immortal is linked with immortal and regard any [10] other supposition as impossible. If then there is, as there

certainly is, anything divine, what we have just said about the primary bodily substance was well said. The mere evidence of the senses is enough to convince us of this, at least with human certainty. For in the whole range of time past, so far as our inherited records reach, no change appears to have taken place either in the whole scheme of the outermost [15] heaven or in any of its proper parts. The name, too, of that body seems to have been handed down right to our own day from our distant ancestors who conceived of it in the fashion which we have been expressing. The same ideas, one must believe, recur in men's minds not once or twice but again and again. And so, implying that the [20] primary body is something else beyond earth, fire, air, and water, they gave the highest place the name of *aether*, derived from the fact that it 'runs always'<sup>2</sup> for an eternity of time. Anaxagoras, however, misuses this name, taking aether as equivalent to fire [25].

It is also clear from what has been said why the number of what we call simple bodies cannot be greater than it is. The motion of a simple body must itself be simple, and we assert that there are only these two simple motions, the circular and the straight, the latter being subdivided into motion away from and motion towards [30] the centre.

4 · That there is no other form of motion contrary to the circular may be proved in various ways. In the first place, there is an obvious tendency to oppose the straight line to the circular. For concave and convex are not only regarded as opposed to one another, but they are also coupled together and treated as a unity in [271<sup>a</sup>1] opposition to the straight. And so, if there is a contrary to circular motion, motion in a straight line must be recognized as having the best claim to that name. But the two forms of rectilinear motion are opposed to one another by reason of their places; for up and down is a difference and a contrary opposition in place. Secondly, it may [5] be thought that the same reasoning which holds good of the rectilinear path applies also to the circular, movement from *A* to *B* being opposed as contrary to movement from *B* to *A*. But what is meant is still rectilinear motion. For that is limited, while the circular paths which pass through the same points are infinite in number. Even [10] if we are confined to the single semicircle and the opposition is between movement from *C* to *D* and from *D* to *C* along that semicircle, the case is no better. For the motion is the same as that along the diameter, since we invariably regard the distance between two points as the length of the straight line which joins them. It is no more satisfactory

to construct a circle and treat motion along one semicircle as contrary to motion along the other. For example, taking a whole circle, motion from [15] *E* to *F* on the semicircle *G* may be opposed to motion from *F* to *E* on the semicircle *H*. But even supposing these are contraries, it in no way follows that the motions on the whole circle are contraries. Nor again can motion along the circle from *A* to *B* be regarded as the contrary of motion from *A* to *C*; for the motion goes from the [20] same point towards the same point, and contrary motion was distinguished as motion from a contrary to its contrary. And even if one circular motion is the contrary of another, one of the two would be pointless; for that which moves in a circle, at whatever point it begins, must necessarily pass through all the contrary [25] places alike. (By contrarieties of place I mean up and down, back and front, and right and left.) But contrarieties of movements correspond to those of places. For if the two motions were equal, there would be no movement, and if one of the two were [30] preponderant, the other would not occur. So that if both bodies were there, one of them, inasmuch as it would not be moving with its own movement, would be pointless, in the sense in which a shoe is pointless when it is not worn. But God and nature create nothing that is pointless.

[271<sup>b</sup>1] **5** · This being clear, we must go on to consider the questions which remain. First, is there an infinite body, as the majority of the ancient philosophers thought, or is this an impossibility? The decision of this question, either way, is not [5] unimportant, but rather all important, to our search for the truth. It is this problem which practically always has been and may be expected to be the source of the differences of those who have written about nature as a whole, since the least initial deviation from the truth is multiplied later a thousandfold. Admit, for instance, the [10] existence of a minimum magnitude, and you will find that the minimum which you have introduced causes the greatest truths of mathematics to totter. The reason is that a principle is great rather in power than in extent; hence that which was small at the start turns out a giant at the end. Now the infinite possesses this power of principles, and indeed in the sphere of quantity possesses it in the highest degree; so [15] that it is in no way absurd or unreasonable that the assumption that an infinite body exists should be of peculiar moment to our inquiry. The infinite, then, we must now discuss, opening the whole matter from the beginning.

Every body is necessarily to be classed either as simple or as

composite; the infinite body, therefore, will be either simple or composite. But it is clear, further, [20] that if the simple bodies are finite, the composite must also be finite, since that which is composed of bodies finite both in number and in magnitude is itself finite in respect of number and magnitude: its quantity is in fact the same as that of the bodies which compose it. What remains for us to consider, then, is whether any of the simple bodies can be infinite in magnitude, or whether this is impossible. Let us [25] try the primary body first, and then go on to consider the others.

The body which moves in a circle must necessarily be finite in every respect, for the following reasons. If the body so moving is infinite, the radii drawn from the [30] centre will be infinite. But the space between infinite radii is infinite—by the space between the lines I mean the area outside which no magnitude which is in contact with the lines can be found. This, I say, will be infinite; for in the case of finite radii it is always finite; and again one can always go on to take more than the given [272<sup>a</sup>1] quantity, so that just as we say that number is infinite, because there is no greatest, the same argument applies also to the space between the radii. Now the infinite cannot be traversed, and if the body is infinite the interval between the radii is [5] necessarily infinite: circular motion therefore is an impossibility. Yet we see that the heavens revolve in a circle, and by argument also we have determined that there is something to which circular movement belongs.

Again, if from a finite time a finite time be subtracted, what remains must be finite and have a beginning. And if the time of a journey has a beginning, there must [10] be a beginning also of the movement, and consequently also of the distance traversed. This applies universally. Take a line, *ACE*, infinite in one direction, *E*, and another line, *BB*, infinite in both directions. Let *ACE* describe a circle, revolving upon *A* as centre. In its circular movement it will cut *BB* for a certain [15] finite time; the total time is finite in which the heavens complete their circular orbit, and consequently the time subtracted from it, during which the one line in its motion cuts the other, is also finite. Therefore there will be a point at which *ACE* began for the first time to cut *BB*. This, however, is impossible. The infinite, then, cannot revolve in a circle; nor could the world, if it were infinite [20].

That the infinite cannot move away may also be shown as follows. Let *A* be a finite line moving past the finite line, *B*. Of necessity *A* will pass clear of *B* and *B* of *A* at the same moment; for each overlaps the other to precisely the same extent. Now if the two were moving in contrary

directions, they would pass clear of one [25] another more rapidly; if one were still and the other moving past it, less rapidly; provided that the speed of the latter were the same in both cases. This, however, is clear: that it is impossible to traverse an infinite line in a finite time. Infinite time, then, would be required. (This we demonstrated above in the discussion of [30] movement.)<sup>3</sup> And it makes no difference whether a finite is passing by an infinite or an infinite by a finite. For when *A* is passing *B*, then *B* overlaps *A*, and it makes no [272<sup>b</sup>1] difference whether *B* is moved or unmoved, except that, if both move, they pass clear of one another more quickly. It is, however, quite possible that a moving line should in certain cases pass one which is stationary quicker than it passes one moving in an opposite direction. One has only to imagine the movement to be slow [5] where both move and much faster where one is stationary. To suppose one line stationary, then, makes no difficulty for our argument, since it is quite possible for *A* to pass *B* at a slower rate when both are moving than when only one is. If, therefore, the time which the finite moving line takes to pass the other is infinite, [10] then necessarily the time occupied by the motion of the infinite past the finite is also infinite. For the infinite to move at all is thus absolutely impossible; since the very smallest movement must take an infinity of time. Moreover the heavens certainly revolve, and they complete their circular orbit in a finite time; so that they pass [15] round the whole extent of any line within their orbit, such as the finite line *AB*. The revolving body, therefore, cannot be infinite.

Again, as a line which has a limit<sup>4</sup> cannot be infinite, or, if it is infinite, is so only in length, so a surface cannot be infinite in that respect in which it has a limit: or, indeed if it is completely determinate, in any respect whatever. E.g. if it is a square or a circle or a sphere, it cannot be infinite, any more than a foot-long line [20] can. There is then no such thing as an infinite sphere or circle, and where there is no circle there can be no circular movement, and similarly where there is no infinite at all there can be no infinite movement; and from this it follows that, an infinite circle being itself an impossibility, there can be no circular motion of an infinite body.

Again, take a centre *C*, an infinite line, *AB*, another infinite line at right angles [25] to it, *E*, and a moving radius, *CD*. *CD* will never cease contact with *E*, but the position will always be something like *CE*, *CD* cutting *E* at *F*. The infinite line, therefore, does not complete the circle.

Again, if the heaven is infinite and moves in a circle, we shall have to admit [30] that in a finite time it has traversed the infinite. For suppose

the fixed heaven infinite, and that which moves within it equal to it. It results that when the infinite body has completed its revolution, it has traversed an infinite equal to itself in a [273<sup>a</sup>1] finite time. But that we know to be impossible.

It can also be shown, conversely, that if the time of revolution is finite, the distance traversed must also be finite; but the distance traversed was equal to itself; therefore, it is itself finite.

[5] We have now shown that the body which moves in a circle is not endless or infinite, but has its limit.

6 · Further, neither that which moves towards nor that which moves away from the centre can be infinite. For the upward and downward motions are contraries and are therefore motions towards contrary places. But if one of a pair of [10] contraries is determinate, the other must be determinate also. Now the centre is determined; for, from whatever point the body which sinks to the bottom starts its downward motion, it cannot go farther than the centre. The centre, therefore, being determinate, the upper place must also be determinate. But if these two places are determined and finite, the corresponding bodies must also be finite. Further, if up [15] and down are determinate, the intermediate place is also necessarily determinate. For, if it is indeterminate, there will be infinite motion; and that we have already shown to be an impossibility.<sup>5</sup> The middle region then is determinate, and consequently any body which either is in it, or might be in it, is determinate. But the [20] bodies which move up and down may be in it, since the one moves naturally away from the centre and the other towards it.

From this it is clear that an infinite body is an impossibility; but there is a further point. If there is no such thing as infinite weight, then it follows that none of these bodies can be infinite. For the supposed infinite body would have to be infinite [25] in weight. (The same argument applies to lightness; for if there is infinite weight, there is infinite lightness, if the rising body is infinite.) This is proved as follows. Assume the weight to be finite, and take an infinite body, *AB*, of the weight *C*. [30] Subtract from the infinite body a finite mass, *BD*, the weight of which shall be *E*. *E* then is less than *C*, since it is the weight of a lesser mass. Suppose then that the smaller goes into the greater a certain number of times, and take *BF* bearing the [273<sup>b</sup>1] same proportion to *BD* which the greater weight bears to the smaller. For you may subtract as much as you please from an infinite. If now the masses are proportionate

to the weights, and the lesser weight is that of the lesser mass, the greater must be [5] that of the greater. The weights, therefore, of the finite and of the infinite body are equal. Again, if the weight of a greater body is greater than that of a less, the weight of *GB* will be greater than that of *FB*; and thus the weight of the finite body is greater than that of the infinite. And, further, the weight of unequal masses will be [10] the same, since the infinite and the finite cannot be equal. It does not matter whether the weights are commensurable or not. If they are *incommensurable* the same reasoning holds. For instance, suppose *E* multiplied by three is rather more than *C*: the weight of three masses of the full size of *BD* will be greater than *C*. We thus arrive at the same impossibility as before. Again we may assume weights [15] which are *commensurate*; for it makes no difference whether we begin with the weight or with the mass. For example, assume the weight *E* to be commensurate with *C*, and take from the infinite mass a part *BD* of weight *E*. Then let a mass *BF* be taken having the same proportion to *BD* which the two weights have to one [20] another. (For the mass being infinite you may subtract from it as much as you please.) These assumed bodies will be commensurate in mass and in weight alike. Nor again does it make any difference to our demonstration whether the total mass has its weight equally or unequally distributed. For it must always be possible to take from the infinite mass bodies of equal weight to *BD* by diminishing or [25] increasing the size of the section to the necessary extent.

From what we have said, then, it is clear that the weight of the infinite body cannot be finite. It must then be infinite. We have therefore only to show this to be impossible in order to prove an infinite body impossible. But the impossibility of infinite weight can be shown in the following way. A given weight moves a given [30] distance in a given time; a weight which is as great and more moves the same distance in a less time, the times being in inverse proportion to the weights. For [274<sup>a</sup>1] instance, if one weight is twice another, it will take half as long over a given movement. Further, a finite weight traverses any finite distance in a finite time. It necessarily follows from this that infinite weight, if there is such a thing, being, on the one hand, as great and more than as great as the finite, will move accordingly, [5] but being, on the other hand, compelled to move in a time inversely proportionate to its greatness, cannot move at all. The time should be less in proportion as the weight is greater. But there is no proportion between the infinite and the finite: proportion can only hold between a less and a greater *finite*

time. And though you may say that the time of the movement can be continually diminished, yet there is no minimum. [10] Nor, if there were, would it help us. For some finite body could have been found greater than the given finite in the same proportion which is supposed to hold between the infinite and the given finite; so that an infinite and a finite weight must have traversed an equal distance in equal time. But that is impossible. Again, whatever the time, so long as it is finite, in which the infinite performs the motion, a [15] finite weight must necessarily move a certain finite distance in that same time. Infinite weight is therefore impossible, and the same reasoning applies also to infinite lightness. Bodies then of infinite weight and of infinite lightness are equally impossible.

7 · That there is no infinite body may be shown, as we have shown it, by a detailed consideration of the various cases. But it may also be shown universally, not [20] only by such reasoning as we advanced in our discussion of principles<sup>6</sup> (though in that passage we have already determined universally the sense in which the existence of an infinite is to be asserted or denied), but also suitably to our present purpose in the following way. That will lead us to a further question. Even if the [25] total mass is not infinite, it may yet be great enough to admit a plurality of universes. The question might possibly be raised whether there is any obstacle to there being other universes composed on the pattern of our own, more than one, though stopping short of infinity. First, however, let us treat of the infinite universally.

[30] Every body must necessarily be either finite or infinite, and if infinite, either of similar or of dissimilar parts. If its parts are *dissimilar*, they must represent either a finite or an infinite number of kinds. That the kinds cannot be *infinite* is evident, if our original presuppositions remain unchallenged. For the [274<sup>b</sup>1] primary movements being finite in number, the kinds of simple body are necessarily also finite, since the movement of a simple body is simple, and the simple movements are finite, and every natural body must always have its proper motion. [5] Now if the infinite body is to be composed of a *finite* number of kinds, then each of its parts (i.e. water, or fire) must necessarily be infinite. But this is impossible, because, as we have already shown, infinite weight and lightness do not exist. Moreover it would be necessary also that their places should be infinite in extent, so [10] that the movements too of all these bodies would be infinite. But this is not possible, if we are to hold



to the truth of our original presuppositions and to the view that neither that which moves downward, nor, by the same reasoning, that which moves upward, can be in a process of moving to infinity. For it is true in regard to quality, quantity, and place alike that it is impossible for a thing to be coming to be [15] what it cannot have come to be. I mean that if it is impossible for a thing to have come to be white, or a cubit long, or in Egypt, it is also impossible for it to be coming to be any of these. It is thus impossible for a thing to be moving to a place at which in its motion it can never by any possibility arrive. Again, suppose the body to exist in dispersion, it may be maintained none the less that the total of all these scattered particles, say, of fire, is infinite. But body we saw to be that which has extension [20] every way. How then can there be several dissimilar elements, each infinite? Each would have to be infinitely extended every way.

It is not possible, again, that the infinite should exist as a whole of *similar* parts. For, in the first place, there is no other movement beyond those mentioned: we must therefore give it one of them. And if so, we shall have to admit either [25] infinite weight or infinite lightness. Nor, secondly, could the body whose movement is circular be infinite, since it is impossible for the infinite to move in a circle. This, indeed, would be as good as saying that the heavens are infinite, which we have shown to be impossible.

Moreover, in general, it is impossible that the infinite should move at all. If it [30] did, it would move either naturally or by constraint; and if by constraint, it possesses also a natural motion, that is to say, there is another place, infinite like itself, to which it will move. But that is impossible.

That in general it is impossible for the infinite to be acted upon by the finite or to act upon it may be shown as follows.

[275<sup>a</sup>1] Let *A* be an infinite, *B* a finite, *C* the time of a given movement produced by one in the other. Suppose, then, that *A* was heated, or impelled, or modified in any way, or caused to undergo any sort of movement whatever, by *B* in the time *C*. Let *D* be less than *B*; and, assuming that a lesser agent moves a lesser patient in an equal time, call the quantity thus modified by *D*, *E*. Then, as *D* is to *B*, so is *E* to some [5] finite quantum. We assume that the alteration of equal by equal takes equal time, and the alteration of less by less or of greater by greater takes the same time, if the quantity of the patient is such as to keep the proportion which obtains between the agents, greater and less. If so, no movement can be caused in the infinite by any [10] finite agent in any

time whatever. For a less agent will produce that movement in a less patient in an equal time, and the proportionate equivalent of that patient will be a finite quantity, since no proportion holds between finite and infinite.

Nor, again, can the infinite produce a movement in the finite in any time whatever. Let *A* be an infinite, *B* a finite, *C* the time of action. In the time *C*, *D* will [15] produce that motion in a patient less than *B*, say *F*. Then take *E*, bearing the same proportion to *D* as the whole *BF* bears to *F*. *E* will produce the motion in *BF* in the time *C*. Thus the finite and the infinite effect the same alteration in equal times. But [20] this is impossible; for the assumption is that the greater effects it in a shorter time. It will be the same with any time that can be taken, so that there will be no time in which the infinite can effect this movement. And, as to infinite time, in that nothing can move another or be moved by it. For such time has no limit, while the action and the effect have.

Nor can infinite be acted upon in any way by infinite. Let *A* and *B* be infinities, *CD* being the time of the action of *A* upon *B*. Now the whole *B* was modified in a [25] certain time, and the part of this infinite, *E*, cannot be so modified in the same time, since we assume that a less quantity makes the movement in a less time. Let *E*, then, when acted upon by *A*, complete the movement in the time *D*. Then, as *D* is to *CD*, [30] so is *E* to some finite part of *B*. This part will necessarily be moved by *A* in the time *CD*. For we suppose that the same agent produces a given effect on a greater and a smaller mass in longer and shorter times, the times and masses varying proportionately. [275<sup>b</sup>1] There is thus no finite time in which infinities can move one another. Is their time then infinite? No, for infinite time has no end, but the movement communicated has.

If therefore every perceptible body possesses the power of acting or of being [5] acted upon, or both of these, it is impossible that an infinite body should be perceptible. All bodies, however, that occupy place are perceptible. There is therefore no infinite body beyond the heaven. Nor again is there anything of limited extent beyond it. And so beyond the heaven there is no body at all. For if you suppose it an object of thought, it will be in a place—since place is what ‘within’ and [10] ‘beyond’ denote—and therefore an object of perception. But nothing that is not in a place is perceptible.

The question may also be examined in the light of more general considerations as follows. The infinite, considered as a whole of similar parts, cannot, on the one hand, move in a circle. For there is no centre of

the infinite, and that which moves in a circle moves about the centre. Nor again can the infinite move in a straight line. [15] For there would have to be another place infinite like itself to be the goal of its natural movement and another, equally great, for the goal of its unnatural movement. Moreover, whether its rectilinear movement is natural or constrained, in either case the force which causes its motion will have to be infinite. For infinite [20] force is force of an infinite body, and of an infinite body the force is infinite. So the motive body also will be infinite. (The proof of this is given in our discussion of movement,<sup>7</sup> where it is shown that no finite thing possesses infinite power, and no infinite thing finite power.) If then that which moves naturally can also move unnaturally, there will be two infinities, one which causes, and another which [25] exhibits the latter motion. Again, what is it that moves the infinite? If it moves itself, it must be animate. But how can it possibly be conceived as an infinite animal? And if there is something else that moves it, there will be two infinities, that which moves and that which is moved, differing in their form and power.

[30] If the whole is not continuous, but exists, as Democritus and Leucippus think, in the form of parts separated by void, there must necessarily be one movement of all the parts. They are distinguished, we are told, from one another by their figures; but their nature is one, like many pieces of gold separated from one another. But [276<sup>a</sup>1] each piece must, as we assert, have the same motion. For a single clod moves to the same place as the whole mass of earth, and a spark to the same place as the whole [5] mass of fire. So that if it be weight that all possess, no body is, strictly speaking, light; and if lightness, none is heavy. Moreover, whatever possesses weight or lightness will have its place either at one of the extremes or in the middle region. But this is impossible while the world is conceived as infinite. And, generally, that which has no centre or extreme limit, no up or down, gives the bodies no place for their [10] motion; and without that movement is impossible. A thing must move either naturally or unnaturally, and the two movements are determined by the proper and alien places. Again, a place in which a thing rests or to which it moves unnaturally, must be the natural place for some other body, as induction shows. Necessarily, [15] therefore, not everything possesses weight or lightness, but some things do and some do not. From these arguments then it is clear that the body of the universe is not infinite.

8 · We must now proceed to explain why there cannot be more than one heaven—the further question mentioned above. For it may be thought that we have [20] not proved universally of bodies that none whatever can exist outside our universe, and that our argument applied only to those of indeterminate position.

Now all things rest and move naturally and by constraint. A thing moves naturally to a place in which it rests without constraint, and rests naturally in a place to which it moves without constraint. On the other hand, a thing moves by [25] constraint to a place in which it rests by constraint, and rests by constraint in a place to which it moves by constraint. Further, if a given movement is due to constraint, its contrary is natural. If, then, it is by constraint that earth moves from a certain place to the centre here, its movement from here to there will be natural, and if earth from there rests here without constraint, its movement hither will be natural. And the natural movement in each case is one. Further, these worlds, being similar [30] in nature to ours, must all be composed of the same bodies as it. Moreover each of the bodies, fire, I mean, and earth and their intermediates, must have the same [276<sup>b</sup>1] power as in our world. For if those elements are named homonymously and not in virtue of having the same form as ours, then the whole to which they belong can only be called a world homonymously. Clearly, then, one of the bodies will move naturally away from the centre and another towards the centre, since fire must be [5] identical with fire, earth with earth, and so on, as the fragments of each are identical in this world. That this must be the case is evident from the principles laid down in our discussion of the movements; for these are limited in number, and the distinction of the elements depends upon the distinction of the movements. Therefore, since the movements are the same, the elements must also be the same [10] everywhere. The particles of earth, then, in another world move naturally also to our centre and its fire to our circumference. This, however, is impossible, since, if it were true, earth must, in its own world, move upwards, and fire to the centre; in the [15] same way the earth of our world must move naturally away from the centre when it moves towards the centre of another universe. This follows from the supposed juxtaposition of the worlds. For either we must refuse to admit the identical nature of the simple bodies in the various universes, or, admitting this, we must make the [20] centre and the extremity one as suggested. This being so, it follows that there cannot be more worlds than one.

To postulate a difference of nature in the simple bodies according as they are more or less distant from their proper places is unreasonable. For what difference can it make whether we say that a thing is this distance away or that? One would have to suppose a difference proportionate to the distance and increasing with it, [25] but the form is in fact the same. Moreover, the bodies must have some movement, since the fact that they move is quite evident. Are we to say then that all their movements, even those which are mutually contrary, are due to constraint? No, for a body which has no natural movement at all cannot be moved by constraint. If then the bodies have a natural movement, the movement of the particular instances of each form must necessarily have for goal a place numerically one, i.e. a particular [30] centre or a particular extremity. If it be suggested that the goal in each case is one in form but numerically more than one, on the analogy of particulars which are many though each undifferentiated in form, we reply that the variety of goal cannot be [277<sup>a</sup>1] limited to this portion or that but must extend to all alike. For all are equally undifferentiated in form, but any one is different numerically from any other. What I mean is this: if the portions in this world behave similarly both to one another and [5] to those in another world, then the portion which is taken hence will not behave differently either from the portions in another world or from those in the same world, but similarly to them, since in form no portion differs from another. The result is that we must either abandon our present assumptions or assert that the [10] centre and the extremity are each numerically one. But this being so, the heaven, by the same evidence and the same necessary inferences, must be one only and no more.

A consideration of the other kinds of movement also makes it plain that there is some point to which earth and fire move naturally. For in general that which is [15] moved changes from something into something, the starting-point and the goal being different in form, and always it is a finite change. For instance, to recover health is to change from disease to health, to increase is to change from smallness to greatness. Locomotion must be similar; for it also has its goal and starting-point—and therefore the starting-point and the goal of the natural movement must [20] differ in form—just as the movement of coming to health does not take any direction which chance or the wishes of the mover may select. Thus, too, fire and earth move not to infinity but to opposite points; and since the opposition in place is between above and below, these will be the limits of their movement. (Even in circular movement there is a sort of opposition between the ends of the diameter,

[25] though the movement as a whole has no contrary: so that here too the movement has in a sense an opposed and finite goal.) There must therefore be some end to locomotion: it cannot continue to infinity.

This conclusion that local movement is not continued to infinity is corroborated by the fact that earth moves more quickly the nearer it is to the centre, and [30] fire the nearer it is to the upper place. But if movement were infinite speed would be infinite also; and if speed then weight and lightness. For as the lower of two bodies would be quick because of its weight, so infinite increase of weight necessitates infinite increase of speed.

[277<sup>b</sup>1] Further, it is not the action of another body that makes one of these bodies move up and the other down; nor is it constraint, like the 'extrusion' of some writers. For in that case the larger the mass of fire or earth the slower would be the upward or downward movement; but the fact is the reverse: the greater the mass of fire or [5] earth the quicker always is its movement towards its own place. Again, the speed of the movement would not increase towards the end if it were due to constraint or extrusion; for a constrained movement always diminishes in speed as the source of constraint becomes more distant, and a body moves without constraint to the place whence it was moved by constraint.

A consideration of these points, then, gives adequate assurance of the truth of our contentions. The same could also be shown with the aid of the discussions which [10] fall under First Philosophy, as well as from the nature of the circular movement, which must be eternal both here and in the other worlds. It is plain, too, from the following considerations that the universe must be one.

The bodily elements are three, and therefore the places of the elements will be [15] three also; the place, first, of the body which sinks to the bottom, namely the region about the centre; the place, secondly, of the revolving body, namely the outermost place, and thirdly, the intermediate place, belonging to the intermediate body. Here in this third place will be the body which rises to the surface; since, if not here, it will be outside, and it cannot be outside: for we have two bodies, one weightless, one [20] endowed with weight, and below is the place of the body endowed with weight, since the region about the centre has been given to the heavy body. And its position cannot be unnatural to it; for it would have to be natural to something else, and there is nothing else. It must then occupy the intermediate place. What distinctions there are within the intermediate itself we will explain later on.

We have now said enough to make plain the character and number of

the bodily elements, the place of each, and further, in general, how many in number the [25] various places are.

9 · We must show not only that the heaven is one, but also that more than one heaven is impossible, and, further, that, as exempt from decay and generation, the heaven is eternal. We may begin by rehearsing the puzzles. From one point of view it might seem impossible that the heaven should be one and unique, since in all [30] formations and products whether of nature or of art we can distinguish the shape in itself and the shape in combination with matter. For instance the form of the sphere is one thing and the gold or bronze sphere another; the shape of the circle again is [278<sup>a</sup>1] one thing, the bronze or wooden circle another. For when we state the essential nature of the sphere or circle we do not include in the formula gold or bronze, because they do not belong to its substance; but if we are speaking of the copper or gold sphere we do include them. We still make the distinction even if we cannot [5] conceive or apprehend any other example beside the particular thing. This may, of course, sometimes be the case: it might be, for instance, that only one circle could be found; yet none the less the difference will remain between being circle and being this particular circle, the one being form, the other form in matter, i.e. a particular thing. Now since the heaven is perceptible it must be regarded as a particular; for [10] everything that is perceptible subsists, as we know, in matter. But if it is a particular, there will be a distinction between being this heaven and being a heaven without qualification. There is a difference, then, between this heaven and a heaven without qualification; the second is form and shape, the first form in combination with matter; and any shape or form has, or may have, more than one particular [15] instance.

On the supposition of Forms such as some assert, this must be the case, and equally on the view that no such entity has a separate existence. For in every case in which the substance is in matter it is a fact of observation that the particulars of like form are several or infinite in number. Hence there either are, or may be, more [20] heavens than one. On these grounds, then, it might be inferred either that there are or that there might be several heavens. We must, however, return and ask how much of this argument is correct and how much not.

Now it is quite right to say that the formula of the shape apart from the matter must be different from that of the shape in the matter, and we may allow this to be true. We are not, however, therefore compelled to

assert a plurality of worlds. Such [25] a plurality is in fact impossible if this world contains the entirety of matter, as in fact it does. But perhaps our contention can be made clearer in this way. Suppose aquilinity to be curvature in the nose or flesh, and flesh to be the matter of aquilinity. Suppose, further, that all flesh came together into a single whole of flesh [30] endowed with this aquiline quality. Then neither would there be, nor could there arise, any other thing that was aquiline. Similarly, suppose flesh and bones to be the matter of man, and suppose a man to be created of all flesh and all bones in indissoluble union. The possibility of another man would be removed. Whatever [278<sup>b</sup>1] case you took it would be the same. The general rule is this: a thing whose substance resides in a substratum of matter can never come into being in the absence of all matter. Now the heaven is certainly a particular and a material thing; if however it [5] is composed not of a part but of the whole of matter, then though being a heaven and being this heaven are still distinct, yet there is no other heaven, and no possibility of others being made, because all the matter is already included in this. It remains, then, only to prove that it is composed of all natural perceptible body.

[10] First, however, we must explain what we mean by 'heaven' and in how many ways we use the word, in order to make clearer the object of our inquiry. In one sense, then, we call 'heaven' the substance of the extreme circumference of the whole, or that natural body whose place is at the extreme circumference. We recognize habitually a special right to the name 'heaven' in the extremity or upper [15] region, which we take to be the seat of all that is divine. In another sense, we use this name for the body continuous with the extreme circumference, which contains the moon, the sun, and some of the stars; these we say are 'in the heaven'.

In yet another sense we give the name to all body included within the extreme [20] circumference, since we habitually call the whole or totality 'the heaven'. The word, then, is used in three senses.

Now the whole included within the extreme circumference must be composed of *all* physical and sensible body, because there neither is, nor can come into being, any body outside the heaven. For if there is a natural body outside the extreme [25] circumference it must be either a simple or a composite body, and its position must be either natural or unnatural. But it cannot be any of the simple bodies. For it has been shown that that which moves in a circle cannot change its place. And it cannot [30] be that which moves from the centre or that which lies lowest. *Naturally* they could not be there, since their proper places are elsewhere; and if these are there *unnaturally*, the exterior place will be



natural to some other body, since a place which is unnatural to one body must be natural to another; but we saw that there is [279<sup>a</sup>1] no other body besides these. Then it is not possible that any simple body should be outside the heaven. But, if no simple body, neither can any mixed body be there; for the presence of the simple body is involved in the presence of the mixture. Further neither can any body come into that place; for it will do so either naturally or unnaturally, and will be either simple or composite; so that the same argument will [5] apply, since it makes no difference whether the question is 'Is it there?' or 'Can it come to be there?' From our arguments then it is evident not only that there is not, but also that there could never come to be, any bodily mass whatever outside the circumference. For the world as a whole includes *all* its appropriate matter, which is, as we saw, natural perceptible body. So that neither are there now, nor have there [10] ever been, nor can there ever be formed more heavens than one, but this heaven of ours is one and unique and complete.

It is therefore evident that there is also no place or void or time outside the heaven. For in every place body can be present; and void is said to be that in which the presence of body, though not actual, is possible; and time is the number of movement. But in the absence of natural body there is no movement, and outside [15] the heaven, as we have shown, body neither exists nor can come to exist. It is clear then that there is neither place, nor void, nor time, outside the heaven. Hence whatever is there, is of such a nature as not to occupy any place, nor does time age it; nor is there any change in any of the things which lie beyond the outermost motion; [20] they continue through their entire duration unalterable and unmodified, living the best and most self-sufficient of lives. As a matter of fact, this word 'duration' possessed a divine significance for the ancients; for the fulfilment which includes the period of life of any creature, outside of which no natural development can fall, has been called its duration. On the same principle the fulfilment of the whole [25] heaven, the fulfilment which includes all time and infinity, is duration—a name based upon the fact that it is *always*<sup>8</sup>—being immortal and divine. From it derive the being and life which other things, some more or less articulately but others feebly, enjoy. So, too, in its discussions concerning the divine, popular philosophy [30] often propounds the view that whatever is divine, whatever is primary and supreme, is necessarily unchangeable. This fact confirms what we have said. For there is nothing else stronger than it to move it—since that would be more divine—and it has no defect and lacks none of its proper

excellences. Its unceasing movement, then, is also reasonable, since everything ceases to move when it comes to its proper [279<sup>b1</sup>] place, but the body whose path is the circle has one and the same place for starting-point and goal.

10 · Having established these distinctions, we may now proceed to the question whether the heaven is ungenerated or generated, indestructible or [5] destructible. Let us start with a review of the theories of other thinkers; for the proofs of a theory are difficulties for the contrary theory. Besides, those who have first heard the pleas of our adversaries will be more likely to credit the assertions which we are going to make. We shall be less open to the charge of procuring [10] judgement by default. To give a satisfactory decision as to the truth it is necessary to be rather an arbitrator than a party to the dispute.

That the world was generated all are agreed, but, generation over, some say that it is eternal, others say that it is destructible like any other natural formation. [15] Others again, with Empedocles of Acragas and Heraclitus of Ephesus, believe that it alternates, being sometimes as it is now and sometimes different and in a process of destruction, and that this continues without end.

Now to assert that it was generated and yet is eternal is to assert the impossible; for we cannot reasonably attribute to anything any characteristics but those which observation detects in many or all instances. But in this case the facts point the other way: generated things are seen always to be destroyed. Further, a [20] thing whose present state had no beginning and which could not have been other than it was at any previous moment throughout its entire duration, cannot possibly be changed. For there will have to be some cause of change, and if this had been present earlier it would have been possible for that which could not be otherwise to [25] be otherwise. Suppose that the world was formed out of elements which were formerly otherwise. Then if their condition was always so and could not have been otherwise, the world could never have come into being. And if the world did come into being, then, clearly, their condition must have been capable of change and not eternal: after combination therefore they will be dispersed, just as in the past after dispersion they came into combination, and this process either has been or could [30] have been, indefinitely repeated. But if this is so, the world cannot be indestructible, and it does not matter whether the change of condition has actually occurred or remains a possibility.

Some of those who hold that the world, though indestructible, was yet generated, try to support their case by a parallel which is illusory. They say that in their statements about its generation they are doing what geometricians do when they construct their figures, not implying that the universe really had a beginning, [280\*1] but for didactic reasons facilitating understanding by exhibiting the object, like the figure, as in course of formation. The two cases, as we said, are not parallel; for, in the construction of the figure, when the various steps are completed the same figure forthwith results; but in these other demonstrations what results is not the same. [5] Indeed it cannot be so; for antecedent and consequent, as assumed, are in contradiction. The ordered, it is said, arose out of the unordered; and the same thing cannot be at the same time both ordered and unordered; there must be a process and a lapse of time separating the two states. In the figure, on the other hand, there is no [10] temporal separation. It is clear that the universe cannot be at once eternal and generated.

To say that the universe alternately combines and dissolves is no more paradoxical than to make it eternal but varying in shape. It is as if one were to think that there was now destruction and now existence when from a child a man is [15] generated, and from a man a child. For it is clear that when the elements come together the result is not a chance system and combination, but the very same as before—especially on the view of those who hold this theory, since they say that the [20] contrary is the cause of each state. So that if the totality of body, which is a continuum, is now in this order or disposition and now in that, and if the combination of the whole is a world or heaven, then it will not be the world that comes into being and is destroyed, but only its dispositions.

If the world is one, it is impossible that it should be, as a whole, first generated [25] and then destroyed, never to reappear; since before it came into being there was always present the combination prior to it, and that, we hold, could never change if it was never generated. If, on the other hand, the worlds are infinite in number the view is more plausible. But whether this is, or is not, impossible will be clear from what follows. For there are some who think it possible both for the ungenerated to be destroyed and for the generated to persist undestroyed. (This is held in the [30] *Timaeus*, where Plato says that the heaven, though it was generated, will none the less exist for the rest of time.) So far as the heaven is concerned we have answered this view with arguments appropriate to the nature of the heaven: on the general question we shall attain clearness when we examine the matter universally.

11 · We must first distinguish the senses in which we use the words [280<sup>b</sup>1] ‘ungenerated’ and ‘generated’, ‘destructible’ and ‘indestructible’. These have many uses, and though it may make no difference to the argument, yet some indeterminacy of thought must result from treating as indivisible something which is divided in many ways. The character which is the ground of the predication will always [5] remain obscure.

The word ‘ungenerated’ then is used in one sense whenever something now is, which formerly was not, no process of becoming or change being involved. Such is the case, according to some, with contact and motion, since there is no process of coming to be in contact or in motion.

It is used in another sense, when something which is capable of coming or of having come to be does not exist; such a thing is ungenerated in the sense that its [10] generation is a possibility. It is also applied where there is general impossibility of any generation such that the thing now is which then was not. (And ‘impossibility’ has two uses: first, where it is untrue to say that the thing can ever come into being, and secondly, where it cannot do so easily, quickly, or well.) In the same way the word ‘generated’ is used, first, where what formerly was not afterwards is, whether [15] a process of becoming was or was not involved, so long as that which then was not, now is; secondly, of anything capable of existing, ‘capable’ being defined with reference either to truth or to facility; thirdly, of anything to which the passage from not being to being belongs, whether already actual, if its existence is due to a process of becoming, or not yet actual but possible. The uses of the words ‘destructible’ and ‘indestructible’ are similar. ‘Destructible’ is applied to that which [20] formerly was and afterwards either is not or might not be, whether a period of being destroyed and changed intervenes or not; and sometimes we apply the word to that which a process of destruction may cause not to be; and also in a third sense, to that which is easily destructible, to the ‘easily-destroyed’, so to speak. Of the indestructible the same account holds good. It is either that which now is and now is [25] not, without any process of destruction, like contact, which without being destroyed afterwards is not, though formerly it was; or that which is but might not be, or which will at some time not be, though it now is. For you exist now and so does the contact; yet both are destructible, because a time will come when it will not be true [30] of you that you exist, nor of these things that they are in contact. Thirdly in its most proper use, it is that which is, but is incapable of any destruction such

that the thing which now is later ceases to be or might cease to be. And indestructible is also used of that which is destroyed with difficulty. [281<sup>a</sup>1]

This being so, we must ask what we mean by 'possible' and 'impossible'. For in its most proper use the predicate 'indestructible' is given because it is impossible that the thing should be destroyed, i.e. exist at one time and not at another. And 'ungenerated' also involves impossibility when used for that which cannot be [5] generated, in such fashion that, while formerly it was not, later it is. An instance is a commensurable diagonal. Now when a thing can move or lift weights, we refer always to the maximum. We speak, for instance, of a power to lift a hundred talents or walk a hundred stades—though if it can effect the maximum it can also effect [10] any part of the maximum—since we feel obliged in defining the power to give the limit or maximum. A thing, then, which is capable of a certain amount as maximum must also be capable of that which lies within it. If, for example, a man can lift a hundred talents, he can also lift two, and if he can walk a hundred stades, he can [15] also walk two. But the power is of the maximum, and a thing said, with reference to its maximum, to be incapable of so much is also incapable of any greater amount. It is, for instance, clear that a person who cannot walk a thousand stades will also be unable to walk a thousand and one. This point need not trouble us, for we may take it as settled that what is, in the strict sense, possible is determined by a limiting [20] maximum. Now perhaps the objection might be raised that there is no necessity in this, since he who sees a stade need not see the measures contained in it, while, on the contrary, he who can see a dot or hear a small sound will perceive what is greater. This, however, does not touch our argument. The maximum may be [25] determined either in the power or in its object. The meaning of this is plain. Superior sight is sight of the smaller body, but superior speed is that of the greater body.

12 · Having established these distinctions we can now proceed to the sequel. If there are things capable both of being and of not being, there must be some [30] definite maximum time of their being and not being; a time, I mean, during which the thing can be and a time during which it can fail to be. And this is true in every category, whether the thing is, for example, a man, or white, or three cubits long, or whatever it may be. For if the time is not definite in quantity, but longer than any that can be suggested and shorter than none, then it will be possible for

one and the [281<sup>b</sup>1] same thing to be for infinite time and not to be for another infinity. This, however, is impossible.

Let us take our start from this point. The impossible and the false have not the same significance. One use of 'impossible' and 'possible', and 'false' and 'true', is [5] hypothetical. It is impossible, for instance, on a certain hypothesis that the triangle should have its angles equal to two right angles, and on another the diagonal is commensurable. But there are also things possible and impossible, false and true, absolutely. Now it is one thing to be absolutely false, and another thing to be absolutely impossible. To say that you are standing when you are not standing is to [10] assert a falsehood, but not an impossibility. Similarly to say that a man who is playing the harp, but not singing, is singing, is to say what is false but not impossible. To say, however, that you are at once standing and sitting, or that the diagonal is commensurable, is to say what is not only false but also impossible. Thus it is not the same thing to make a false and to make an impossible hypothesis; and [15] from the impossible hypothesis impossible results follow. A man has, it is true, the capacity at once of sitting and of standing, because when he possesses the one he also possesses the other; but it does not follow that he can at the same time sit and stand, but at different times. But if a thing has for infinite time more than one capacity, another time is impossible and the times must coincide. Thus if anything [20] which exists for infinite time is destructible, it will have the capacity of not being. Now if it exists for infinite time let this capacity be actualized; and it will be in actuality at once existent and non-existent. Thus a false conclusion would follow because a false assumption was made; but if what was assumed had not been impossible its consequence would not have been impossible.

Anything then which always exists is absolutely imperishable. It is also [25] ungenerated, since if it was generated it will have the power for some time of not being. For as that which formerly was, but now is not, or is capable at some future time of not being, is destructible, so that which is capable of formerly not having been is generated. But in the case of that which always is, there is no time for such a capacity of not being, whether the supposed time is finite or infinite; for its capacity [30] of being must include the finite time since it covers infinite time.

It is therefore impossible that one and the same thing should be capable of always existing and of always not-existing. And not always existing, the contradictory, is also excluded. Thus it is impossible for a thing always to exist and yet to be destructible. Nor, similarly, can it be generated. For of two terms if the second [282<sup>a</sup>1] cannot be present

without the first, and the first is impossible, so too is the second. What always is, then, since it is incapable of ever not being, cannot possibly be generated. But since the contradictory of 'that which is always capable of being' is [5] 'that which is not always capable of being'; while 'that which is always capable of not being' is the contrary, whose contradictory in turn is 'that which is not always capable of not being', it is necessary that the contradictories of both terms should be predicable of one and the same thing, and thus that, intermediate between what always is and what always is not, there should be that to which being and not-being are both possible; for the contradictory of each will at times be true of it unless it [10] always exists. Hence that which not always is not will sometimes be and sometimes not be; and it is clear that this is true also of that which cannot always be but sometimes is and therefore sometimes is not. One thing, then, will have the power of being and of not being, and thus be intermediate between the other two.

Expressed universally our argument is as follows. Let there be two attributes, *A* and *B*, not capable of being present in any one thing together, while either *A* or *C* [15] and either *B* or *D* are capable of being present in everything. Then *C* and *D* must be predicated of everything of which neither *A* nor *B* is predicated. Let *E* lie between *A* and *B*; for that which is neither of two contraries is a mean between them. In *E* both *C* and *D* must be present; for either *A* or *C* is present everywhere and therefore in *E*. [20] Since then *A* is impossible, *C* must be present, and the same argument holds of *D*.

Neither that which always is, therefore, nor that which always is not is either generated or destructible. And clearly whatever is generated or destructible is not eternal. If it were, it would be at once capable of always being and capable of not always being; but it has already been shown that this is impossible. Surely then [25] whatever is ungenerated and in being must be eternal, and whatever is indestructible and in being must equally be so. (I use the words 'ungenerated' and 'indestructible' in their proper sense, 'ungenerated' for that which now is and could not at some previous time have been truly said not to be; 'indestructible' for that [30] which now is and cannot at any future time be truly said not to be.) If, again, the two terms follow one another, if the ungenerated is indestructible, and the indestructible ungenerated, then the eternal follows each of them: anything [282<sup>b</sup>1] ungenerated is eternal and anything indestructible is eternal. This is clear too from the definition of the terms. Whatever is destructible must be generated; for it is either ungenerated or generated, but, if ungenerated, it is by hypothesis

indestructible. Whatever, further, is generated must be destructible. For it is either [5] destructible or indestructible, but, if indestructible, it is by hypothesis ungenerated.

If, however, 'indestructible' and 'ungenerated' do not follow one another, there is no necessity that either the ungenerated or the indestructible should be eternal. But they must follow one another, for the following reasons. The terms 'generated' and 'destructible' follow one another; this is obvious from our former remarks, since [10] between what always is and what always is not there is an intermediate which neither follows, and that intermediate is the generated and destructible. For whatever is either of these is capable both of being and of not being for a definite time: in either case, I mean, there is a certain period of time during which the thing is and another during which it is not. Anything therefore which is generated or [15] destructible must be intermediate. Now let *A* be that which always is and *B* that which always is not, *C* the generated, and *D* the destructible. Then *C* must be intermediate between *A* and *B*. For in their case there is no time in the direction of either limit, in which either *A* is not or *B* is. But for the generated there must be such [20] a time either actually or potentially, though not for *A* and *B* in either way. *C* then will be, and also not be, for a limited length of time, and this is true also of *D*. Therefore each is both generated and destructible. Therefore 'generated' and 'destructible' follow one another. Now let *E* stand for the ungenerated, *F* for the [25] generated, *G* for the indestructible, and *H* for the destructible. As for *F* and *H*, it has been shown that they follow one another. But when terms stand to one another as these do, *F* and *H* following, *E* and *F* never predicated of the same thing but one or other of everything, and *G* and *H* likewise, then *E* and *G* must follow one another. [30] For suppose that *E* does not follow *G*; then *F* will, since either *E* or *F* is predicable of everything. But of that of which *F* is predicated *H* will be predicable also. *H* will then follow *G*; but this we saw to be impossible. And the same argument shows that [283<sup>a</sup>1] *G* follows *E*.

Now the relation of the ungenerated (*E*) to the generated (*F*) is the same as that of the indestructible (*G*) to the destructible (*H*). To say then that there is no reason why anything should not be generated and yet indestructible or ungenerated [5] and yet destroyed, to imagine that in the one case generation and in the other case destruction occurs once for all, is to destroy part of the data. For everything is capable of acting or being acted upon, of being or not being, either for an infinite, or for a definitely limited space of time; and the infinite time is only a possible



alternative because it is after a fashion defined, as a length of time which cannot be [10] exceeded. But infinity in one direction is neither infinite nor defined. Further, why, after always existing, was the thing destroyed, why, after an infinity of not being, was it generated, at one moment rather than another? If there is no reason and the moments are infinite in number, it is clear that a generated or destructible thing existed for an infinite time. It has therefore for an infinite time the capacity of not being (since the capacity of being and the capacity of not being will be present together), if destructible, in the time before destruction, if generated, in the time [15] after generation. If then we assume the two capacities to be actualized, opposites will be present together. Further, this will be equally present at every moment, so that the thing will have for an infinite time the capacity both of being and of not being; but this has been shown to be impossible. Again, if the capacity is present [20] prior to the activity, it will be present for all time, even while the thing was as yet ungenerated and non-existent but capable of being generated. At the time, then, when it was not, at that same time it had the capacity of being, both of being then and of being thereafter, and therefore for an infinity of time.

It is clear also on other grounds that it is impossible that the destructible should not at some time be destroyed. For otherwise it will always be at once [25] destructible and in actuality indestructible, so that it will be at the same time capable of always existing and of not always existing. Thus the destructible is at some time actually destroyed. The generable, similarly, has been generated; for it is capable of having been generated and thus also of not always existing.

We may also see in the following way how impossible it is either for a thing which is generated to be thenceforward indestructible, or for a thing which is [30] ungenerated and has always hitherto existed to be destroyed. Nothing that is by chance can be indestructible or ungenerated, since the products of chance and fortune are opposed to what is, or comes to be, always or for the most part, while anything which exists for a time infinite either absolutely or from a certain point, is [283<sup>b</sup>1] in existence either always or for the most part. That which is by chance, then, is by nature such as to exist at one time and not at another. But in things of that character the contradictory states proceed from one and the same capacity, the matter of the thing being the cause equally of its existence and of its non-existence. Hence opposites would be present together in actuality. [5]

Further, it cannot truly be said of a thing now that it exists last year, nor could it be said last year that it exists now. It is therefore impossible

for what once did not exist later to be eternal. For in its later state it will possess the capacity of not existing, only not of not existing at a time when it exists—since then it exists in actuality—but of not existing last year or in the past. Now suppose it to be in [10] actuality what it is capable of being. It will then be true to say now that it does not exist last year. But this is impossible. No capacity relates to being in the past, but always being in the present or future. It is the same with the notion of an eternity of existence followed later by non-existence. In the later state the capacity will be present for that which is not there in actuality. Actualize, then, the capacity. It will [15] be true to say now that this exists last year or in the past generally.

Considerations not general but proper to the subject also show it to be impossible that what was formerly eternal should later be destroyed or that what formerly was not should later be eternal. Whatever is destructible or generated is always alterable. Now alteration is due to contraries, and the things which compose [20] the natural body are the very same that destroy it.

## BOOK II

1 · That the heaven as a whole neither came into being nor admits of destruction, as some assert, but is one and eternal, with no end or beginning of its total duration, containing and embracing in itself the infinity of time, we may [30] convince ourselves not only by the arguments already set forth but also by a consideration of the views of those who differ from us in providing for its generation. If our view is a possible one, and the manner of generation which they assert is [284<sup>a</sup>1] impossible, this fact will have great weight in convincing us of the immortality and eternity of the world. Hence it is well to persuade oneself of the truth of the ancient and truly traditional theories, that there is some immortal and divine thing which [5] possesses movement, but movement such as has no limit and is rather itself the limit of all other movement. A limit is a thing which contains; and this motion, being perfect, contains those imperfect motions which have a limit and a cessation, having itself no beginning or end, but unceasing through the infinity of time, and of other [10] movements, to some the cause of their beginning, of others receiving the cessation. The ancients gave to the Gods the heaven or upper place, as being alone immortal; and our present argument testifies that it is indestructible and ungenerated. Further, it is unaffected by any mortal discomfort, and, in addition, effortless; for it [15] needs no constraining necessity to keep it to its path, and prevent it from moving with some other movement more natural to itself. Such a constrained movement would necessarily involve effort—the more so, the more eternal it were—and would be inconsistent with perfection. Hence we must not believe the old tale which says [20] that the world needs some Atlas to keep it safe—a tale composed, it would seem, by men who, like later thinkers, conceived of all the upper bodies as earthy and endowed with weight, and therefore supported it in their fabulous way upon animate necessity. We must no more believe that than follow Empedocles when he says that the world, by being whirled round, received a movement quick enough to [25] overpower its own downward tendency, and thus has been kept from destruction all this time. Nor, again, is it possible that it should persist eternally by the necessitation of a soul. For a soul could not live in such conditions painlessly or [30] happily, since the movement involves constraint, being imposed on the

first body, whose natural motion is different, and imposed continuously. It must therefore be uneasy and devoid of all rational satisfaction; for it could not even, like the soul of mortal animals, take recreation in the bodily relaxation of sleep. An Ixion's lot must [284<sup>b</sup>1] needs possess it, without end or respite. If then, as we said, the view already stated of the first motion is a possible one, it is not only more appropriate so to conceive of its eternity, but also on this hypothesis alone are we able to advance a theory consistent [5] with our premonitions of divinity. But of this enough for the present.

2 · Since there are some who say that there is a right and a left in the heaven, with those who are known as Pythagoreans—to whom indeed the view really belongs—we must consider whether, if we are to apply these principles to the body [10] of the universe, we should follow their statement of the matter or find a better way. At the start we may say that, if right and left are applicable, there are prior principles which must first be applied. These principles have been analysed in the discussion of the movements of animals,<sup>9</sup> for the reason that they are proper to animal nature. For in some animals we find all such distinctions of parts as this of [15] right and left clearly present, and in others some; but in plants we find only above and below. Now if we are to apply to the heaven such a distinction of parts, we must expect, as we have said, to find in it also that distinction which in animals is found first of them all. The distinctions are three, namely, above and below, front and its [20] opposite, right and left—all these three oppositions we expect to find in the perfect body—and each may be called a principle. Above is the principle of length, right of breadth, front of depth. Or again we may connect them with the various [25] movements, taking principle to mean that part, in a thing capable of movement, from which movement first begins. Growth starts from above, locomotion from the right, sense-movement from in front (for front is simply the part to which the senses are directed). Hence we must not look for above and below, right and left, front and [30] back, in every kind of body, but only in those which, being animate, have a principle of movement within themselves. For in no inanimate thing do we observe a part from which movement originates. Some do not move at all, some move, but not indifferently in any direction; fire, for example, only upward, and earth only to the [285<sup>a</sup>1] centre. It is true that we speak of above and below, right and left, in these bodies relatively to ourselves. The reference may be to our own right hands, as with the diviner, or to some similarity to our own

members, such as the parts of a statue possess; or we may take the contrary spatial order, calling right that which is to our [5] left, and left that which is to our right. We observe, however, in the things themselves none of these distinctions; indeed if they are turned round we proceed to speak of the opposite parts as right and left, above and below, front and back. Hence it is remarkable that the Pythagoreans should have spoken of these two principles, [10] right and left, only, to the exclusion of the other four, which have as good a title as they. There is no less difference between above and below or front and back in animals generally than between right and left. The difference is sometimes only one [15] of function, sometimes also one of shape; and while the distinction of above and below is characteristic of all animate things, whether plants or animals, that of right and left is not found in plants. Further, inasmuch as length is prior to breadth, if above is the principle of length, right of breadth, and if the principle of that which is [20] prior is itself prior, then above will be prior to right (for things are called in order of generation prior in several ways). If, in addition, above is the region from which movement originates, right the region in which it starts, front the region to which it is directed, then on this ground too above has the character of a principle as compared with the other forms of position. Thus they may fairly be criticized, first, [25] for omitting the more fundamental principles, and secondly, for thinking that the two they mentioned were attributable equally to everything.

Since we have already determined that functions of this kind belong to things which possess a principle of movement, and that the heaven is animate and possesses a principle of movement, clearly the heaven must also exhibit above and [30] below, right and left. We need not be troubled by the question, arising from the spherical shape of the world, how there can be a distinction of right and left within [285<sup>b</sup>1] it, all parts being alike and all for ever in motion. We must think of the world as of something in which right differs from left in shape as well as in other respects, which subsequently is included in a sphere. The difference of function will persist, but will appear not to by reason of the regularity of shape. In the same fashion must [5] we conceive of the beginning of its movement. For even if it never began to move, yet it must possess a principle from which it would have begun to move if it had begun, and from which it would begin again if it came to a stand. Now by its length I mean the interval between its poles, one pole being above and the other below; for [10] two hemispheres are specially distinguished from all others by the immobility of the poles. Further, by 'transverse' in the

universe we commonly mean, not above and below, but a direction crossing the line of the poles, which, by implication, is length; for transverse motion is motion crossing motion up and down. Of the poles, that [15] which we see above us is the lower region, and that which we do not see is the upper. For right in anything is, as we say, the region in which locomotion originates, and the rotation of the heaven originates in the region from which the stars rise. So this will be the right, and the region where they set the left. If then they begin from the [20] right and move round to the right, the upper must be the unseen pole. For if it is the pole we see, the movement will be leftward, which we deny to be the fact. Clearly then the invisible pole is above. And those who live there are in the upper hemisphere and to the right, while we are in the lower and to the left. This is just the [25] opposite of the view of the Pythagoreans, who make us above and on the right side and those in the other hemisphere below and on the left side; the fact being the exact opposite. Relatively, however, to the secondary revolution, I mean that of the [30] planets, we are above and on the right and they are below and on the left. For the principle of their movement has the reverse position, since the movement itself is the contrary of the other; hence it follows that we are at its beginning and they at its [286<sup>a</sup>1] end. Here we may end our discussion of the parts determined by the three dimensions and defined by their position.

3 · Since circular motion is not the contrary of the reverse circular motion, we must consider why there is more than one motion, though we have to pursue our [5] inquiries at a distance—a distance created not so much by our spatial position as by the fact that our senses enable us to perceive very few of the attributes of the heavenly bodies. But let not that deter us. The reason must be sought in the following facts. Everything which has a function exists for its function. The activity of God is immortality, i.e. eternal life. Therefore the movement of God must be [10] eternal. But such is the heaven, viz. a divine body, and for that reason to it is given the circular body whose nature it is to move always in a circle. Why, then, is not the whole body of the heaven of the same character as that part? Because there must be something at rest at the centre of the revolving body; and of that body no part can be [15] at rest, either elsewhere or at the centre. It could do so only if the body's natural movement were towards the centre. But the circular movement is natural, since otherwise it could not be eternal; for nothing unnatural is eternal. The unnatural is subsequent to the natural, being a derangement of the

natural which occurs in the course of its generation. Earth then has to exist; for it is earth which is at rest at the [20] centre. (At present we may take this for granted: it will be explained later.) But if earth must exist, so must fire. For, if one of a pair of contraries naturally exists, the other, if it is really contrary, exists also naturally, and has a nature of its own (for the matter of contraries is the same). Also, the positive is prior to its privation [25] (warm, for instance, to cold), and rest and heaviness stand for the privation of lightness and movement. But further, if fire and earth exist, the intermediate bodies must exist also; for each element stands in a contrary relation to every other. (This, again, we will here take for granted and try later to explain.) With these four [30] elements generation clearly is involved, since none of them can be eternal; for contraries interact with one another and destroy one another. Further, it is unreasonable that a movable body should be eternal, if its movement cannot be naturally eternal: and these bodies possess movement. Thus we see that generation [286<sup>b</sup>1] is necessarily involved. But if so, there must be at least one other motion; for a single movement of the whole heaven would necessitate an identical relation of the elements of bodies to one another. This matter also will be cleared up in what follows; but for the present so much is clear, that the reason why there is more than [5] one circular body is the necessity of generation, which follows on the presence of fire, which, with that of the other bodies, follows on that of earth; and earth is required because eternal movement in one body necessitates eternal rest in another.

4 · The shape of the heaven is of necessity spherical; for that is the shape [10] most appropriate to its substance and also by nature primary.

First, let us consider generally which shape is primary among planes and solids alike. Every plane figure must be either rectilinear or curvilinear. Now the rectilinear is bounded by more than one line, the curvilinear by one only. But since [15] in any kind the one is naturally prior to the many and the simple to the complex, the circle will be the first of plane figures. Again, if by complete, as previously defined,<sup>10</sup> we mean a thing outside which nothing can be found, and if addition is always possible to the straight line but never to the circular, clearly the line which [20] embraces the circle is complete. If then the complete is prior to the incomplete, it follows on this ground also that the circle is primary among figures. And the sphere holds the same position among solids. For it alone is embraced by a single surface, while rectilinear solids

have several. The sphere is among solids what the circle is [25] among plane figures. Further, those who divide bodies into planes and generate them out of planes seem to bear witness to the truth of this. Alone among solids they leave the sphere undivided, as not possessing more than one surface; for the division into surfaces is not just dividing a whole by cutting into its parts, but division into [30] parts different in form. It is clear, then, that the sphere is first of solid figures.

If, again, one orders figures according to their numbers, it is most reasonable to arrange them in this way. The circle corresponds to the number one, the triangle, [287\*1] being the sum of two right angles, to the number two. But if one is assigned to the triangle, the circle will not be a figure at all.

Now the first figure belongs to the first body, and the first body is that at the farthest circumference. It follows that the body which revolves with a circular movement must be spherical. The same then will be true of the body continuous [5] with it; for that which is continuous with the spherical is spherical. The same again holds of the bodies between these and the centre. Bodies which are bounded by the spherical and in contact with it must be, as wholes, spherical; and the lower bodies [10] are contiguous with the sphere above them. The sphere then will be spherical throughout; for every body within it is contiguous and continuous with spheres.

Again, since the whole seems—and has been assumed—to revolve in a circle, and since it has been shown that outside the farthest circumference there is neither void nor place, from these grounds also it will follow necessarily that the heaven is [15] spherical. For if it is to be rectilinear in shape, it will follow that there is place and body and void without it. For a rectilinear figure as it revolves never continues in the same room, but where formerly was body, is now none, and where now is none, body will be in a moment because of the changing positions of the corners. Similarly, if [20] the world had some other figure with unequal radii, if, for instance, it were lentiform, or oviform, in every case we should have to admit space and void outside the moving body, because the whole body would not always occupy the same room.

Again, if the motion of the heaven is the measure of all movements in virtue of being alone continuous and regular and eternal, and if, in each kind, the measure is [25] the minimum, and the minimum movement is the swiftest, then the movement of the heaven must be the swiftest of all movements. Now of lines which return upon themselves the line which bounds the circle is the shortest; and that movement is the swiftest which



follows the shortest line. Therefore, if the heaven moves in a circle and moves more swiftly than anything else, it must necessarily be spherical.

[30] Corroborative evidence may be drawn from the bodies whose position is about the centre. If earth is enclosed by water, water by air, air by fire, and these similarly by the upper bodies—which while not continuous are yet contiguous with them—and [287<sup>b</sup>1] if the surface of water is spherical, and that which is continuous with or embraces the spherical must itself be spherical, then on these grounds also it is clear that the heavens are spherical. But the surface of water is seen to be spherical if we [5] take as our starting-point the fact that water naturally tends to collect in the more hollow places—and the more hollow are those nearer the centre. Draw from the centre the lines *AB*, *AC*, and let them be joined by the straight line *BC*. The line *AD*, drawn to the base of the triangle, will be shorter than either of the radii. Therefore [10] the place in which it terminates will be more hollow. The water then will collect there until equality is established. But the line *AE* is equal to the radii. Thus water lies at the ends of the radii, and there will it rest; but the line which connects the extremities of the radii is circular: therefore the surface of the water *BEC* is spherical.

It is plain from the foregoing that the universe is spherical. It is plain, further, [15] that it is so accurately turned that no manufactured thing nor anything else within the range of our observation can even approach it. For the matter of which these are composed does not admit of anything like the same regularity and finish as the substance of the enveloping body; since with each step away from earth the matter [20] manifestly becomes finer in the same proportion as water is finer than earth.

5 · Now there are two ways of moving along a circle, from *A* to *B* or from *A* to *C*, and we have already explained that these movements are not contrary to one another. But nothing which concerns the eternal can be a matter of chance or spontaneity, and the heaven and its circular motion are eternal. We must therefore [25] ask why this motion takes one direction and not the other. Either this is itself a principle or there is a principle behind it. It may seem evidence of excessive folly or excessive zeal to try to provide an explanation of some things, or of everything, [30] admitting no exception. The criticism, however, is not always just: one should first consider what reason there is for speaking, and also what kind of certainty is looked for, whether human merely or of a more

cogent kind. When any one shall succeed in finding proofs of greater precision, gratitude will be due to him for the discovery, [288<sup>a</sup>1] but at present we must be content with what seems to be the case. If nature always follows the best course possible, and, just as upward movement is the superior form of rectilinear movement, since the upper region is more divine than the lower, so forward movement is superior to backward, then front and back exhibits, like right [5] and left, as we said before and as the difficulty just stated itself suggests, the distinction of prior and posterior, which provides a reason and so solves our difficulty. Supposing that nature is ordered in the best way possible, this may stand as the reason of the fact mentioned. For it is best to move with a movement simple [10] and unceasing, and, further, in the superior of two possible directions.

6 · We have next to show that the movement of the heaven is regular and not irregular. This applies to the first heaven and the first movement; for the lower [15] spheres exhibit a composition of several movements into one. If the movement is uneven, clearly there will be acceleration, maximum speed, and retardation, since these appear in all irregular motions. The maximum may occur either at the [20] starting-point or at the goal or between the two; and we expect natural motion to reach its maximum at the goal, unnatural motion at the starting-point, and missiles midway between the two. But circular movement, having no beginning or limit or middle without qualification, has neither whence nor whither nor middle; for in time it is eternal, and in length it returns upon itself without a break. If then its [25] movement has no maximum, it can have no irregularity, since irregularity is produced by retardation and acceleration. Further, since everything that is moved is moved by something, the cause of the irregularity of movement must lie either in the mover or in the moved or in both. For if the mover moved not always with the [30] same force, or if the moved were altered and did not remain the same, or if both were to change, the result might well be an irregular movement in the moved. But none of these possibilities can occur in the case of the heavens. As to that which is moved, we have shown that it is primary and simple and ungenerated and [288<sup>b</sup>1] indestructible and generally unchanging; and it is far more reasonable to ascribe those attributes to the mover. It is the primary that moves the primary, the simple the simple, the indestructible and ungenerated that which is indestructible and [5] ungenerated. Since then that which is moved, being a body, is nevertheless unchanging, how should the mover,

which is incorporeal, be changed?

For if irregularity occurs, there must be change either in the movement as a whole, from fast to slow and slow to fast, or in its parts. That there is no irregularity [10] in the parts is obvious, since, if there were, some divergence of the stars would have taken place before now in the infinity of time, as one moved slower and another faster; but no alteration of their intervals is ever observed. Nor again is a change in the movement as a whole admissible. Retardation is always due to incapacity, and [15] incapacity is unnatural. The incapacities of animals, age, decay, and the like, are all unnatural, due, it seems, to the fact that the whole animal complex is made up of materials which differ in respect of their proper places, and no single part occupies its own place. If therefore that which is primary contains nothing unnatural, being [20] simple and unmixed and in its proper place and having no contrary, then it has no place for incapacity, nor, consequently, for retardation or (since acceleration involves retardation) for acceleration. Again, it is unreasonable that the mover should first show incapacity for an infinite time, and capacity afterwards for another infinity. For clearly nothing which, like incapacity, is unnatural ever [25] continues for an infinity of time; nor does the unnatural endure as long as the natural, or any form of incapacity as long as the capacity. But if the movement is retarded it must necessarily be retarded for an infinite time. Equally impossible is perpetual acceleration or perpetual retardation. For such movement would be infinite and indefinite; but every movement, in our view, proceeds from one point to [30] another and is definite in character. Again, suppose one assumes a minimum time in less than which the heaven could not complete its movement. For, as a given walk or a given exercise on the harp cannot take any and every time, but every performance has its definite minimum time which is unsurpassable, so, one might suppose, the [289<sup>a</sup>1] movement of the heaven could not be completed in any and every time. But in that case perpetual acceleration is impossible (and, equally, perpetual retardation; for the argument holds of both and each), if we may take acceleration to proceed by identical or increasing additions of speed and for an infinite time. The remaining [5] possibility is to say that the movement exhibits an alternation of slower and faster; but this is a mere fiction and quite unreasonable. Further, irregularity of this kind would be particularly unlikely to pass unobserved, since contrast makes observation [10] easy.

That there is one heaven, then, only, and that it is ungenerated and eternal, and further that its movement is regular, has now been

sufficiently explained.

7 · We have next to speak of the stars, as they are called, of their composition, shape, and movements. It would be most reasonable and consequent upon what has been said that each of the stars should be composed of that substance in which their path lies, since, as we said, there is an element whose natural [15] movement is circular. In so saying we are only following the same line of thought as those who say that the stars are fiery because they believe the upper body to be fire, the presumption being that a thing is composed of the same stuff as that in which it is situated. The warmth and light which proceed from them are caused by the [20] friction set up in the air by their motion. Movement tends to create fire in wood, stone, and iron; and with even more reason should it have that effect on air, a substance which is closer to fire than these. An example is that of missiles, which as they move are themselves fired so strongly that leaden balls are melted; and if they [25] are fired the surrounding air must be similarly affected. Now while the missiles are heated by reason of their motion in air, which is turned into fire by the agitation produced by their movement, the upper bodies are carried on a moving sphere, so that, though they are not themselves fired, yet the air underneath the sphere of the [30] revolving body is necessarily heated by its motion, and particularly in that part where the sun is attached to it. Hence warmth increases as the sun gets nearer or higher or overhead. Of the fact, then, that the stars are neither fiery nor move in fire, enough has been said.

8 · Since changes evidently occur not only in the position of stars but also in [289<sup>b</sup>1] that of the whole heaven, there are three possibilities: either both are at rest, or both are in motion, or the one is at rest and the other in motion.

That both should be at rest is impossible; for, if the earth is at rest, the hypothesis does not account for the phenomena; and we take it as granted that the [5] earth is at rest. It remains either that both are moved, or that the one is moved and the other at rest.

On the view, first, that both are in motion, we have the absurdity that the stars and the circles move with the same speed, i.e. that the pace of every star is that of the circle in which it moves. For star and circle are seen to come back to the same [10] place at the same moment; from which it follows that the star has traversed the circle and the circle has

completed its own movement, i.e. traversed its own circumference, at one and the same moment. But it is unreasonable that the pace of each star should be exactly proportioned to the size of its circle. That the pace of each circle should be proportionate to its size is not absurd but inevitable; but that [15] the same should be true of the movement of the stars contained in the circles is quite unreasonable. For if the star which moves on the greater circle is necessarily swifter, clearly if the stars shifted their position so as to exchange circles, the slower would become swifter and the swifter slower. But this would show that their movement [20] was not their own, but due to the circles. If, on the other hand, the arrangement was a chance combination, the coincidence in every case of a greater circle with a swifter movement of the star contained in it is unreasonable. In one or two cases it might not inconceivably fall out so, but to imagine it in every case alike is a mere fiction. [25] Besides, chance has no place in that which is natural, and what happens everywhere and in every case is no matter of chance.

The same absurdity is equally plain if it is supposed that the circles stand still and that it is the stars themselves which move. For it will follow that the outer stars [30] are the swifter, and that the pace of the stars corresponds to the size of circles.

Since, then, we cannot reasonably suppose either that both are in motion or that the star alone moves, it remains that the circles should move, while the stars are at rest and move with the circles to which they are attached. Only on this supposition are we involved in no absurd consequence. For, in the first place, the quicker movement of the larger circle is reasonable when all the circles are attached [290<sup>a</sup>1] to the same centre. Whenever bodies are moving with their proper motion, the larger moves quicker. It is the same here with the revolving bodies; for the arc intercepted by two radii will be larger in the larger circle, and hence it is reasonable that the revolution of the larger circle should take the same time as that of the [5] smaller. And secondly, the fact that the heavens do not break in pieces follows not only from this but also from the proof already given of the continuity of the whole.

Again, since the stars are spherical, as our opponents assert and we may consistently admit, inasmuch as we construct them out of the spherical body, and [10] since the spherical body has two movements proper to itself, namely rolling and spinning, it follows that if the stars have a movement of their own, it will be one of these. But neither is observed. Suppose them to *spin*. They would then stay where they were, and not change their place, as, by observation and general consent, they

do. Further, it would be reasonable for them all to exhibit the same movement; but [15] the only star which appears to possess this movement is the sun, at sunrise or sunset, and this appearance is due not to the sun itself but to the distance from which we observe it. The visual ray being excessively prolonged becomes weak and wavering. The same reason probably accounts for the apparent twinkling of the fixed stars and [20] the absence of twinkling in the planets. The planets are near, so that the visual ray reaches them in its full vigour, but when it comes to the fixed stars it is quivering because of the distance and its excessive extension; and its tremor produces an appearance of movement in the star; for it makes no difference whether movement is set up in the ray or in the object of vision.

[25] On the other hand, it is also clear that the stars do not *roll*. For rolling involves rotation; but the 'face', as it is called, of the moon is always seen. Therefore, since any movement of their own which the stars possessed would presumably be one proper to themselves, and no such movement is observed in them, clearly they have no movement of their own.

[30] There is, further, the absurdity that nature has bestowed upon them no organ appropriate to such movement. For nature leaves nothing to chance, and would not, while caring for animals, overlook things so precious. Indeed, nature seems deliberately to have stripped them of everything which makes self-originated progression possible, and to have removed them as far as possible from things which have organs of movement. This is just why it seems reasonable that the whole [290<sup>b</sup>1] heaven and every star should be spherical. For while of all shapes the sphere is the most convenient for movement in one place, making possible, as it does, the swiftest and most self-contained motion, for forward movement it is the most unsuitable, [5] least of all resembling shapes which are self-moved, in that it has no dependent or projecting part, as a rectilinear figure has, and is in fact as far as possible removed in shape from ambulatory bodies. Since, therefore, the heavens have to move in one place, and the stars are not required to move themselves forward, it is reasonable that both should be spherical—a shape which best suits the movement of the one [10] and the immobility of the other.

9 · From all this it is clear that the theory that the movement of the stars produces a harmony, i.e. that the sounds they make are concordant, in spite of the grace and originality with which it has been stated, is

nevertheless untrue. Some thinkers suppose that the motion of bodies of that size must produce a noise, since [15] on our earth the motion of bodies far inferior in size and in speed of movement has that effect. Also, when the sun and the moon, they say, and all the stars, so great in number and in size, are moving with so rapid a motion, how should they not produce [20] a sound immensely great? Starting from this argument and from the observation that their speeds, as measured by their distances, are in the same ratios as musical concordances, they assert that the sound given forth by the circular movement of the stars is a harmony. Since, however, it appears unaccountable that we should not hear this music, they explain this by saying that the sound is in our ears from the [25] very moment of birth and is thus indistinguishable from its contrary silence, since sound and silence are discriminated by mutual contrast. What happens to men, then, is just what happens to coppersmiths, who are so accustomed to the noise of the smithy that it makes no difference to them. But, as we said before, melodious [30] and poetical as the theory is, it cannot be a true account of the facts. There is not only the absurdity of our hearing nothing, the ground of which they try to remove, but also the fact that no effect other than sensitive is produced upon us. Excessive noises, we know, shatter the solid bodies even of inanimate things: the noise of thunder, for instance, splits rocks and the strongest of bodies. But if the moving [291<sup>a</sup>1] bodies are so great, and the sound which penetrates to us is proportionate to their size, that sound must needs reach us in an intensity many times that of thunder, and the force of its action must be immense. Indeed the reason why we do not hear, and show in our bodies none of the effects of violent force, is easily given: it is that there [5] is no noise. But not only is the explanation evident; it is also a corroboration of the truth of the views we have advanced. For the very difficulty which made the Pythagoreans say that the motion of the stars produces a concord corroborates our view. Bodies which are themselves in motion, produce noise and friction; but those [10] which are attached or fixed to a moving body, as the parts to a ship, can no more create noise, than a ship on a river moving with the stream. Yet by the same argument one might say it was absurd that on a large vessel the motion of mast and [15] poop should not make a great noise, and the like might be said of the movement of the vessel itself. But sound is caused when a moving body is enclosed in an unmoved body, and cannot be caused by one enclosed in, and continuous with, a moving body and creating no friction. We may say, then, in this matter that if the heavenly bodies moved in a generally diffused mass of air or fire, as every one

supposes, their [20] motion would necessarily cause a noise of tremendous strength and such a noise would necessarily reach and shatter us. Since, therefore, this effect is evidently not produced, it follows that none of them can move with the motion either of animate nature or of constraint. It is as though nature had foreseen the result, that if their [25] movement were other than it is, nothing on this earth could maintain its character.

That the stars are spherical and are not self-moved, has now been explained.

**10** · With their order—I mean the movement of each, as involving the [30] priority of some and the posteriority of others, and their distances from each other—astronomy may be left to deal, since the astronomical discussion is adequate. This discussion shows that the movements of the several stars depend, as regards the varieties of speed which they exhibit, on their distances. It is established that the outermost revolution of the heavens is a simple movement and the swiftest [291<sup>b</sup>1] of all, and that the movement of all other bodies is composite and relatively slow, for the reason that each is moving on its own circle with the reverse motion to that of the heavens. This at once makes it reasonable that the body which is nearest to that first simple revolution should take the longest time to complete its circle, and that [5] which is farthest from it the shortest, the others taking a longer time the nearer they are and a shorter time the farther away they are. For it is the nearest body which is most strongly influenced, and the most remote, by reason of its distance, which is least affected, the influence on the intermediate bodies varying, as the [10] mathematicians show, with their distance.

**11** · With regard to the shape of each star, the most reasonable view is that they are spherical. It has been shown that it is not in their nature to move themselves, and, since nature does nothing without reason or in vain, clearly she will have given things which possess no movement a shape particularly unadapted to [15] movement. Such a shape is the sphere, since it possesses no instrument of movement. Clearly then their mass will have the form of a sphere. Again, what holds of one holds of all, and the evidence of our eyes shows us that the moon is spherical. For how else should the moon as it waxes and wanes show for the most [20] part a crescent-shaped or gibbous figure, and only at one moment a half-moon? And astronomical arguments give further confirmation; for no



other hypothesis accounts for the crescent shape of the sun's eclipses. One, then, of the heavenly bodies being spherical, clearly the rest will be spherical also.

12 · There are two difficulties, which may very reasonably here be raised, of [25] which we must now attempt to state what seems to be the case; for we regard the zeal of one whose thirst after philosophy leads him to accept even slight indications where it is very difficult to see one's way, as a proof rather of modesty than of over-confidence.

Of many such problems one of the strangest is the problem why we find the [30] greatest number of movements in the intermediate bodies, and not, rather, in each successive body a variety of movement proportionate to its distance from the primary motion. For we might reasonably expect, since the primary body shows one motion only, that the body which is nearest to it should move with the fewest movements, say two, and the one next after that with three, or some similar arrangement. But the opposite is the case. The movements of the sun and moon are fewer than those of some of the planets. Yet these planets are farther from the [292<sup>a</sup>1] centre and thus nearer to the primary body than they, as observation has itself in some cases revealed. For we have seen the moon, half-full, pass beneath the planet Mars, which vanished on its shadow side and came forth by the bright and shining [5] part. Similar accounts of other stars are given by the Egyptians and Babylonians, whose observations have been kept for very many years past, and from whom much of our evidence about particular stars is derived.

A second difficulty which may with equal justice be raised is this. Why is it [10] that the primary motion includes such a multitude of stars that their whole array seems to defy counting, while of the other stars each one is separated off, and in no case do we find two or more attached to the same motion?

On these questions it is well that we should seek to increase our understanding, though we have but little to go upon, and are placed at so great a distance from the [15] facts in question. Nevertheless if we base our consideration on such things, we shall not find this difficulty by any means insoluble. We think of the stars as mere bodies, and as units with a serial order indeed but entirely inanimate; but we should rather [20] conceive them as enjoying life and action. On this view the facts cease to appear surprising. For it is plausible that the best-conditioned of all things should have its good without action, that that which is nearest to it

should achieve it by little and simple action, and that which is farther removed by a complexity of actions, just as with men's bodies one is in good condition without exercise at all, another after a [25] short walk, while another requires running and wrestling and hard training, and there are yet others who however hard they worked themselves could never secure this good, but only some substitute for it. To succeed often or in many things is difficult. For instance, to throw ten thousand Chians<sup>11</sup> with the dice would be impossible, but to throw one or two is comparatively easy. In action, again, when A [30] has to be done to get B, B to get C, and C to get D, one step or two present little difficulty, but as the series extends the difficulty grows. We must, then, think of the action of the stars as similar to that of animals and plants. For on our earth it is man [292<sup>b</sup>1] that has the greatest variety of actions—for there are many goods that man can secure; hence his actions are various and directed to ends beyond them—while the perfectly conditioned has no need of action, since it is itself the end, and action [5] always requires two terms, end and means. The lower animals have less variety of action than man; and plants perhaps have little action and of one kind only. For either they have but one attainable good (as indeed man has), or, if several, each contributes directly to their ultimate good. One thing then has and enjoys the ultimate good, other things attain to it, one immediately by few steps, another by [10] many, while yet another does not even attempt to secure it but is satisfied to reach a point not far removed from that consummation. Thus, taking health as the end, there will be one thing that always possesses health, others that attain it, one by reducing flesh, another by running and thus reducing flesh, another by taking steps [15] to enable himself to run, thus further increasing the number of movements, while another cannot attain health itself, but only running or reduction of flesh, so that one or other of these is for such a being the end. For while it is clearly best for any being to attain the real end, yet, if that cannot be, the nearer it is to the best the better will be its state. It is for this reason that the earth moves not at all and the [20] bodies near to it with few movements. For they do not attain the final end, but only come as near to it as their share in the divine principle permits. But the first heaven finds it immediately with a single movement, and the bodies intermediate between the first and last heavens attain it indeed, but at the cost of a multiplicity of movement.

[25] As to the difficulty that into the one primary motion is crowded a vast multitude of stars, while of the other stars each has been separately given special movements of its own, there is in the first place this reason

for regarding the arrangement as a reasonable one. In thinking of the life and principle of the several [30] heavens one must regard the first as far superior to the others. Such a superiority would be reasonable. For this single first motion has to move many of the divine bodies, while the numerous other motions move only one each, since each single [293<sup>a</sup>1] planet moves with a variety of motions. Thus, then, nature makes matters equal and establishes a certain order, giving to the single motion many bodies and to the single body many motions. And there is a second reason why the other motions have each [5] only one body, in that each of them except the last, i.e. that which contains the one star, is really moving many bodies. For this last sphere moves with many others, to which it is fixed, each sphere being actually a body; so that its movement will be a joint product. Each sphere, in fact, has its particular natural motion, to which the [10] general movement is, as it were, added. But the force of any limited body is only adequate to moving a limited body.

The characteristics of the stars which move with a circular motion, in respect of substance and shape, movement and order, have now been sufficiently explained.

[15] **13** · It remains to speak of the earth, of its position, of the question whether it is at rest or in motion, and of its shape.

As to its *position* there is some difference of opinion. Most people—all, in fact, who regard the whole heaven as finite—say it lies at the centre. But the Italian [20] philosophers known as Pythagoreans take the contrary view. At the centre, they say, is fire, and the earth is one of the stars, creating night and day by its circular motion about the centre. They further construct another earth in opposition to ours to which they give the name counter-earth. In all this they are not seeking for theories [25] and causes to account for the phenomena, but rather forcing the phenomena and trying to accommodate them to certain theories and opinions of their own. But there are many others who would agree that it is wrong to give the earth the central position, looking for confirmation rather to theory than to the phenomena. Their [30] view is that the most precious place befits the most precious thing; but fire, they say, is more precious than earth, and the limit than the intermediate, and the circumference and the centre are limits. Reasoning on this basis they take the view that it is not earth that lies at the centre of the sphere, but rather fire. The Pythagoreans have a further reason. They hold that the most important part of the [293<sup>b</sup>1] world, which is the centre, should be most

strictly guarded, and name the fire which occupies that place the 'Guard-house of Zeus', as if the word 'centre' were quite unequivocal, and the centre of the mathematical figure were always the same with [5] that of the thing or the natural centre. But it is better to conceive of the case of the whole heaven as analogous to that of animals, in which the centre of the animal and that of the body are different. For this reason they have no need to be so disturbed about the world, or to call in a guard for its centre: rather let them look for the [10] centre in the other sense and tell us what it is like and where nature has set it. That centre will be something primary and precious; but to the mere position we should give the last place rather than the first. For the middle is what is defined, and what defines it is the limit, and that which contains or limits is more precious than that which is limited, seeing that the latter is the matter and the former the substance of [15] the system.

As to the position of the earth, then, this is the view which some advance, and the views advanced concerning its *rest or motion* are similar. For here too there is no general agreement. All who deny that the earth lies at the centre think that it revolves about the centre, and not the earth only but, as we said before, the [20] counter-earth as well. Some of them even consider it possible that there are several bodies so moving, which are invisible to us owing to the interposition of the earth. This, they say, accounts for the fact that eclipses of the moon are more frequent than eclipses of the sun; for in addition to the earth each of these moving bodies can obstruct it. Indeed, as in any case the earth is not actually a centre but distant from [25] it a full hemisphere, there is no more difficulty, they think, in accounting for the phenomena on their view that we do not dwell at the centre, than on the view that the earth is in the middle. Even as it is, there is nothing to suggest that we are removed from the centre by half the diameter of the earth. Others, again, say that [30] the earth, which lies at the centre, is rolled, and thus in motion, about the axis of the whole heaven. So it stands written in the *Timaetus*.<sup>12</sup>

There are similar disputes about the *shape* of the earth. Some think it is spherical, others that it is flat and drum-shaped. For evidence they bring the fact [294<sup>a</sup>1] that, as the sun rises and sets, the part concealed by the earth shows a straight and not a curved edge, whereas if the earth were spherical the line of section would have to be circular. In this they leave out of account the great distance of the sun from the earth and the great size of the circumference, which, seen from a distance on these [5] apparently small circles appears straight. Such an appearance ought not to make them doubt the circular shape of the earth. But they have

another argument. They say that because it is at rest, the earth must necessarily have this shape.

There are many different ways in which the movement or rest of the earth has [10] been conceived. The difficulty must have occurred to every one. It would indeed be a complacent mind that felt no surprise that, while a little bit of earth, let loose in [15] mid-air, moves and will not stay still, and the more there is of it the faster it moves, the whole earth, free in mid-air, should show no movement at all. Yet here is this great weight of earth, and it is at rest. And again, from beneath one of these moving fragments of earth, before it falls, take away the earth, and it will continue its downward movement with nothing to stop it. The difficulty then, has naturally [20] passed into a commonplace of philosophy; and one may well wonder that the solutions offered are not seen to involve greater absurdities than the problem itself.

By these considerations some, like Xenophanes of Colophon, have been led to assert that the earth below us is infinite, [saying that it has 'pushed its roots to infinity']<sup>13</sup> in order to save the trouble of seeking for the cause. Hence the sharp [25] rebuke of Empedocles, in the words 'if the deeps of the earth are endless and endless the ample ether—such is the vain tale told by many a tongue, poured from the mouths of those who have seen but little of the whole'.<sup>14</sup> Others say the earth rests upon water. This, indeed, is the oldest theory that has been preserved, and is [30] attributed to Thales of Miletus. It was supposed to stay still because it floated like wood and other similar substances, which are so constituted as to rest upon water but not upon air. As if the same account had not to be given of the water which carries the earth as of the earth itself! It is not the nature of water, any more than of [294<sup>b</sup>1] earth, to stay in mid-air: it must have something to rest upon. Again, as air is lighter than water, so is water than earth: how then can they think that the naturally lighter substance lies below the heavier? Again, if the earth as a whole is capable of floating upon water, that must obviously be the case with any part of it. But [5] observation shows that this is not the case. Any piece of earth goes to the bottom, the quicker the larger it is. These thinkers seem to push their inquiries some way into the problem, but not so far as they might. It is what we are all inclined to do, to direct our inquiry not to the matter itself, but to the views of our opponents; for even [10] when inquiring on one's own one pushes the inquiry only to the point at which one can no longer offer any opposition. Hence a good inquirer will be one who is ready in bringing forward the objections proper to the genus, and that he will be when he has gained an understanding of all the

differences.

Anaximenes and Anaxagoras and Democritus give the flatness of the earth as [15] the cause of its staying still. Thus, they say, it does not cut, but covers like a lid, the air beneath it. This seems to be the way of flat-shaped bodies; for even the wind can scarcely move them because of their power of resistance. The same immobility, they say, is produced by the flatness of the surface which the earth presents to the air which underlies it (while the air, not having room enough to change its place, rests [20] on the compressed mass underneath), like the water in a clepsydra. And they adduce an amount of evidence to prove that air, when cut off and at rest, can bear a considerable weight.

Now, first, if the shape of the earth is not flat, its flatness cannot be the cause [25] of its immobility. But in their own account it is rather the size of the earth than its flatness that causes it to remain at rest. For the reason why the air is so closely confined that it cannot find a passage, and therefore stays where it is, is its great amount; and this amount is great because the body which cuts it off, the earth, is very large. This result, then, will follow, even if the earth is spherical, so long as it retains its size. So far as their arguments go, the earth will still be at rest. [30]

In general, our quarrel with those who speak of movements in this way cannot be confined to the parts; it concerns the whole universe. One must decide at the outset whether bodies have a natural movement or not, whether there is no natural but only constrained movement. Seeing, however, that we have already decided this [295<sup>a</sup>1] matter to the best of our ability, we are entitled to treat our results as representing fact. Bodies which have no natural movement, have no constrained movement; and where there is no natural and no constrained movement there will be no movement at all. This is a conclusion, the necessity of which we have already decided, and we [5] have seen further that rest also will be impossible, since rest, like movement, is either natural or constrained. But if there is any natural movement, constraint will not be the sole principle of motion or of rest. If, then, it is by constraint that the earth now keeps its place, it must have come together at the centre because of the whirling. (The form of causation supposed they all borrow from observations of [10] liquids and of air, in which the larger and heavier bodies always move to the centre of the whirl. This is why all those who try to generate the heavens say that the earth came together at the centre. They then seek a reason for its staying there; and some say, in the manner explained, that the reason is its size and flatness, others, with [15] Empedocles, that the motion of the heavens, moving about it at a higher

speed, prevents movement of the earth, as the water in a cup, when the cup is given a circular motion, though it is often underneath the bronze, is for this same reason [20] prevented from moving with the downward movement which is natural to it.) But suppose both the whirl and its flatness (the air beneath being withdrawn) cease to prevent the earth's motion, where will the earth move to then? Its movement to the centre was constrained, and its rest at the centre is due to constraint; but there must be some motion which is natural to it. Will this be upward motion or downward or [25] what? It must have some motion; and if upward and downward motion are alike to it, and the air above the earth does not prevent upward movement, then no more could air below it prevent downward movement. For the same cause must necessarily have the same effect on the same thing.

Further, against Empedocles there is another point which might be made. [30] When the elements were separated off by Hate, what caused the earth to keep its place? Surely the whirl cannot have been then also the cause. It is absurd too not to perceive that, while the whirling movement may have been responsible for the original coming together of the parts of earth at the centre, the question remains, why *now* do all heavy bodies move to the earth. For the whirl surely does not come near us. Why, again, does fire move upward? Not, surely, because of the whirl. But [295<sup>b</sup>1] if fire is naturally such as to move in a certain direction, clearly the same may be supposed to hold of earth. Again, it cannot be the whirl which determines the heavy and the light. Rather that movement caused the pre-existent heavy and light things [5] to go to the middle and stay on the surface respectively. Thus, before ever the whirl began, heavy and light existed; and what can have been the ground of their distinction, or the manner and direction of their natural movements? In infinite space there can have been neither above nor below, and it is by these that heavy and light are determined.

[10] It is to these causes that most writers pay attention; but there are some, Anaximander, for instance, among the ancients, who say that the earth keeps its place because of its indifference. Motion upward and downward and sideways were all, they thought, equally inappropriate to that which is set at the centre and indifferently related to every extreme point; and to move in contrary directions at [15] the same time was impossible: so it must needs remain still. This view is ingenious but not true. The argument would prove that everything which is put at the centre must stay there. Fire, then, will rest at the centre; for the proof turns on no peculiar property of earth. But in any case it is superfluous.

The observed facts about earth [20] are not only that it remains at the centre, but also that it moves to the centre. The place to which any fragment of earth moves must necessarily be the place to which the whole moves; and in the place to which a thing naturally moves, it will naturally rest. The reason then is not in the fact that the earth is indifferently related to every extreme point; for this would apply to any body, whereas movement to the centre is [25] peculiar to earth. Again it is absurd to look for a reason why the earth remains at the centre and not for a reason why fire remains at the extremity. If the extremity is the natural place of fire, clearly earth must also have a natural place. But suppose that the centre is not its place, and that the reason of its remaining there is this [30] necessity of indifference—on the analogy of the hair which, it is said, however great the tension, will not break under it, if it be evenly distributed, or of the man who, though exceedingly hungry and thirsty, and both equally, yet being equidistant from food and drink, is therefore bound to stay where he is—even so, it still remains [296<sup>a</sup>1] to explain why fire stays at the extremities. It is strange, too, to ask about things staying still but not about their motion,—why, I mean, one thing, if nothing stops it, moves up, and another thing to the centre. Again, their statements are not true. It happens, indeed, to be the case that a thing to which movement this way and that is [5] equally inappropriate is obliged to remain at the centre. But so far as their argument goes, instead of remaining there, it will move, only not as a mass but in fragments. For the argument applies equally to fire. Fire, if set at the centre, should [10] stay there, like earth, since it will be indifferently related to every point on the extremity. Nevertheless it will move, as in fact it always does move when nothing stops it, away from the centre to the extremity. It will not, however, move in a mass to a single point on the circumference—the only possible result on the lines of the indifference theory—but rather each corresponding portion of fire to the corresponding [15] part of the extremity, each fourth part, for instance, to a fourth part of the circumference. For since no body is a point, it will have parts. The expansion, when the body increased the place occupied, would be on the same principle as the [20] contraction, in which the place was diminished. Thus, for all the indifference theory shows to the contrary, the earth also would have moved in this manner away from the centre, unless the centre had been its natural place.

We have now outlined the views held as to the shape, position, and rest or movement of the earth.



14 · Let us first decide the question whether the earth moves or is at rest. For, as we said, there are some who make it one of the stars, and others who, setting [25] it at the centre, suppose it to be rolled and in motion about the pole as axis. That both views are untenable will be clear if we take as our starting-point the fact that the earth's motion, whether the earth be at the centre or away from it, must needs be a constrained motion. It cannot be the movement of the earth itself. If it were, [30] any portion of it would have this movement; but in fact every part moves in a straight line to the centre. Being, then, constrained and unnatural, the movement could not be eternal. But the order of the universe is eternal. Again, everything that moves with the circular movement, except the first sphere, is observed to be passed, [296<sup>b</sup>1] and to move with more than one motion. The earth, then, also, whether it moves about the centre or is stationary at it, must necessarily move with two motions. But if this were so, there would have to be passings and turnings of the fixed stars. Yet no such thing is observed. The same stars always rise and set in the same parts of the [5] earth.

Further, the natural movement of the earth, part and whole alike, is to the centre of the whole—whence the fact that it is now actually situated at the centre—but it might be questioned, since both centres are the same, which centre it is that portions of earth and other heavy things move to. Is this their goal because it [10] is the centre of the earth or because it is the centre of the whole? The goal, surely, must be the centre of the whole. For fire and other light things move to the extremity of the area which contains the centre. It happens, however, that the centre of the earth and of the whole is the same. Thus they do move to the centre of [15] the earth, but accidentally, in virtue of the fact that the earth's centre lies at the centre of the whole. That the centre of the earth is the goal of their movement is indicated by the fact that heavy bodies moving towards the earth do not move parallel but so as to make equal angles, and thus to a single centre, that of the earth. [20] It is clear, then, that the earth must be at the centre and immovable, not only for the reasons already given, but also because heavy bodies forcibly thrown quite straight upward return to the point from which they started, even if they are thrown to an unlimited distance. From these considerations then it is clear that the earth does not move and does not lie elsewhere than at the centre.

From what we have said the explanation of the earth's immobility is also [25] apparent. If it is the nature of earth, as observation shows, to

move from any point to the centre, as of fire contrariwise to move from the centre to the extremity, it is impossible that any portion of earth should move away from the centre except by [30] constraint. For a single thing has a single movement, and a simple thing a simple: contrary movements cannot belong to the same thing, and movement away from the centre is the contrary of movement to it. If then no portion of earth can move away from the centre, obviously still less can the earth as a whole so move. For it is the nature of the whole to move to the point to which the part naturally moves. Since, then, it would require a force greater than itself to move it, it must needs stay at the [297<sup>a</sup>1] centre. This view is further supported by the contributions of mathematicians to astronomy, since the phenomena—the changes of the shapes by which the order of the stars is determined—are fully accounted for on the hypothesis that the earth lies [5] at the centre. Of the position of the earth and of the manner of its rest or movement, our discussion may here end.

Its shape must necessarily be spherical. For every portion of earth has weight until it reaches the centre, and the jostling of parts greater and smaller would bring [10] about not a waved surface, but rather compression and convergence of part and part until the centre is reached. The process should be conceived by supposing the earth to come into being in the way that some of the natural philosophers describe. Only they attribute the downward movement to constraint, and it is better to keep to the [15] truth and say that the reason of this motion is that a thing which possesses weight is naturally endowed with a centripetal movement. When the mixture, then, was merely potential, the things that were separated off moved similarly from every side towards the centre. Whether the parts which came together at the centre were [20] distributed at the extremities evenly, or in some other way, makes no difference. If, on the one hand, there were a similar movement from each quarter of the extremity to the single centre, it is obvious that the resulting mass would be similar on every side. For if an equal amount is added on every side the extremity of the mass will be everywhere equidistant from its centre, i.e. the figure will be spherical. But neither [25] will it in any way affect the argument if there is not a similar accession of concurrent fragments from every side. For the greater quantity, finding a lesser in front of it, must necessarily drive it on, both having an impulse whose goal is the centre, and the greater weight driving the lesser forward till this goal is reached. In [30] this we have also the solution of a possible difficulty. The earth, it might be argued, is

at the centre and spherical in shape: if, then, a weight many times that of the earth were added to one hemisphere, the centre of the earth and of the whole will no longer be coincident. So that either the earth will not stay at the centre, or if it does, it might even now be at rest without being at the centre but at a place where it is its [297<sup>b</sup>1] nature to move. Such is the difficulty. A short consideration will give us an easy answer, if we first give precision to our postulate that any body endowed with weight, of whatever size, moves towards the centre. Clearly it will not stop when its [5] edge touches the centre. The greater quantity must prevail until its own centre occupies the centre. For that is the goal of its impulse. Now it makes no difference whether we apply this to a clod or arbitrary fragment of earth or to the earth as a whole. The fact indicated does not depend upon degrees of size but applies [10] universally to everything that has the centripetal impulse. Therefore earth in motion whether in a mass or in fragments, necessarily continues to move until it occupies the centre equally every way, the less being forced to equalize itself by the greater owing to the forward drive of the impulse.

If the earth was generated, then, it must have been formed in this way, and so [15] clearly its generation was spherical; and if it is ungenerated and has remained so always, its character must be that which the initial generation, if it had occurred, would have given it. But the spherical shape, necessitated by this argument, follows also from the fact that the motions of heavy bodies always make equal angles, and are not parallel. This would be the natural form of movement towards what is [20] naturally spherical. Either then the earth is spherical or it is at least naturally spherical. And it is right to call anything that which nature intends it to be, and which belongs to it, rather than that which it is by constraint and contrary to nature. The evidence of the senses further corroborates this. How else would eclipses of the moon show segments shaped as we see them? As it is, the shapes which the moon [25] itself each month shows are of every kind—straight, gibbous, and concave—but in eclipses the outline is always curved; and, since it is the interposition of the earth that makes the eclipse, the form of this line will be caused by the form of the earth's surface, which is therefore spherical. Again, our observations of the stars make it [30] evident, not only that the earth is circular, but also that it is a circle of no great size. For quite a small change of position on our part to south or north causes a manifest alteration of the horizon. There is much change, I mean, in the stars which are overhead, and the stars seen are different, as one moves northward or southward. [298<sup>a</sup>1] Indeed there are some stars seen in

Egypt and in the neighbourhood of Cyprus which are not seen in the northerly regions; and stars, which in the north are never beyond the range of observation, in those regions rise and set. All of which goes to [5] show not only that the earth is circular in shape, but also that it is a sphere of no great size; for otherwise the effect of so slight a change of place would not be so quickly apparent. Hence one should not be too sure of the incredibility of the view of those who conceive that there is continuity between the parts about the pillars of Hercules and the parts about India, and that in this way the ocean is one. As further [10] evidence in favour of this they quote the case of elephants, a species occurring in each of these extreme regions, suggesting that the common characteristic of these extremes is explained by their continuity. Also, those mathematicians who try to [15] calculate the size of the earth's circumference arrive at the figure 400,000 stades.<sup>15</sup> This indicates not only that the earth's mass is spherical in shape, but also that as compared with the stars it is not of great size. [20]

## BOOK III

1 · We have already discussed the first heaven and its parts, the moving stars within it, the matter of which these are composed and their nature, and we have also [25] shown that they are ungenerated and indestructible. Now things that we call natural are either substances or functions and attributes of substances. As substances I class the simple bodies—fire, earth, and the other terms of the series—and all things composed of them; for example, the heaven as a whole and its [30] parts, animals, again, and plants and their parts. By attributes and functions I mean the movements of these and of all other things in which they have power in themselves to cause movement, and also their alterations and reciprocal transformations. It is obvious, then, that the greater part of the inquiry into nature concerns [298<sup>b</sup>1] bodies; for a natural substance is either a body or a thing which cannot come into existence without body and magnitude. This appears plainly from an analysis of the [5] character of natural things, and equally from specialized studies. Since, then, we have spoken of the primary element, of its nature, and of its freedom from destruction and generation, it remains to speak of the other two. In speaking of them we shall be obliged also to inquire into generation and destruction. For if there [10] is generation anywhere, it must be in these elements and things composed of them.

This is indeed the first question we have to ask: is generation a fact or not? Earlier speculation was at variance both with itself and with the views here put forward as to the true answer to this question. Some removed generation and [15] destruction from the world altogether. Nothing that is, they said, is generated or destroyed, and our conviction to the contrary is an illusion. So maintained the school of Melissus and Parmenides. But however excellent their theories may otherwise be, anyhow they cannot be held to speak as students of nature. There may be things not subject to generation or any kind of movement, but if so they belong to [20] another and a higher inquiry than the study of nature. They, however, had no idea of any form of being other than the substance of things perceived; and when they saw, what no one previously had seen, that there could be no knowledge or wisdom without some such unchanging entities, they naturally transferred what was true of them to things perceived. Others, perhaps intentionally, maintain precisely the [25] contrary opinion to this. It had been asserted that everything in the world was subject to generation and nothing was ungenerated, but that

after being generated some things remained indestructible while the rest were again destroyed. This had been asserted in the first instance by Hesiod and his followers, but afterwards outside his circle by the earliest natural philosophers. But what these thinkers [30] maintained was that all else is being generated and is flowing, nothing having any stability, except one single thing which persists as the basis of all these transformations. So we may interpret the statements of Heraclitus of Ephesus and many others. And some subject all bodies whatever to generation, by means of the [299<sup>a</sup>1] composition and separation of planes.

Discussion of the other views may be postponed. But this last theory which composes every body of planes is, as is seen at a glance, in many respects in plain [5] contradiction with mathematics. It is, however, wrong to remove the foundations of a science unless you can replace them with others more convincing. And, secondly, the same theory which composes solids of planes clearly composes planes of lines and lines of points, so that a part of a line need not be a line. This matter has been [10] already considered in our discussion of movement, where we have shown that an indivisible length is impossible.<sup>16</sup> But with respect to natural bodies there are impossibilities involved in the view which asserts indivisible lines, which we may briefly consider at this point. For the impossible consequences which result from this view in the mathematical sphere will reproduce themselves when it is applied to [15] physical bodies, but there will be difficulties in physics which are not present in mathematics; for mathematics deals with an abstract and physics with a more concrete object. There are many attributes necessarily present in physical bodies which are necessarily absent from indivisibles. There can be nothing divisible in an indivisible thing, but the attributes of bodies are all divisible in one of two ways. [20] They are divisible into kinds, as colour is divided into white and black, and they are divisible *per accidens* when that which has them is divisible. In this latter sense attributes which are simple are all divisible. Attributes of this kind will serve, therefore, to illustrate the impossibility of the view. It is impossible, if two parts of a [25] thing have no weight, that the two together should have weight. But either all perceptible bodies or some, such as earth and water, have weight, as these thinkers would themselves admit. Now if the point has no weight, clearly the lines have not either, and, if they have not, neither have the planes. Therefore no body has weight. It is, further, manifest that the point cannot have weight. For while a heavy thing [30] may always be heavier than something and a light thing lighter than

something, a thing which is heavier or lighter than something need not be itself heavy or light, [299<sup>b</sup>1] just as a large thing is larger, but what is larger is not always large. A thing which, judged absolutely, is small may none the less be larger than other things. Whatever, then, is heavy and also heavier than something else, must be greater in [5] weight. A heavy thing therefore is always divisible. But it is agreed that a point is indivisible. Again, suppose that what is heavy is a dense body, and what is light rare. Dense differs from rare in containing more matter in the same bulk. A point, then, if it may be heavy or light, may be dense or rare. But the dense is divisible while a [10] point is indivisible. And if what is heavy must be either hard or soft, an impossible consequence is easy to draw. For a thing is soft if its surface can be pressed in, hard if it cannot; and if it can be pressed in it is divisible.

Moreover, no weight can consist of parts not possessing weight. For how, [15] except by the merest fiction, can they specify the number and character of the parts which will produce weight? And, further, if it is weight by which one weight is greater than another, then every indivisible part possesses weight. For suppose that a body of four points possesses weight. A body composed of more than four points will be superior in weight to it, a thing which has weight. But what makes something [20] heavier than a heavy thing must be heavy, just as what makes something whiter than a white thing must be white. Here the difference which makes the superior weight heavier is the single point which remains when the common number, four, is subtracted. A single point, therefore, has weight.

Further, to assume that the planes can only be put in linear contact would be ridiculous. For just as there are two ways of putting lines together, namely, end to [25] end and side by side, so there must be two ways of putting planes together. Lines can be put together so that contact is linear by laying one along the other, though not by putting them end to end. But if in putting the planes together, superficial contact is also allowed there will be bodies which are not any element nor composed of [30] elements, viz. bodies put together from planes put together in this way. Again, if it is the number of planes in a body that makes one heavier than another, as the *Timaeus*<sup>17</sup> explains, clearly the line and the point will have weight. For the cases [300<sup>a</sup>1] are, as we said before, analogous. But if the reason of differences of weight is not this, but rather the heaviness of earth and the lightness of fire, then some of the [5] planes will be light and others heavy (which involves a similar distinction in the lines and the points); the earth-plane, I mean, will be heavier than the fire-plane. In

general, the result is either that there is no magnitude at all, or that all magnitude could be done away with. For a point is to a line as a line is to a plane and as a plane [10] is to a body. Now the various forms in passing into one another will each be resolved into its ultimate constituents. It might happen therefore that nothing existed except points, and that there was no body at all. A further consideration is that if time is similarly constituted, there would be, or might be, a time at which it was done away with. For the indivisible now is like a point in a line. The same consequences follow [15] from composing the heaven of numbers, as some of the Pythagoreans do who make all nature out of numbers. For natural bodies are manifestly endowed with weight and lightness, but an assemblage of units can neither be composed to form a body nor possess weight.

[20] **2** · The necessity that each of the simple bodies should have a natural movement may be shown as follows. They manifestly move, and if they have no proper movement they must move by constraint; and the constrained is the same as the unnatural. Now an unnatural movement presupposes a natural movement [25] which it contravenes, and which, however many the unnatural movements, is always one. For naturally a thing moves in one way, while its unnatural movements are manifold. The same may be shown from the fact of rest. Rest, also, must either be constrained or natural, constrained in a place to which movement was constrained, natural in a place to which movement was natural. Now manifestly [30] there is a body which is at rest at the centre. If then this rest is natural to it, clearly motion to this place is natural to it. If, on the other hand, its rest is constrained, what is hindering its motion? Something, perhaps, which is at rest; but if so, we shall simply repeat the same argument; and either we shall come to an ultimate [300<sup>b</sup>1] something to which rest where it is is natural, or we shall have an infinite process, which is impossible. The hindrance to its movement, then, we will suppose, is a moving thing—as Empedocles says that it is the vortex which keeps the earth still—: but in that case where would it have moved to? It could not move infinitely; [5] for to traverse an infinite is impossible, and impossibilities do not happen. So the moving thing must stop somewhere, and there rest not by constraint but naturally. But a natural rest proves a natural movement to the place of rest.

Hence Leucippus and Democritus, who say that the primary bodies are in [10] perpetual movement in the void or infinite, may be asked to



explain the manner of their motion and the kind of movement which is natural to them. For if the various elements are constrained by one another to move as they do, each must still have a natural movement which the constrained contravenes, and the prime mover must [15] cause motion not by constraint but naturally. If there is no ultimate natural cause of movement and each preceding term in the series is always moved by constraint, we shall have an infinite process. The same difficulty is involved even if it is supposed, as we read in the *Timaeus*,<sup>18</sup> that before the world was made the elements moved without order. Their movement must have been due either to constraint or to their nature. And if their movement was natural, careful consideration shows that there [20] was already a world. For the prime mover must cause motion in virtue of its own natural movement, and the other bodies, moving without constraint, as they came to rest in their proper places, would fall into the order in which they now stand, the heavy bodies moving towards the centre and the light bodies away from it. But that is the order of their distribution in our world. There is a further question, too, which [25] might be asked. Is it not possible that bodies in unordered movement should combine in some cases into combinations like those of which bodies of nature's composing are composed, such, I mean, as bones and flesh? This is what Empedocles asserts to have occurred under Love. 'Many a head', he says 'came to [30] birth without a neck'.<sup>19</sup>

The answer to the view that there are infinite bodies moving in an infinite is that, if the cause of movement is single, they must move with a single motion, and therefore not without order; and if, on the other hand, the causes are of infinite [307<sup>a</sup>1] variety, their motions too must be infinitely varied. For a finite number of causes would produce a kind of order, since absence of order is not proved by diversity of direction in motions: indeed, in the world we know, not all bodies, but only bodies of the same kind, have a common goal of movement. Again, disorderly movement means in reality unnatural movement, since the order proper to perceptible things is [5] their nature. And there is also absurdity and impossibility in the notion that the disorderly movement is infinitely continued. For the nature of things is the nature which most of them possess for most of the time. Thus their view brings them into the contrary position that disorder is natural, and order or system unnatural. But no [10] natural fact can originate in chance. This is a point which Anaxagoras seems to have thoroughly grasped; for he starts his cosmogony from unmoved things. The others, it is true, make things collect together somehow before they try to produce motion and

separation. But it is unreasonable to start generation from an original state in which bodies are separated and in movement. Hence Empedocles begins [15] after the process ruled by Love; for he could not have constructed the heaven by building it up out of bodies in separation, making them to combine by the power of Love, since our world has its constituent elements in separation, and therefore presupposes a previous state of unity and combination.

These arguments make it plain that every body has its natural movement, [20] which is not constrained or contrary to its nature. We go on to show that there are certain bodies whose impetus must be that of weight and lightness. Of necessity, we assert, they must move, and a moved thing which has no natural impetus cannot move either towards or away from the centre. Suppose a body *A* without weight, [25] and a body *B* endowed with weight. Suppose the weightless body to move the distance *CD*, while *B* in the same time moves the distance *CE*, which will be greater since the heavy thing must move further. Let the heavy body then be divided in the [30] proportion *CE:CD* (for there is no reason why a part of *B* should not stand in this relation to the whole). Now if the whole moves the whole distance *CE*, the part must in the same time move the distance *CD*. A weightless body, therefore, and one which has weight will move the same distance, which is impossible. And the same [301<sup>b1</sup>] argument would fit the case of lightness. Again, a body which is in motion but has neither weight nor lightness, must be moved by constraint, and must continue its constrained movement infinitely. For there will be a force which moves it, and the [5] smaller and lighter a body is the further will a given force move it. Now let *A*, the weightless body, be moved the distance *CE*, and *B*, which has weight, be moved in the same time the distance *CD*. Dividing the heavy body in the proportion *CE:CD*, [10] we subtract from the heavy body a part which will in the same time move the distance *CE*, since the whole moved *CD*; for the relative speeds of the two bodies will be in inverse ratio to their respective sizes. Thus the weightless body will move the same distance as the heavy in the same time. But this is impossible. Hence, since [15] the motion of the weightless body will cover a greater distance than any that is suggested, it will continue infinitely.

It is therefore obvious that every body must have a definite weight or lightness. But since a source of movement within the thing itself is its nature, while a force is a source of movement in something other than it or in itself *qua* other, and since movement is always due either to nature or to constraint, movement which is [20] natural, as downward

movement is to a stone, will be merely accelerated by an external force, while an unnatural movement will be due to the force alone. In either case the air is as it were instrumental to the force. For air is both light and heavy, and thus *qua* light produces upward motion, being propelled and set in motion by [25] the force, and *qua* heavy produces a downward motion. In either case the force transmits the movement to the body by first, as it were, tying it up in the air. That is why a body moved by constraint continues to move even when that which gave the impulse ceases to accompany it. Otherwise, i. e. if the air were not endowed with this function, constrained movement would be impossible. And the natural movement of a body may be helped on in the same way. This discussion suffices to show [30] that all bodies are either light or heavy, and how unnatural movement takes place.

From what has been said earlier it is plain that there cannot be generation either of everything or in an absolute sense of anything. It is impossible that [302<sup>a</sup>1] everything should be generated, unless a separate void is possible. For the place which is to be occupied by that which is coming to be when it has come to be, must have been previously occupied by void in which no body was. Now it is quite possible for one body to be generated out of another, air for instance out of fire, but in the [5] absence of any pre-existing mass generation is impossible. That which is potentially a certain kind of body may, it is true, become such in actuality. But if the potential body was not already in actuality some other kind of body, the existence of a separate void must be admitted.

[10] **3** · It remains to say what bodies are subject to generation, and why. Since in every case knowledge depends on what is primary, and the elements are the primary constituents of bodies, we must ask which of such bodies are elements, and why; and after that what is their number and character. The answer will be plain if we first explain what kind of substance an element is. An element, we take it, is a body into [15] which other bodies may be analysed, present in them potentially or in actuality (which of these, is still disputable), and not itself divisible into bodies different in form. That, or something like it, is what all men in every case mean by element. Now if what we have described is an element, clearly there must be such bodies. For [20] flesh and wood and all other similar bodies contain potentially fire and earth, since one sees these elements exuded from them; and, on the other hand, neither in potentiality nor in actuality does fire contain flesh or wood, or it would exude them.

Similarly, even if there were only one elementary body, it would not contain them. [25] For though it will be either flesh or bone or something else, that does not at once show that it contained these in potentiality: the further question remains, in what manner it becomes them. Now Anaxagoras opposes Empedocles' view of the elements. Empedocles says that fire and earth and the related bodies are elementary bodies of which all things are composed; but this Anaxagoras denies. His elements [30] are the homoeomerous things, viz. flesh, bone, and the like. Earth and fire are mixtures, composed of them and all the other seeds, each consisting of a collection [302<sup>b</sup>1] of all the homoeomerous bodies, separately invisible; and that explains why from these two bodies all others are generated. (To him fire and *aither* are the same thing.) But since every natural body has its proper movement, and movements are [5] either simple or mixed, mixed in mixed bodies and simple in simple, there must obviously be simple bodies; for there are simple movements. It is plain, then, that there are elements, and why.

4 · The next question to consider is whether the elements are finite or infinite [10] in number, and, if finite, what their number is. Let us first show reason for denying that their number is infinite, as some suppose. We begin with the view of Anaxagoras that all the homoeomerous bodies are elements. Any one who adopts this view misapprehends the meaning of element. Observation shows that even [15] mixed bodies are often divisible into homoeomerous parts; examples are flesh, bone, wood, and stone. Since then the composite cannot be an element, not every homoeomerous body can be an element; only, as we said before, that which is not divisible into bodies different in form. But even taking 'element' as they do, they [20] need not assert an infinity of elements, since the hypothesis of a *finite* number will give identical results. Indeed even two or three such bodies serve the purpose as well, as Empedocles' attempt shows. Again, even on their view it turns out that all things are not composed of homoeomerous bodies. They do not pretend that a face is [25] composed of faces, or that any other natural conformation is composed of parts like itself. Obviously then it would be better to assume a finite number of principles. They should, in fact, be as few as possible, consistently with proving what has to be proved. This is the common demand of mathematicians, who always assume as principles things finite either in kind or in number. Again, if body is distinguished [30] from body by the appropriate qualitative difference, and there is a limit to the [303<sup>a</sup>1] number of differences (for the difference lies in qualities

apprehended by sense, which are in fact finite in number, though this requires proof), then manifestly there is necessarily a limit to the number of elements.

There is, further, another view—that of Leucippus and Democritus of Abdera—the implications of which are also unreasonable. The primary masses, [5] according to them, are infinite in number and indivisible in mass: one cannot turn into many nor many into one; and all things are generated by their combination and involution. Now this view in a sense makes things out to be numbers or composed of [10] numbers. The exposition is not clear, but this is its real meaning. And further, they say that since the atomic bodies differ in shape, and there is an infinity of shapes, there is an infinity of simple bodies. But they have never explained in detail the shapes of the various elements, except so far as to allot the sphere to fire. Air, water, [15] and the rest they distinguished by the relative size of the atom, assuming that its nature was a sort of seed-bed for each and every element. Now, in the first place, they make the mistake already noticed. The principles which they assume are not limited in number, though such limitation would necessitate no other alteration in their theory. Further, if the differences of bodies are not infinite, plainly the [20] elements will not be an infinity. Besides, a view which asserts atomic bodies must needs come into conflict with the mathematical sciences, in addition to invalidating many reputable opinions and phenomena of sense perception. But of these things we have already spoken in our discussion of time and movement.<sup>20</sup> They are also bound [25] to contradict themselves. For if the elements are atomic, air, earth, and water cannot be differentiated by the relative sizes of their atoms, since then they could not be generated out of one another. The extrusion of the largest atoms is a process that will in time exhaust the supply; and it is by such a process that they account for the generation of water, air, and earth from one another. Again, even on their own [30] presuppositions it does not seem as if the elements would be infinite in number. The atoms differ in figure, and all figures are composed of pyramids, rectilinear in the [303<sup>b</sup>1] case of rectilinear figures, while the sphere has eight pyramidal parts. The figures must have their principles, and, whether these are one or two or more, the simple bodies must be the same in number as they. Again, if every element has its proper movement, and a simple body has a simple movement, and the number of simple [5] motions is not infinite, because the simple motions are only two and the number of places is not infinite, on these grounds also we should have to deny that the number of elements is infinite.

5 · Since the number of the elements must be limited, it remains to inquire [10] whether there is more than one element. Some assume one only, which is according to some water, to others air, to others fire, to others again something finer than water and denser than air, an infinite body—so they say—embracing all the heavens.

Now those who decide for a single element, which is either water or air or a body finer than water and denser than air, and proceed to generate other things out of it by use of density and rarity, all alike fail to observe the fact that they are [15] introducing something else prior to the element. Generation out of the elements is, as they say, synthesis, and generation into the elements is analysis, so that the body with the finer parts must have priority in the order of nature. But they say that fire is of all bodies the finest. Hence fire will be first in the natural order. And whether [20] the finest body is fire or not makes no difference; anyhow it must be one of the other bodies that is primary and not that which is intermediate. Again, density and rarity, as instruments of generation, are equivalent to fineness and coarseness, since the fine is rare, and coarse in their use means dense. But fineness and coarseness, again, [25] are equivalent to greatness and smallness, since a thing with small parts is fine and a thing with large parts coarse. For that which spreads itself out widely is fine, and a thing composed of small parts is so spread out. In the end, then, they distinguish the various other substances by the greatness and smallness of their parts. This method of distinction makes all judgement relative. There will be no absolute distinction [30] between fire, water, and air, but one and the same body will be relatively to this fire, relatively to something else air. The same difficulty is involved equally in the view [304<sup>a</sup>1] which recognizes several elements and distinguishes them by their greatness and smallness. The principle of distinction between bodies being quantity, the various sizes will be in a definite ratio, and whatever bodies are in this ratio to one another must be air, fire, earth, and water respectively. For the ratios of smaller bodies may [5] be repeated among greater bodies.

Those who start from fire as the single element, while avoiding this difficulty, involve themselves in many others. Some of them give fire a particular shape, like those who make it a pyramid, and this on one of two grounds. The reason given may [10] be—more crudely—that the pyramid is the most piercing of figures as fire is of bodies, or—more ingeniously—the position may be supported by the following argument. As all bodies are composed of that which has the finest parts, so all solid

figures are composed of pyramids; but the finest body is fire, while among figures [15] the pyramid is primary and finest; and the primary body must have the primary figure: therefore fire will be a pyramid. Others, again, express no opinion on the subject of its figure, but simply regard it as the body of the finest parts, which in combination will form other bodies, as if from the blowing together of pieces of dust. [20] Both of these views involve the same difficulties. For if, on the one hand, they make the primary body an atom, the view will be open to the objections already advanced against the atomic theory. And further the theory is inconsistent with a regard for the facts of nature. For if all bodies are quantitatively commensurable, and the [25] relative size of the various homoeomerous masses and of their several elements are in the same ratio, so that the total mass of water, for instance, is related to the total mass of air as the elements of each are to one another, and so on, and if there is more air than water and, generally, more of the finer body than of the coarser, obviously [30] the element of water will be smaller than that of air. But the lesser quantity is contained in the greater. Therefore the air element is divisible. And the same could be shown of fire and of all bodies whose parts are relatively fine. If, on the other [304<sup>b</sup>1] hand, the primary body is divisible, then those who give fire a special shape will have to say that a part of fire is not fire, because a pyramid is not composed of [5] pyramids, and also that not every body is either an element or composed of elements, since a part of fire will be neither fire nor any other element. And those whose ground of distinction is size will have to recognize an element prior to the element, a regress which continues infinitely, since every body is divisible and that which has the smallest parts is the element. Further, they too will have to say that [10] the same body is relatively to this fire and relatively to that air, to others again water and earth.

The common error of all views which assume a single element is that they allow only one natural movement, which is the same for every body. For it is a matter of observation that every natural body possesses a principle of movement. If then all [15] bodies are one, all will have one movement. With this motion the greater their quantity the more they will move, just as fire, in proportion as its quantity is greater, moves faster with the upward motion which belongs to it. But the fact is that increase of quantity makes many things move the faster downward. For these reasons, then, as well as from the distinction already established of a plurality of [20] natural movements, it is impossible that there should be only one element. But if the elements are not an infinity and not

reducible to one, they must be several and finite in number.

6 · First we must inquire whether the elements are eternal or subject to generation and destruction; for when this question had been answered their number [25] and character will be manifest. In the first place, they cannot be eternal. It is a matter of observation that fire, water, and every simple body undergo a process of analysis, which must either continue infinitely or stop somewhere. Suppose it infinite. Then the time occupied by the process will be infinite, and also that occupied by the reverse process of synthesis. For the processes of analysis and [30] synthesis succeed one another in the various parts. It will follow that there are two infinite times which are mutually exclusive, the time occupied by the synthesis, which is infinite, being preceded by the period of analysis. There are thus two mutually exclusive infinities, which is impossible. Suppose, on the other hand, that [305<sup>a</sup>1] the analysis stops somewhere. Then the body at which it stops will be either atomic or, as Empedocles seems to have intended, a divisible body which will yet never be divided. The foregoing arguments show that it cannot be an atom; but neither can it [5] be a divisible body which analysis will never reach. For a smaller body is more easily destroyed than a larger; and a destructive process which succeeds in destroying, that is, in resolving into smaller bodies, a body of some size, cannot reasonably be expected to fail with the smaller body. Now in fire we observe a destruction of two [10] kinds: it is destroyed by its contrary when it is quenched, and by itself when it dies out. But the effect is produced by a greater quantity upon a lesser, and the more quickly the smaller it is. The elements of bodies must therefore be subject to destruction and generation.

Since they are generated, they must be generated either from something incorporeal or from a body, and if from a body, either from one another or from [15] something else. The theory which generates them from something incorporeal requires a separate void. For everything that comes to be comes to be in something, and that in which the generation takes place must either be incorporeal or possess body; and if it has body, there will be two bodies in the same place at the same time, viz. that which is coming to be and that which was previously there, while if it is incorporeal, there must be a separate void. But we have already shown that this is [20] impossible. But, on the other hand, it is equally impossible that the elements should be generated from some kind of body. That would involve a body distinct from the elements and prior



to them. But if this body possesses weight or lightness, it will be one of the elements; and if it has no tendency to movement, it will be an immovable [25] or mathematical entity, and therefore not in a place at all. A place in which a thing is at rest is a place in which it might move, either by constraint, i.e. unnaturally, or in the absence of constraint, i.e. naturally. If, then, it is in a place and somewhere, it will be one of the elements; and if it is not in a place, nothing can come from it, since that which comes into being and that out of which it comes must needs be together. [30] The elements therefore cannot be generated from something incorporeal nor from a body which is not an element, and the only remaining possibility is that they are generated from one another.

7 · We must, therefore, turn to the question, what is the manner of their generation from one another? Is it as Empedocles and Democritus say, or as those who resolve bodies into planes say, or is there yet another possibility?

What the followers of Empedocles and Democritus do, though without [305<sup>b</sup>1] observing it themselves, is to reduce the generation of elements out of one another to an illusion. They make it a process of excretion from a body of what was in it all the time—as though generation required a vessel rather than a material—so that it involves no change of anything. And even if this were accepted, there are other [5] implications equally unsatisfactory. We do not expect a mass of matter to be made heavier by compression. But they will be bound to maintain this, if they say that water is a body present in air and excreted from air, since air becomes heavier when it turns into water. Again, when the mixed body is divided, they can show no reason [10] why one of the constituents must by itself take up more room than the body did; but when water turns into air, the room occupied is increased. The fact is that the finer body takes up more room, as is obvious in any case of transformation. As the liquid is converted into vapour or air the vessel which contains it is often burst because it [15] does not contain room enough. Now, if there is no void at all, and if, as those who take this view say, there is no expansion of bodies, the impossibility of this is manifest; and if there is void and expansion, there is no accounting for the fact that the body which results from division occupies of necessity a greater space. It is inevitable, too, that generation of one out of another should come to a stop, since a [20] finite quantum cannot contain an infinity of finite quanta. When earth produces water something is taken away from

the earth, for the process of excretion. The same thing happens again when the residue produces water. But this can only go on [25] for ever, if the finite body contains an infinity, which is impossible. Therefore the generation of elements out of one another will not always continue.

We have now explained that the mutual transformations of the elements cannot take place by means of excretion. The remaining alternative is that they should be generated by changing into one another. And this in one of two ways, [30] either by change of shape, as the same wax takes the shape both of a sphere and of a cube, or, as some assert, by resolution into planes. Generation by change of shape would necessarily involve atomic bodies. For if the particles were divisible there would be a part of fire which was not fire and a part of earth which was not earth, for the reason that not every part of a pyramid is a pyramid nor of a cube a cube. [306<sup>a</sup>1] But if the process is resolution into planes, the first difficulty is that the elements cannot all be generated out of one another. This they are obliged to assert, and do assert. It is absurd, because it is unreasonable that one element alone should have no part in the transformations, and also contrary to the observed data of sense, [5] according to which all alike change into one another. In fact their explanation of the phenomena is not consistent with the phenomena. And the reason is that their ultimate principles are wrongly assumed: they had certain predetermined views, and were resolved to bring everything into line with them. It seems that perceptible [10] things require perceptible principles, eternal things eternal principles, corruptible things corruptible principles; and, in general, every subject matter principles homogeneous with itself. But they, owing to their love for their principles, fall into the attitude of men who undertake the defence of a position in argument. In the confidence that the principles are true they are ready to accept any consequence of [15] their application. As though some principles did not require to be judged from their results, and particularly from their final issue! And that issue, which in the case of productive knowledge is the product, in the knowledge of nature is the phenomena always and properly given by perception.

The result of their view is that earth has the best right to the name element, and is alone indestructible; for that which is indissoluble is indestructible and [20] elementary, and earth alone cannot be dissolved into any body but itself. Again, in the case of those elements which do suffer dissolution, the 'suspension' of the triangles is unreasonable. But this takes place whenever one is dissolved into another, because of the numerical inequality of the triangles which compose them. Further, those

who hold these views must needs suppose that generation does not [25] start from a body. For what is generated out of planes cannot be said to have been generated from a body. And they must also assert that not all bodies are divisible, coming thus into conflict with our most accurate sciences, namely the mathematical, which assume that even the intelligible is divisible, while they, in their anxiety to save their hypothesis, cannot even admit this of every perceptible thing. For any [30] one who gives each element a shape of its own, and makes this the ground of distinction between the substances, has to attribute to them indivisibility; since division of a pyramid or a sphere must leave somewhere at least a residue which is not a sphere or a pyramid. Either, then, a part of fire is not fire, so that there is a body prior to the element—for every body is either an element or composed of [306<sup>b</sup>1] elements—or not every body is divisible.

8 · In general, the attempt to give a shape to each of the simple bodies is unsound, for the reason, first, that they will not succeed in filling the whole. It is agreed that there are only three plane figures which can fill a space, the triangle, the [5] square, and the hexagon, and only two solids, the pyramid and the cube. But the theory needs more than these because the elements which it recognizes are more in number. Secondly, it is manifest that the simple bodies are often given a shape by the place in which they are included, particularly water and air. In such a case the [10] shape of the element cannot persist; for, if it did, the contained mass would not be in continuous contact with the containing body; while, if its shape is changed, it will cease to be water, since the distinctive quality is shape. Clearly, then, their shapes are not fixed. Indeed, nature itself seems to offer corroboration to this theoretical [15] conclusion. Just as in other cases the substratum must be formless and unshapen—for thus the ‘all-receptive’, as we read in the *Timaeus*<sup>21</sup> will be best for modelling—so the elements should be conceived as a material for composite things; [20] and that is why they can put off their qualitative distinctions and pass into one another. Further, how can they account for the generation of flesh and bone or any other continuous body? The elements alone cannot produce them because their collocation cannot produce a continuum. Nor can the composition of planes; for this [25] produces the elements themselves, not bodies made up of them. Any one then who insists upon an exact statement of this kind of theory, instead of assenting after a passing glance at it, will see that it removes generation from the world.

Further, the very properties, powers, and motions, to which they paid [30] particular attention in allotting shapes, show the shapes not to be in accord with the bodies. Because fire is mobile and productive of heat and combustion, some made it a sphere, others a pyramid. These shapes, they thought, were the most mobile because they offer the fewest points of contact and are the least stable of any; they were also the most apt to produce heat and combustion, because the one is angular [307<sup>a</sup>1] throughout while the other has the most acute angles, and the angles, they say, produce heat and combustion. Now, in the first place, with regard to movement both are in error. These may be the figures best adapted to movement; they are not, [5] however, well adapted to the movement of fire, which is an upward and rectilinear movement, but rather to that form of circular movement which we call rolling. Earth, again, they call a cube because it is stable and at rest. But it rests only in its own place, not anywhere; from any other it moves if nothing hinders, and fire and [10] the other bodies do the same. The obvious inference, therefore, is that fire and each several element is in a foreign place a sphere or a pyramid, but in its own a cube. Again, if the possession of angles makes a body produce heat and combustion, every element produces heat, though one may do so more than another. For they all [15] possess angles, the octahedron and dodecahedron as well as the pyramid; and Democritus makes even the sphere a kind of angle, which cuts things because of its mobility. The difference, then, will be one of degree; and this is plainly false. They must also accept the inference that the mathematical solids produce heat and [20] combustion, since they too possess angles and contain atomic spheres and pyramids, especially if there are, as they allege, atomic magnitudes. Anyhow if these functions belong to some of these things and not to others, they should explain the difference, instead of speaking in quite general terms as they do. Again, combustion of a body [25] produces fire, and fire is a sphere or a pyramid. The body, then, is turned into spheres or pyramids. Let us grant that these figures may reasonably be supposed to cut and break up bodies; still it remains quite inexplicable that a pyramid must needs produce pyramids or a sphere spheres. One might as well postulate that a [30] knife or a saw divides things into knives or saws. It is also ridiculous to think only of division when allotting fire its shape. Fire is generally thought of as combining and connecting rather than as separating. For though it separates bodies different in [307<sup>b</sup>1] kind, it combines those which are the same; and the combining is essential to it, the functions of connecting and uniting being a mark of fire, while the separating is

incidental. For the expulsion of the foreign body is an incident in the compacting of the homogeneous. In choosing the shape, then, they should have thought either of [5] both functions or preferably of the combining function. In addition, since hot and cold are contrary powers, it is impossible to allot any shape to the cold. For the shape given must be the contrary of that given to the hot, but there is no contrariety between figures. That is why they have all left the cold out, though properly either [10] all or none should have their distinguishing figures. Some of them, however, do attempt to explain this power, and they contradict themselves. A body of large particles, they say, is cold because instead of penetrating through the passages it crushes. Clearly, then, that which is hot is that which penetrates these passages, or [15] in other words that which has fine particles. It results that hot and cold are distinguished not by the figure but by the size of the particles. Again, if the pyramids are unequal in size, the large ones will not be fire, and that figure will produce not combustion but its contrary.

From what has been said it is clear that the difference of the elements does not [20] depend upon their shape. Now the most important differences of bodies are those of property, function, and power; for every natural body has, we maintain, its own functions, properties, and powers. Our first business, then, will be to speak of these, and that inquiry will enable us to explain the differences of each from each.

## BOOK IV

1 · We have now to consider the heavy and the light. We must ask what the bodies so called are, how they are constituted, and what is the reason of their [30] possessing these powers. The consideration of these questions is a proper part of the theory of movement, since we call things heavy and light because they have the power of being moved naturally in a certain way. (The activities corresponding to these powers have not been given any name, unless it is thought that 'impetus' is such a name.) But because the inquiry into nature is concerned with movement, and [308<sup>a</sup>1] these things have in themselves some spark (as it were) of movement, all inquirers avail themselves of these powers, though in all but a few cases without exact discrimination. We must then first look at whatever others have said, and formulate the questions which require settlement in the interests of this inquiry, before we go [5] on to state our own view of the matter.

Things are called heavy and light both without qualification and in relation to something else. Of two heavy things, such as wood and bronze, we say that the one is relatively light, the other relatively heavy. Our predecessors have not dealt at all with the absolute use of the terms, but only with the relative. I mean, they do not [10] explain what the heavy is or what the light is, but only the relative heaviness and lightness of things possessing weight. This can be made clearer as follows. There are things whose constant nature it is to move away from the centre, while others move constantly towards the centre; and of these movements that which is away from the [15] centre I call upward movement and that which is towards it I call downward movement. (The view, urged by some, that there is no up and no down in the heaven, is absurd. There can be, they say, no up and no down, since the universe is similar every way, and from any point on the earth's surface a man by advancing far [20] enough will come to stand foot to foot with himself. But the extremity of the whole, which we call 'above', is in position above and in nature primary. And since the universe has an extremity and a centre, it must clearly have an up and down. Common usage is thus correct, though inadequate. And the reason of its inadequacy is that men think that the universe is not similar every way. They [25] recognize only the hemisphere which is over us. But if they went on to think of the world as formed on this pattern all round, with a centre identically related to each point on the extremity, they would have to admit that the extremity was

above and the centre below.) By absolutely light, then, we mean that which moves upward or to the extremity, and by absolutely heavy that which moves downward or to the [30] centre. By lighter or relatively light we mean that one, of two bodies endowed with weight and equal in bulk, which is exceeded by the other in the speed of its natural downward movement.

2 · Those of our predecessors who have entered upon this inquiry have for the most part spoken of light and heavy things only in the sense in which one of two [35] things both endowed with weight is said to be the lighter. And this treatment they consider a sufficient analysis also of the notions of absolute heaviness and absolute [308<sup>b</sup>1] lightness, to which their account does not apply. This, however, will become clearer as we advance. One use of the terms ‘lighter’ and ‘heavier’ is that which is set forth in writing in the *Timaeus*<sup>22</sup> that the body which is composed of the greater number [5] of identical parts is relatively heavy, while that which is composed of a smaller number is relatively light. As a larger quantity of lead or of bronze is heavier than a smaller—and this holds good of all homogeneous masses, the superior weight always depending upon a numerical superiority of equal parts—in precisely the same [10] way, they assert, lead is heavier than wood. For all bodies, in spite of the general opinion to the contrary, are composed of identical parts and of a single material. But this analysis says nothing of the absolutely heavy and light. The facts are that fire is always light and moves upward, while earth and all earthy things move downwards [15] or towards the centre. It cannot then be the fewness of the triangles (of which, in their view, all these bodies are composed) which disposes fire to move upward. If it were, the greater the quantity of fire the slower it would move, owing to the increase in weight due to the increased number of triangles. But the palpable fact, on the [20] contrary, is that the greater the quantity, the lighter the mass is and the quicker its upward movement; and, similarly, in the reverse movement from above downward, the small mass will move quicker and the large slower. Further, since to be lighter is to have fewer of these homogeneous parts and to be heavier is to have more, and air, water, and fire are composed of the same triangles, the only difference being in the number of such parts, which must therefore explain any distinction of relatively [25] light and heavy between these bodies, it follows that there must be a certain quantum of air which is heavier than water. But the facts are directly opposed to this. The larger the quantity of air the more readily it moves upward, and any portion of

air without exception will rise up out of the water.

So much for one view of the distinction between light and heavy. To others the [30] analysis seemed insufficient; and their views on the subject, though they belong to an older generation, have an air of novelty. It is apparent that there are bodies which, when smaller in bulk than others, yet exceed them in weight. It is therefore obviously insufficient to say that bodies of equal weight are composed of an equal number of primary parts; for that would give equality of bulk. Those who maintain that the primary or atomic parts, of which bodies endowed with weight are [309a1] composed, are planes, cannot so speak without absurdity; but those who regard them as solids are in a better position to assert that of such bodies the larger is the heavier. But since in composite bodies the weight obviously does not correspond in this way to the bulk, the lesser bulk being often seen to be superior in weight (as, for [5] instance, if one be wool and the other bronze), there are some who think and say that the cause is to be found elsewhere. The void, they say, which is imprisoned in bodies, lightens them and sometimes makes the larger body the lighter. The reason is that there is more void. And this would also account for the fact that a body composed of a number of solid parts equal to, or even smaller than, that of another is [10] sometimes larger in bulk than it. In short, generally and in every case a body is relatively light when it contains a relatively large amount of void. This is the way they put it themselves, but their account requires an addition. Relative lightness must depend not only on an excess of void, but also on a defect of solid; for if the ratio of solid to void exceeds a certain proportion, the relative lightness will [15] disappear. Thus fire, they say, is the lightest of things just for this reason that it has the most void. But it would follow that a large mass of gold, as containing more void than a small mass of fire, is lighter than it, unless it also contains many times as much solid. The addition is therefore necessary.

Of those who deny the existence of a void some, like Anaxagoras and Empedocles, have not tried to analyse the notions of light and heavy at all; and those [20] who, while still denying the existence of a void, have attempted this, have failed to explain why there are bodies which are absolutely heavy and light, or in other words why some always move upward and others downward. The fact, again, that the body of greater bulk is sometimes lighter than smaller bodies is one which they have [25] passed over in silence, and what they have said gives no obvious suggestion for reconciling their views with the phenomena.

But those who attribute the lightness of fire to its containing so much



void are necessarily involved in practically the same difficulties. For though fire be supposed to contain less solid than any other body, as well as more void, yet there will be a [30] certain quantum of fire in which the amount of solid or plenum is in excess of the solids contained in some small quantity of earth. They may reply that there is an excess of void also. But the question is, how will they discriminate the absolutely heavy? Presumably, either by its excess of solid or by its defect of void. On the former view there could be an amount of earth so small as to contain less solid than [309<sup>b</sup>1] a large mass of fire. And similarly, if the distinction rests on the amount of void, there will be body, lighter than the absolutely light, which nevertheless moves downward as constantly as the other moves upward. But that cannot be so, since the absolutely light is always lighter than bodies which have weight and move [5] downward, while, on the other hand, that which is lighter need not be light, because in common speech we distinguish a lighter and a heavier (viz. water and earth) among bodies endowed with weight. Again, the suggestion of a certain ratio between the void and the solid in a body is no more equal to solving the problem before us. This manner of speaking will issue in a similar impossibility. For any two [10] portions of fire, small or great, will exhibit the same ratio of solid to void; but the upward movement of the greater is quicker than that of the less, just as the downward movement of a mass of gold or lead, or of any other body endowed with weight, is quicker in proportion to its size. This, however, should not be the case if [15] the ratio is the ground of distinction between heavy things and light. There is also an absurdity in attributing the upward movement of bodies to a void which does not itself move. If, however, it is the nature of a void to move upward and of a plenum to move downward, and therefore each causes a like movement in other things, there was no need to raise the question why composite bodies are some light and some [20] heavy; they had only to explain why these two things are themselves light and heavy respectively and to give, further, the reason why the plenum and the void are not eternally separated. It is also unreasonable to imagine a place for the void, as if the void were not itself a kind of place. But if the void is to move, it must have a place [25] out of which and into which the change carries it. Also what is the cause of its movement? Not, surely, its voidness; for it is not the void only which is moved, but also the solid.

Similar difficulties are involved in all other methods of distinction, whether [30] they account for the relative lightness and heaviness of bodies by distinctions of size, or proceed on any other principle, so long

as they attribute to each the same matter, or even if they recognize more than one matter, so long as that means only a pair of contraries. If there is a single matter, as with those who compose things of triangles, nothing can be absolutely heavy or light; and if there is one matter and its [310<sup>a</sup>1] contrary—the void, for instance, and the plenum—no reason can be given for the relative lightness and heaviness of the bodies intermediate between the absolutely light and heavy when compared either with one another or with these themselves. The view which bases the distinction upon differences of size is more like a mere [5] fiction than those previously mentioned, but, in that it is able to make distinctions between the four elements, it is in a stronger position for meeting the foregoing difficulties. Since, however, it imagines that these bodies which differ in size are all of one nature, it implies, equally with the view that there is but one matter, that there is nothing absolutely light and nothing which moves upward (except as being [10] passed by other things or forced up by them); and since a multitude of small atoms are heavier than a few large ones, it will follow that much air or fire is heavier than a little water or earth, which is impossible.

3 · These, then, are the views which have been advanced by others and the [15] terms in which they state them. We may begin our own statement by settling a question which to some has been the main difficulty—the question why some bodies move always and naturally upward and others downward, while others again move both upward and downward. After that we will inquire into light and heavy and the [20] explanation of the various properties connected with them. The local movement of each body into its own place must be regarded as similar to what happens in connexion with other forms of generation and change. There are, in fact, three kinds of movement, affecting respectively the size, the form, and the place of a thing, and [25] in each it is observable that change proceeds from a contrary to a contrary or to something intermediate: it is never the change of any chance subject in any chance direction, nor, similarly, is the relation of the mover to its object fortuitous: the thing altered is different from the thing increased, and precisely the same difference holds between that which produces alteration and that which produces increase. In [30] the same manner it must be thought that that which produces local motion and that which is so moved are not fortuitously related. Now, that which produces upward and downward movement is that which produces weight and lightness, and that which is moved is that which is potentially heavy and light, and

the movement of each body to its own place is motion towards its own form. (It is best to interpret in [310<sup>b</sup>1] this sense the old saying that 'like moves to like'. For the words are not in every sense true to fact. If one were to remove the earth to where the moon now is, the various fragments of earth would each move not towards it but to the place in which [5] it now is. In general, when a number of similar and undifferentiated bodies are moved with the same motion this result is necessarily produced, viz. that the place which is the natural goal of the movement of each single part is also that of the whole. But since the place of a thing is the boundary of that which contains it, and all things that move upward or downward are contained by the extremity and the centre, and this boundary comes to be, in a sense, the form of that which is [10] contained, for something to move to its own place is for it to move to its like. For the successive members of the series are like one another: water, I mean, is like air and air like fire, and between intermediates the relation may be converted, though not between them and the extremes; thus air is like water, but water is like earth; for the relation of each outer body to that which is next within it is that of form to matter.) [15] Thus to ask why fire moves upward and earth downward is the same as to ask why the healable, when moved and changed *quâ* healable, attains health and not whiteness; and similar questions might be asked concerning any other subject of alteration. Of course the subject of increase, when changed *quâ* increasable, attains [20] not health but a superior size. The same applies in the other cases. One thing changes in quality, another in quantity: and so in place, a light thing goes upward, a heavy thing downward. The only difference is that in the last case, viz. that of the [25] heavy and the light, the bodies are thought to have a principle of change within themselves, while the subjects of healing and increase are thought to be moved purely from without. Sometimes, however, even they change of themselves, i.e. in response to a slight external movement reach health or increase, as the case may be. And since the same thing which is healable is also receptive of disease, it depends on whether it is moved *quâ* healable or *quâ* liable to disease whether the motion is towards health or towards disease. But the reason why the heavy and the light [30] appear more than these things to contain within themselves the principle of their movements is that their matter is nearest to substance. This is indicated by the fact that locomotion belongs to bodies only when isolated from other bodies, and is generated last of the several kinds of movement; in order of being then it will be first. Now whenever air comes into being out of water, light out of heavy, it goes to [311<sup>a</sup>1] the

upper place. It is forthwith light: becoming is at an end, and in that place it has being. Obviously, then, it is a potentiality, which, in its passage to actuality, comes into that place and quantity and quality which belong to its actuality. And the same [5] fact explains why what is already actually fire or earth moves, when nothing obstructs it, towards its own place. For motion is equally immediate in the case of nutriment, when nothing hinders, and in the case of the thing healed, when nothing stays the healing. But the movement is also due to the original creative force and to [10] that which removes the hindrance or off which the moving thing rebounded, as was explained in our opening discussions, where we tried to show how none of these things moves itself.<sup>23</sup> The reason of the various motions of the various bodies, and the meaning of the motion of a body to its own place, have now been explained.

4 · We have now to speak of the distinctive properties of these bodies and of [15] the various properties connected with them. In accordance with general conviction we may distinguish the absolutely heavy, as that which sinks to the bottom of all things, from the absolutely light, which is that which rises to the surface of all things. I use the term ‘absolutely’ with reference to the genus and to those bodies which do not combine lightness and heaviness. It is apparent, I mean, that fire, in [20] whatever quantity, so long as there is no external obstacle, moves upward, and earth downward; and, if the quantity is increased, the movement is the same, though swifter. But the heaviness and lightness of bodies which combine these qualities is different from this, since while they rise to the surface of some bodies they sink to the bottom of others. Such are air and water. Neither of them is absolutely either [25] light or heavy. Both are lighter than earth—for any portion of either rises to the surface of it—but heavier than fire, since a portion of either, whatever its quantity, sinks to the bottom of fire; compared together, however, the one has absolute weight, the other absolute lightness, since air in any quantity rises to the surface of water, while water in any quantity sinks to the bottom of air. Now other bodies are [30] severally light and heavy, and evidently in them the attributes are due to the difference of their uncompounded parts: that is to say, according as the one or the other happens to preponderate the bodies will be heavy and light respectively. Therefore we need only speak of these parts, since they are primary and all else consequential; and in so doing we shall be following the advice which we gave to those who attribute heaviness to the presence of plenum and lightness to that of [311b1] void. It is due to the properties of the

elementary bodies that a body which is regarded as light in one place is regarded as heavy in another, and vice versa. In air, for instance, a talent's weight of wood is heavier than a mina of lead, but in water [5] the wood is the lighter. The reason is that all the elements except fire have weight and all but earth lightness. Earth, then, and bodies in which earth preponderates, must needs have weight everywhere, while water is heavy anywhere but in earth, and air is heavy when not in water or earth. In its own place each of these bodies has weight except fire, even air. Of this we have evidence in the fact that a bladder when [10] inflated weighs more than when empty. A body, then, in which air preponderates over earth and water, may well be lighter than something in water and yet heavier than it in air, since such a body does not rise in air but rises to the surface in water.

The following account will make it plain that there are absolutely light and [15] absolutely heavy things. And by absolutely light I mean one which of its own nature always moves upward, by absolutely heavy one which of its own nature always moves downward, if no obstacle is in the way. There are, I say, these two kinds of body, and it is not the case, as some maintain, that all bodies have weight. Others [20] indeed agree with us that there is a heavy body, which moves uniformly towards the centre. But there is also similarly a light body. For we see with our eyes, as we said before, that earthy things sink to the bottom of all things and move towards the [25] centre. But the centre is a fixed point. If therefore there is some body which rises to the surface of all things—and we observe fire to move upward even in air itself, while the air remains at rest—clearly this body is moving towards the extremity. It cannot then have any weight. If it had, there would be another body in which it sank; and if that were so, there would be another which moved to the extremity and thus rose to the surface of all moving things. In fact, however, we have no evidence of such a body. Fire, then, has no weight. Neither has earth any lightness, since it sinks to the bottom of all things, and that which sinks moves to the centre. That there is a centre towards which the motion of heavy things, and away from which [30] that of light things is directed, is manifest in many ways. First, because no movement can continue to infinity. For what cannot be can no more come-to-be than be, and movement is a coming-to-be in one place from another. Secondly, like the upward movement of fire, the downward movement of earth and all heavy things makes equal angles on every side with the earth's surface; it must therefore be directed towards the centre. Whether it is really the centre of the earth and not [312<sup>a</sup>1] rather that of the whole to

which it moves, may be left to another inquiry, since these are coincident.<sup>24</sup> But since that which sinks to the bottom of all things moves to the centre, necessarily that which rises to the surface of all things moves to the extremity of the region in which the movement of these bodies takes place. For the [5] centre is opposed as contrary to the extremity, as that which always sinks is opposed to that which rises to the surface. This also gives a reasonable ground for the duality of heavy and light in the spatial duality centre and extremity. Now there is also the intermediate region to which each name is given in opposition to the other extreme. For that which is intermediate between the two is in a sense both extremity and [10] centre. For this reason there is another heavy and light; namely, water and air. But in our view the container pertains to form and the contained to matter; and this distinction is present in every genus. Alike in the sphere of quality and in that of quantity there is that which corresponds rather to form and that which corresponds to matter. In the same way, among spatial distinctions, the above belongs to the [15] determinate, the below to matter. The same holds, consequently, also of the matter itself of that which is heavy and light: as potentially possessing the one character, it is matter for the heavy, and as potentially possessing the other, for the light. It is the same matter, but its being is different, as that which is receptive of disease is the same as that which is receptive of health, though in being different from it, and [20] therefore diseasedness is different from healthiness.

5 · A thing then which has the one kind of matter is light and always moves upward, while a thing which has the opposite matter is heavy and always moves downward. Bodies composed of kinds of matter different from these but having relatively to each other the character which these have absolutely, possess both the upward and the downward motion. Hence air and water each have both lightness [25] and weight, and water sinks to the bottom of all things except earth, while air rises to the surface of all things except fire. But since there is one body only which rises to the surface of all things and one only which sinks to the bottom of all things, there must needs be two other bodies which sink in some bodies and rise to the surface of others. The kinds of matter, then must be as numerous as these bodies, i.e. four, but [30] though they are four there must be a common matter of all—particularly if they pass into one another—which in each is in being different. There is no reason why [312<sup>b</sup>1] there should not be one or more intermediates between the contraries, as in the case of colour; for ‘intermediate’ and ‘mean’ are

capable of more than one application.

Now in its own place every body endowed with both weight and lightness has weight—whereas earth has weight everywhere—but they only have lightness [5] among bodies to whose surface they rise. Hence when a support is withdrawn such a body moves downward until it reaches the body next below it, air to the place of water and water to that of earth. But if the fire above air is removed, it will not move upward to the place of fire, except by constraint; and in that way water also may be [10] drawn up, when the upward movement of air which has had a common surface with it is swift enough to overpower the downward impulse of the water. Nor does water move upward to the place of air, except in the manner just described. Earth is not so affected at all, because a common surface is not possible to it. Hence water is drawn up into the vessel to which fire is applied, but not earth. As earth fails to move [15] upward, so fire fails to move downward when air is withdrawn from beneath it; for fire has no weight even in its own place, as earth has no lightness. The other two move downward when the body beneath is withdrawn because, while the absolutely heavy is that which sinks to the bottom of all things, the relatively heavy sinks to its own place or to the surface of the body in which it rises, since it is similar in matter to it.

[20] It is plain that one must suppose as many distinct species of matter as there are bodies. For if there is a single matter of all things, as, for instance, the void or the plenum or extension or the triangles, either all things will move upward or all things will move downward, and the second motion will be abolished. And so, either there will be no absolutely light body, if superiority of weight is due to superior size or [25] number of the constituent bodies or to the fullness of the body (but the contrary is a matter of observation, and it has been shown that the downward and upward movements are equally constant and universal); or, if the matter in question is the void or something similar, which moves uniformly upward, there will be nothing to move uniformly downward. Further, it will follow that the intermediate bodies move downward in some cases quicker than earth; for air in sufficiently large [30] quantity will contain a larger number of triangles or solids or particles. It is, however, manifest that no portion of air whatever moves downward. And the same reasoning applies to lightness, if that is supposed to depend on superiority of quantity of matter. But if the kinds of matter are two, it will be difficult to make the intermediate bodies behave as air and water behave. Suppose, for example, that the [313<sup>a</sup>1]

two asserted are void and plenum. Fire, then, as moving upward, will be void, earth, as moving downward, plenum; and in air, it will be said, fire preponderates, in water, earth. There will then be a quantity of water containing more fire than a little air, and a large amount of air will contain more earth than a little water; [5] consequently we shall have to say that air in a certain quantity moves downward more quickly than a little water. But such a thing has never been observed anywhere. Necessarily, then, as fire goes up because it has something, e.g. void, which other things do not have, and earth goes downward because it has plenum, so [10] air goes to its own place above water because it has something else, and water goes downward because of some special kind of body. But if the two bodies are one matter, or two matters both present in each, there will be a certain quantity of each at which water will excel a little air in the upward movement and air excel water in the downward movement, as we have already often said.

6 · The shape of bodies will not account for their moving upward or downward in general, though it will account for their moving faster or slower. The [15] reasons for this are not difficult to see. For the problem thus raised is why a flat piece of iron or lead floats upon water, while smaller and less heavy things, so long as they are round or long—a needle, for instance—sink down; and sometimes a thing floats because it is small, as with gold dust and the various earthy and dusty [20] materials which throng the air. With regard to these questions, it is wrong to accept the explanation offered by Democritus. He says that the warm bodies moving up out of the water hold up heavy bodies which are broad, while the narrow ones fall [313<sup>b1</sup>] through, because the bodies which offer resistance to them are not numerous. But this would be even more likely to happen in air—an objection which he himself raises. His reply to the objection is feeble. He says that the ‘drive’ (meaning by drive the movement of the upward moving bodies) is not uniform in direction. But since [5] some continua are easily divided and others less easily, and things which produce division differ similarly in the ease with which they produce it, the explanation must be found in this fact. It is the easily bounded, in proportion as it is easily bounded, which is easily divided; and air is more so than water, water than earth. Further, the [10] smaller the quantity in each kind, the more easily it is divided and disrupted. Thus the reason why broad things keep their place is because they cover so wide a surface and the greater quantity is less easily disrupted. Bodies of the opposite shape sink down because they occupy so little of the



surface, which is therefore easily parted. [15] And these considerations apply with greater force to air, since it is more easily divided than water. But since there are two factors, the force responsible for the downward motion of the heavy body and the disruption-resisting force of the continuous surface, there must be some ratio between the two. For in proportion as the force applied by the heavy thing towards disruption and division exceeds that which resides in the continuum, the quicker will it force its way down; only if the [20] force of the heavy thing is the weaker, will it ride upon the surface.

We have now finished our examination of the heavy and the light and of the properties connected with them.

<sup>1</sup>See *Physics* I 7–9.

<sup>2</sup>αἰθήρ from ἀεὶ θεῖν.

<sup>3</sup>I.e. *Physics* VI 7.

<sup>4</sup>Retaining the MSS reading ἧς πέρας.

<sup>5</sup>At *Physics* VIII 8.

<sup>6</sup>I.e. *Physics* III 4–8.

<sup>7</sup>*Physics* VIII 10.

<sup>8</sup>‘Duration’, αἶών, is derived from ‘always existing’, αἰεὶ ὄν.

<sup>9</sup>See *Progression of Animals* 4–5.

<sup>10</sup>See *Physics* 207<sup>a</sup>8.

<sup>11</sup>Snake’s eyes.

<sup>12</sup>Plato, *Timaeus* 40B.

<sup>13</sup>Allan excises the bracketed clause.

<sup>14</sup>Frag. 39 Diels-Kranz.

<sup>15</sup>About 10,000 miles.

<sup>16</sup>See *Physics* VI 1.

<sup>17</sup>See *Timaeus* 56B.

<sup>18</sup>*Timaeus* 30A.

<sup>19</sup>Frag. 57 Diels-Kranz.

<sup>20</sup>See *Physics* VI 1–2.

<sup>21</sup>*Timaeus* 51A.

<sup>22</sup>*Timaeus* 63C.

<sup>23</sup>See *Physics* VIII 4.

<sup>24</sup>See above, II 14.

# ON GENERATION AND CORRUPTION\*\*

*H. H. Joachim*

## BOOK I

[314<sup>a</sup>1] **1** · Our next task is to study coming-to-be and passing-away. We are to distinguish the causes, and to state the definitions, of these processes considered in general—as they apply uniformly to all the things that come-to-be and pass-away by nature. Further, we are to study growth and alteration. We must inquire what [5] each of them is; and whether alteration has the same nature as coming-to-be, or whether to these different names there correspond two separate processes with distinct natures.

On this question, indeed, the early philosophers are divided. Some of them assert that the so-called unqualified coming-to-be is alteration, while others maintain that alteration and coming-to-be are distinct. For those who say that the universe is one something (i.e. those who generate all things out of one thing) are [10] bound to assert that coming-to-be is alteration, and that whatever comes-to-be in the proper sense of the term is being altered; but those who make the matter of things more than one must distinguish coming-to-be from alteration. To this latter class belong Empedocles, Anaxagoras, and Leucippus. And yet Anaxagoras failed to understand his own utterance. He says, at all events, that coming-to-be and passing-away are the same as being altered; yet, in common with other thinkers, he [15] affirms that the elements are many. Thus Empedocles holds that the corporeal elements are four, while all the elements—including those which initiate movement—are six in number; whereas Anaxagoras agrees with Leucippus and Democritus that the elements are infinite.

20 (Anaxagoras posits as elements the ‘homoeomeries’, viz. bone,

flesh, marrow, and everything else which is such that part and whole are synonymous; while Democritus and Leucippus say that there are indivisible bodies, infinite both in number and in the varieties of their shapes, of which everything else is composed—the compounds differing one from another according to their constituents and to the positions, and groupings of their constituents.)

For the views of the school of Anaxagoras seem diametrically opposed to those [25] of the followers of Empedocles. Empedocles says that Fire, Water, Air, and Earth are four elements, and are thus simple, rather than flesh, bone, and bodies which, like these, are ‘homoeomeries’. But the followers of Anaxagoras regard the ‘homoeomeries’ as simple and elements, whilst they affirm that Earth, Fire, Water, and Air are composite; for each of these is (according to them) a seed-bed of the ‘homoeomeries’.

Those, then, who construct all things out of a single element, must maintain [314<sup>b</sup>1] that coming-to-be and passing-away are alteration. For they must affirm that the underlying something always remains identical and one; and change of such a kind is what we call altering. Those, on the other hand, who make the ultimate kinds of [5] things more than one, must maintain that alteration is distinct from coming-to-be; for coming-to-be and passing-away result from the consilience and the dissolution of the many kinds. That is why Empedocles too uses language to this effect, when he says ‘There is no coming-to-be of anything, but only a mingling and a divorce of what has been mingled’. <sup>1</sup> Thus it is clear that their account in these terms is in accordance with their assumption, and that they do in fact so describe things; [10] nevertheless, they too must recognize alteration as a fact distinct from coming-to-be, though it is impossible for them to do so consistently with what they say.

That we are right in this criticism is easy to perceive. For while the substance of the thing remains unchanged, we *see* it altering just as we *see* in it the changes of magnitude called growth and diminution. Nevertheless, the statements of those who [15] posit more principles than one make alteration impossible. For the affections in respect of which we say that alteration occurs (I mean, e.g., hot-cold, white-black, dry-moist, soft-hard, and so forth) are differences characterizing the elements. Empedocles says: [20]

The sun everywhere bright to see, and hot;

The rain everywhere dark and cold;<sup>2</sup>

and he characterizes his remaining elements in a similar manner. Since,

therefore, it is not possible for Fire to become Water, or Water to become Earth, neither will it be possible for anything white to become black, or anything soft to become hard; and the same argument applies to all the other qualities. Yet this is what alteration [25] essentially is.

It follows, as an obvious corollary, that a single matter must always be assumed as underlying the contraries in any change—whether change of place, or growth and diminution, or alteration; further, that the being of this matter and the being of alteration must stand and fall together. For if the change is alteration, then the *substratum* is a single element; i.e. all things which admit of change into one [315<sup>a</sup>1] another have a single matter. And, conversely, if the *substratum* is one, there is alteration.

Empedocles, indeed, seems to contradict his own statements as well as the [5] phenomena. For he denies that any one of his elements comes-to-be out of any other, insisting on the contrary that they are the things out of which everything else comes-to-be; and yet (having brought the entirety of existing things, except Strife, together into one) he maintains, simultaneously with this denial, that each thing once more comes-to-be out of the One. Hence it was clearly out of a One that *this* came-to-be Water, and *that* Fire, various portions of it being separated off by [10] certain characteristic differences or affections—as indeed he calls the sun white and hot, and the earth heavy and hard. If, therefore, these differences be taken away (for they can be taken away, since they came-to-be), it will clearly be inevitable for Earth to come-to-be out of Water and Water out of Earth, and for each of the other elements to undergo a similar transformation—not only *then*, but [15] also *now*—if they change their affections. And, to judge by what he says, they *can* be attached to things and *can* again be separated from them, especially since Strife and Love are still fighting with one another. It was owing to this same conflict that the elements were generated from a One at the former period for presumably Fire, Earth, and Water had no distinctive existence at all while merged in one.

It is not clear either whether we should regard as his first principle the One or [20] the Many—i.e. Fire and Earth, and the bodies co-ordinate with these. For the One is an element in so far as it underlies the process as matter—as that out of which Earth and Fire come-to-be through a change due to the motion. On the other hand, in so far as the One results from *composition* (by a consilience of the Many), whereas they result from *disintegration*, the Many are more elementary than the [25] One, and prior to it in their nature.

2 · We have therefore to discuss the whole subject of unqualified coming-to-be and passing-away; we have to inquire whether they do or do not occur and, if they occur, to explain how they occur. We must also discuss the remaining forms of movement, viz. growth and alteration. For Plato only investigated the conditions [30] under which things come-to-be and pass-away; and he discussed not *all* coming-to-be, but only that of the elements. He asked no questions as to how flesh or bones, or any of the other similar things, come-to-be; nor again did he examine the conditions under which alteration or growth are attributable to things.

In general, no one except Democritus has applied himself to any of these matters in a more than superficial way. Democritus, however, does seem not only to [315<sup>b</sup>1] have thought about all the problems, but also to be distinguished from the outset by his method. For, as we are saying, none of the other philosophers made any definite statement about growth, except such as any amateur might have made. They said that things grow by the accession of like to like, but they did not proceed to explain the manner of this accession. Nor did they give any account of combination; and they neglected almost every single one of the remaining problems, offering no [5] explanation, e.g., of action or passion—how in natural actions one thing acts and the other undergoes action. Democritus and Leucippus, however, postulate the ‘figures’, and make alteration and coming-to-be result from them. They explain coming-to-be and passing-away by their dissociation and association, but alteration by their grouping and position. And since they thought that the truth lay in the appearance, and the appearances are conflicting and infinitely many, they made the [10] ‘figures’ infinite in number. Hence—owing to the changes of the compound—*the same* thing seems different to different people: it is transposed by a small additional ingredient, and appears utterly other by the transposition of a single constituent. For Tragedy and Comedy are both composed of *the same* letters. [15]

Since almost all our predecessors think that coming-to-be is distinct from alteration, and that, whereas things alter by change of their affections, it is by association and dissociation that they come-to-be and pass-away, we must concentrate our attention on these theses. For they lead to many well-grounded dilemmas. If, on the one hand, coming-to-be is association, many impossible consequences [20] result; and yet there are other arguments, not easy to unravel, which force the conclusion upon us that coming-to-be cannot possibly be anything else. If, on the other hand, coming-to-be *is not* association, either there is no such thing

as coming-to-be at all or it is alteration; or else we must endeavour to unravel this dilemma too—and a stubborn one we shall find it.

The starting-point, in dealing with all these difficulties, is this: ‘Do things [25] come-to-be and alter and grow, and undergo the contrary changes, because the primary things are indivisible magnitudes? Or is no magnitude indivisible?’ For the answer we give to this question makes the greatest difference. And again, if the primary things are indivisible magnitudes, are these *bodies*, as Democritus and Leucippus maintain? Or are they *planes*, as is asserted in the *Timaeus*? [30]

To resolve bodies into planes and no further—this, as we have also remarked elsewhere, is in itself unreasonable. Hence there is more to be said for the view that there are indivisible bodies. Yet even these involve much that is unreasonable. Still, as we have said, it is possible to construct alteration and coming-to-be with them, if one transposes *the same* by ‘turning’ and ‘intercontact’, and by the varieties of the figures, as Democritus does. (His denial of the reality of colour is a corollary from [316<sup>a</sup>1] this position; for, according to him, things get coloured by ‘turning’.) But the possibility of such a construction no longer exists for those who divide bodies into planes. For nothing except solids results from putting planes together: they do not even attempt to generate any affection from them.

Lack of experience diminishes our power of taking a comprehensive view of the [5] admitted facts. Hence those who dwell in intimate association with nature and its phenomena are more able to lay down principles such as to admit of a wide and coherent development; while those whom devotion to abstract discussions has rendered unobservant of the facts are too ready to dogmatize on the basis of a few observations. The rival treatments of the subject now before us will serve to [10] illustrate how great is the difference between a scientific and a dialectical method of inquiry. For, whereas the one school argues that there must be atomic magnitudes because otherwise The Triangle will be more than one, Democritus would appear to have been convinced by arguments appropriate to the subject, i.e. drawn from the science of nature. Our meaning will become clear as we proceed.

[15] For to suppose that a body (i.e. a magnitude) is divisible through and through, and that this division is possible, involves a difficulty. What will there be in the body which escapes the division?

If it is divisible through and through, and if this division is possible, then it might *be*, at one and the same moment, *divided* through and through, even though the dividings had not been effected simultaneously;

and the actual occurrence of this result would involve no impossibility. Hence whenever a body is by nature [20] divisible through and through, whether by bisection, or generally by any method whatever nothing impossible will have resulted if it has actually been divided—for if it has been divided into innumerable parts, themselves divided innumerable times, nothing impossible will have resulted, though perhaps nobody in fact could so divide it.

Since, therefore, the body is divisible through and through, let it have been divided. What, then, will remain? A magnitude? No: that is impossible, since then [25] there will be something not divided, whereas *ex hypothesi* the body was divisible *through and through*. But if it be admitted that neither a body nor a magnitude will remain, and yet division is to take place, the body will *either* consist of points (and its constituents will be without magnitude) *or* it will be absolutely nothing. If the latter, then it might both come-to-be out of nothing and exist as a composite of nothing; and thus presumably the whole body will be nothing but an appearance. [30] But if it consists of points, it will not possess any magnitude. For when the points were in contact and coincided to form a single magnitude, they did not make the whole any bigger (since, when the body was divided into two or more parts, the whole was not a bit smaller or bigger than it was before the division); hence, even if all the points be put together, they will not make any magnitude.

But suppose that, as the body is being divided, something like sawdust is [316<sup>b</sup>1] produced, and that in this sense a body comes away from the magnitude, even then the same argument applies. For in what sense is that divisible? But if what came away was not a body but a separable form or affection, and if the magnitude *is* points or contacts thus qualified, it is absurd that a magnitude should consist of [5] things which are not magnitudes. Moreover, *where* will the points be? And are they motionless or moving? And every contact is always a contact of two somethings, i.e. there is always something besides the contact or the division or the point.

These, then, are the difficulties resulting from the supposition that any and every body, whatever its size, is divisible through and through. There is, besides, this further consideration. If, having divided a piece of wood or anything else, I put it [10] together, it is again equal to what it was, and is one. Clearly this is so, whatever the point at which I cut the wood. The wood, therefore, has been divided *potentially* through and through. What, then, is there in the wood besides the division? For even



if we suppose there is some affection, yet how is the wood dissolved into such constituents and how does it come-to-be out of them? Or how are such constituents separated?

[15] Since, therefore, it is impossible for magnitudes to consist of contacts or points, there must be indivisible bodies and magnitudes. Yet, if we *do* postulate the latter, we are confronted with equally impossible consequences, which we have examined in other works. But we must try to disentangle these perplexities, and must therefore formulate the whole problem over again.

On the one hand, then, it is in no way absurd that every perceptible body should be indivisible as well as divisible at any and every point. For the second [20] predicate will attach to it *potentially*, but the first *actually*. On the other hand, it would seem to be impossible for a body to be potentially divisible at all points simultaneously. For if it were possible, then it might actually occur, with the result, not that the body would simultaneously be actually *both* (indivisible and divided), but that it would be simultaneously divided at any and every point. Consequently, [25] nothing will remain and the body will have passed-away into what is incorporeal; and so it might come-to-be again either out of points or absolutely out of nothing. And how is that possible?

But now it is obvious that a body is in fact divided into separable magnitudes which are smaller at each division—into magnitudes which fall apart from one another and are actually separated. Hence the process of dividing a body part by part is not a breaking up which could continue *ad infinitum*; nor can a body be [30] simultaneously divided at every point (for that is not possible) but only up to a certain limit. The necessary consequence—especially if coming-to-be and passing-away are to take place by association and dissociation respectively—is that a body must contain atomic magnitudes which are invisible.

Such is the argument which is believed to establish the necessity of atomic [317<sup>a</sup>] magnitudes: we must now show that it conceals a faulty inference, and exactly where it conceals it.

For, since no point is contiguous to another point, magnitudes are divisible through and through in one sense, and yet not in another. When, however, it is admitted that a magnitude is divisible through and through, it is thought that there is a point not only anywhere, but also everywhere, in it: hence it follows that the [5] magnitude must be divided away into nothing. For there is a point everywhere within it, so that it consists either of contacts or of points. But it is only *in one sense* that the magnitude is divisible through and through, viz. in so far as there

is one point *anywhere* within it and all its points are *everywhere* within it if you take them singly. But there are not more points than one *anywhere* within it, for the points are not consecutive; hence it is not divisible through and through. For if it were, then, if it be divisible at its centre, it will be divisible also at a contiguous point. But it is not [10] so divisible; for position is not contiguous to position, nor point to point (i.e. division or composition).

Hence there are both association and dissociation, though neither into, and out of, atomic magnitudes (for that involves many impossibilities), nor so that division takes place through and through—for this would have resulted if point had been [15] contiguous to point; but dissociation takes place into small (i.e. relatively small) parts, and association takes place out of relatively small parts.

It is wrong, however, to suppose, as some assert, that coming-to-be in the unqualified and complete sense is defined by association and dissociation, while the change that takes place in what is continuous is alteration. On the contrary, this is where the whole error lies. For unqualified coming-to-be and passing-away are not [20] effected by association and dissociation. They take place when a thing changes, from *this* to *that*, as a whole. But they suppose that all such change is alteration; whereas in fact there is a difference. For in that which underlies the change there is a factor corresponding to the definition and there is a material factor. When, then, [25] the change is in these factors, there will be coming-to-be or passing-away; but when it is in the thing's affections and accidental, there will be alteration.

Dissociation and association make a thing susceptible to passing-away. For if water has first been dissociated into smallish drops, air comes-to-be out of it more quickly; while, if drops of water have first been associated, air comes-to-be more [30] slowly. This will become clearer in the sequel. Meantime, so much may be taken as established—viz. that coming-to-be cannot be association of the kind some assert it to be.

3 · Now that we have established that we must first consider whether there is anything which comes-to-be and passes-away in the unqualified sense; or whether nothing comes-to-be in this strict sense, but everything always comes-to-be *something* and *out of something*—I mean, e.g., comes-to-be healthy out of being ill and ill out of being healthy, comes-to-be small out of being big and big out of being [317<sup>b</sup>1] small, and so on in

every other instance. For if there is to be coming-to-be without qualification, something must—without qualification—come-to-be out of not-being, so that it would be true to say that not-being is an attribute of some things. For *qualified* coming-to-be is a process out of *qualified* not-being (e.g. out of [5] not-white or not-beautiful), but *unqualified* coming-to-be is a process out of *unqualified* not being.

Now ‘unqualified’ means either the primary within each category, or the universal, i.e. the all-comprehensive. Hence, if it signifies the primary, there will be a coming-to-be of a substance out of not-substance. But that which is not a substance or a ‘this’ clearly cannot possess predicates drawn from any of the other [10] categories either—e.g. we cannot attribute to it any quality, quantity, or position. Otherwise, properties would admit of existence in separation from substances. If, on the other hand, it means what is not in any sense at all, it will be a universal negation of all forms of being, so that what comes-to-be will have to come-to-be out of nothing.

Although we have rehearsed and settled these problems at greater length in another work,<sup>3</sup> we must mention them briefly here too.

[15] In one sense things come-to-be out of that which has no being without qualification; yet in another sense they come-to-be always out of what is. For there must pre-exist something which *potentially* is, but *actually* is not; and this something is spoken of both as being and as not-being.

These distinctions may be taken as established; but even then it is extraordinarily difficult to see how there can be unqualified coming-to-be (whether we [20] suppose it to occur out of what potentially is, or in some other way), and we must recall this problem for further examination. For the question might be raised whether substance (i.e. the ‘this’) comes-to-be at all. Is it not rather the ‘such’, the ‘so great’, or the ‘somewhere’, which comes-to-be? And the same question might be raised about ‘passing-away’ also. For if a substantial thing comes-to-be, it is clear that there will be (not actually, but potentially) a substance, out of which its coming-to-be will proceed and into which the thing that is passing-away will necessarily change. Then will any predicate belonging to the [25] remaining categories attach *actually* to this? In other words, will that which is only potentially a ‘this’ (which only potentially *is*), while without qualification it is not a ‘this’ (i.e. *is not*), possess, e.g., any determinate size or quality or position? For if it possesses none, but all of them potentially, the result is that a being, which is not a determinate being, is capable of separate existence; and *in addition* that coming-to-be

proceeds out of nothing pre-existing—a thesis which, more than any other, preoccupied and alarmed the earliest philosophers. On the other hand if, although it [30] is not a ‘this somewhat’ or a substance, it is to possess some of the remaining determinations quoted above, then (as we said) properties will be separable from substances.

We must therefore concentrate all our powers on the discussion of these difficulties and on the solution of a further question—viz. What is the cause of the perpetuity of coming-to-be? Why is there always unqualified, as well as *partial*, coming-to-be?

Now the cause is either the source from which, as we say, the movement [318<sup>a</sup>1] originates, or the matter. It is the material cause that we have here to state. For, as to the other cause, we have already explained (in our treatise on Motion)<sup>4</sup> that it involves something immovable through all time and something always being moved. And the treatment of the first of these—of the immovable source—belongs to the [5] province of the other and prior philosophy; while as regards that which sets everything else in motion by being itself continuously moved, we shall have to explain later<sup>5</sup> which amongst the particular causes exhibits this character. But at present we are to state the cause classed under the head of matter, to which it is due that passing-away and coming-to-be never fail to occur in nature. For perhaps, if [10] we succeed in clearing up this question, it will simultaneously become clear what account we ought to give of that which perplexed us just now, i.e. of *unqualified* passing-away and coming-to-be.

Our new question too—viz. What is the cause of the unbroken continuity of coming-to-be?—is sufficiently perplexing, if in fact what passes-away vanishes into what is not and what is not is nothing (since what is not is neither a thing, nor possessed of a quality or quantity, nor in any place). If, then, some one of the things which are is constantly disappearing, why has not the universe been used up long ago and vanished away—assuming of course that the material of all the several comings-to-be was finite? For, presumably, the unfailing continuity of coming-to-be cannot be attributed to the infinity of the material. That is impossible; for [20] nothing is *actually* infinite, and potentially things are infinite by way of division; so that we should have to suppose there is only one kind of coming-to-be, viz. one which never fails, such that what comes-to-be is on each successive occasion smaller than before. But in fact this is not what we see occurring.

Why, then, is this form of change necessarily ceaseless? Is it because the passing-away of *this* is a coming-to-be of *something else*, and the

coming-to-be of [25] *this* a passing-away of *something else*?

The cause implied in this solution must be considered adequate to account for coming-to-be and passing-away in their general character as they occur in all existing things alike. Yet, if the same process is a coming-to-be of *this* but a [30] passing-away of *that*, and a passing-away of *this* but a coming-to-be of *that*, why are some things said to come-to-be and pass-away without qualification, but others only with a qualification?

This question must be investigated once more, for it demands some explanation. For we say 'it is now passing-away' without qualification, and not merely '*this* is passing-away'; and we call *this* change coming-to-be, and *that* passing-away, without qualification. And so-and-so comes-to-be something, but does not come-to-be without qualification; for we say that the student comes-to-be learned, not comes-to-be without qualification.

[318<sup>b</sup>1] Now we often divide terms into those which signify a 'this somewhat' and those which do not. And the issue we are investigating results from this; for it makes a difference *into what* the changing thing changes. Perhaps, e.g., the passage into Fire is coming-to-be *unqualified*, but passing-away-of something (e.g. of Earth); [5] whilst the coming-to-be of Earth is *qualified* (not *unqualified*) coming-to-be, though *unqualified* passing-away (e.g. of Fire). This would be the case on the theory set forth by Parmenides; for he says that the things into which change takes place are two, and he asserts that these two, viz. *what is* and *what is not*, are Fire and Earth. Whether we postulate these, or other things of a similar kind, makes no difference. For we are trying to discover not what undergoes these changes, but what is their characteristic manner. The passage, then, into what without qualification [10] is not is unqualified passing-away, while the passage into what is without qualification is unqualified coming-to-be. Hence however they are characterized—whether as Fire and Earth, or as some other couple—the one of them will be a being and the other a not-being.

We have thus stated one way in which *unqualified* will be distinguished from *qualified* coming-to-be and passing-away; but they are also distinguished according to the material of the changing thing. For a material, whose constitutive differences signify [15] more a 'this somewhat', is itself more a substance while a material, whose constitutive differences signify privation, is more not-being. (Suppose, e.g., that the hot is a positive predication, i.e. a form, whereas cold is a privation, and that Earth and Fire differ from one another by these constitutive differences.)

The opinion, however, which most people are inclined to prefer, is that the distinction depends upon the difference between the perceptible and the imperceptible. [20] Thus, when there is a change into perceptible material, people say there is coming-to-be; but when there is a change into invisible material, they call it passing-away. For they distinguish what is and what is not by their perceiving and not perceiving, just as what is knowable is and what is unknowable is not—perception on their view having the force of knowledge. Hence, just as they deem themselves to live and to be in virtue of their perceiving or their capacity to perceive, [25] so too they deem the things to be *qua* perceived or perceptible—and in this they are in a sense on the track of the truth, though what they actually say is not true.

Thus unqualified coming-to-be and passing-away turn out to be different according to common opinion from what they are in truth. For Wind and Air are in truth more a ‘this somewhat’ or a ‘form’ than Earth. But they are less real to perception—which explains why things are commonly said to ‘pass-away’ without [30] qualification when they change into Wind and Air, and to ‘come-to-be’ when they change into what is tangible, i.e. into Earth.

We have now explained why there is unqualified coming-to-be (though it is a passing-away-of-something) and unqualified passing-away (though it is a coming-to-be-of-something). For this distinction depends upon a difference in the material—upon whether the material is or is not a substance, *or* upon whether it is more or [319<sup>a</sup>1] less substantial, *or* upon whether the material out of which and into which the change occurs is more or less perceptible.

But why are some things said to come-to-be without qualification, and others only to come-to-be so-and-so, in cases different from the one we have been considering where two things come-to-be reciprocally out of one another? For at present we have explained no more than why, when two things change reciprocally [5] into one another, we do not attribute coming-to-be and passing-away *uniformly* to them both, although every coming-to-be is a passing-away of something else and every passing-away some other thing’s coming-to-be. But the question subsequently formulated involves a different problem—viz. why, although the learning thing is said to come-to-be learned but not to come-to-be without qualification, yet the [10] growing thing *is* said to come-to-be.

The distinction here turns upon the difference of the Categories. For some things signify a *this somewhat*, others a *such*, and others a *so-much*.

Those things, then, which do not signify substance, are not said to come-to-be without qualification, but only to come-to-be so-and-so. Nevertheless, in all changing things alike, we speak of coming-to-be when the thing comes-to-be something in *one* of the two columns—e.g. in substance, if it comes-to-be fire but not if it comes-to-be earth; and [15] in quality, if it comes-to-be learned but not when it comes-to-be ignorant.

We have explained why some things come-to-be without qualification, but not others—both in general, and also when the changing things are substances; and we have stated that the *substratum* is the material cause of the continuous occurrence of coming-to-be, because it is such as to change from contrary to contrary and [20] because, in substances, the coming-to-be of one thing is always a passing-away of another, and the passing-away of one thing is always another's coming-to-be. But there is no need even to discuss why coming-to-be continues though things are constantly being destroyed. For just as people speak of a passing-away without qualification when a thing has passed into what is imperceptible and what is not, so also they speak of a coming-to-be out of a not-being when a thing emerges from an [25] imperceptible. Whether, therefore, the *substratum* is or is not something, what comes-to-be emerges out of a not-being; so that a thing comes-to-be out of a not-being just as much as passes-away into what is not. Hence it is reasonable enough that coming-to-be should never fail. For coming-to-be is a passing-away of what is not and passing-away is a coming-to-be of what is not.

But what about that which without qualification is not? Is it one of the two [30] contrary poles of the change—e.g. is earth (i.e. the heavy) a not-being, but fire (i.e. the light) a being? Or, on the contrary, does what is include earth as well as fire, whereas what is not is matter—the matter of earth and fire alike? And again, is the matter of each different? Or is it the same, since otherwise they would not [319<sup>b</sup>1] come-to-be reciprocally out of one another, i.e. contraries out of contraries? For these things—fire, earth, water, air—are characterized by the contraries.

4 · Perhaps the solution is that their matter is in one sense the same, but in another sense different. For that which underlies them, whatever its nature may be [5] is the same; but its being is not the same. So much, then, on these topics. Next we must state what the difference is between coming-to-be and alteration—for we maintain that these changes are distinct from one another.

Since, then, we must distinguish the *substratum*, and the property whose nature it is to be predicated of the *substratum*; and since change of each of these [10] occurs; there is alteration when the *substratum* is perceptible and persists, but changes in its own properties, the properties in question being either contraries or intermediates. The body, e.g., although persisting as the same body, is now healthy and now ill; and the bronze is now spherical and at another time angular, and yet remains the same bronze. But when nothing perceptible persists in its identity as a [15] *substratum*, and the thing changes as a whole (when e.g. the seed as a whole is converted into blood, or water into air, or air as a whole into water), such an occurrence is a coming-to-be of one substance and a passing-away of the other—especially if the change proceeds from an imperceptible something to something perceptible (either to touch or to all the senses), as when water comes-to-be out of, [20] or passes-away into, air; for air is pretty well imperceptible. If, however, in such cases, any property (being one of a pair of contraries) persists, in the thing that has come-to-be, the same as it was in the thing which has passed-away—if, e.g., when water comes-to-be out of air, both are transparent or cold—the *second* thing, into which the *first* changes, must not be a property of this. Otherwise the change will be alteration.

[25] Suppose, e.g., that *the musical man* passed-away and *an unmusical man* came-to-be, and that *the man* persists as something identical. Now, if musicalness (and unmusicalness) had not been in itself a property of the man, these changes would have been a coming-to-be of unmusicalness and a passing-away of musicalness; but in fact a property of the persistent thing. (Hence these are properties of the [30] man, and of *musical man* and *unmusical man*, there is a passing-away and a coming-to-be.) Consequently such changes are alteration.

When the change from contrary to contrary is *in quantity*, it is growth and diminution; when it is *in place*, it is locomotion; when it is in property, i.e. *in quality*, it is alteration; but when nothing persists of which the resultant is a property (or an [320<sup>a</sup>1] accident in any sense of the term), it is coming-to-be, and the converse change is passing-away.

5 · Matter, in the most proper sense of the term, is to be identified with the *substratum* which is receptive of coming-to-be and passing-away; but the *substratum* of the remaining kinds of change is also, in a certain sense, matter, because all these *substrata* are receptive of contrarieties of some kind. So much, then, as an answer to the questions whether coming-



to-be occurs or not, and how it occurs, and [5] what alteration is; but we have still to treat of growth. We must explain wherein growth differs from coming-to-be and from alteration, and what is the process of growing and the process of diminishing in each and all of the things that grow and diminish. [10]

Hence our first question is this: Do these changes differ from one another solely because of a difference in their respective spheres? In other words, do they differ because, while a change from *this* to *that* (viz. from potential *substance* to actual *substance*) is coming-to-be, a change in the sphere of *magnitude* is growth and one in the sphere of *quality* is alteration—both growth and alteration being changes from what is potentially to what is actually? Or is there also a difference in [15] the manner of the change, since it is evident that, whereas neither what is altering nor what is coming-to-be necessarily changes its place, what is growing or diminishing does, though in a different manner from that in which the moving thing does? For that which is being moved changes its place as a whole; but the growing [20] thing changes its place like a metal that is being beaten, retaining its position as a whole while its parts change their places. (But not in the same way as the parts of a sphere; for they change their places while the whole continues to occupy an equal place, but the parts of the growing thing change over an ever-increasing place and the parts of the diminishing thing over an ever-diminishing area.)

It is clear, then, that these changes—the changes of that which is coming-to-be, [25] of that which is altering, and of that which is growing—differ *in manner* as well as *in sphere*. But how are we to conceive the sphere of the change which is growth and diminution? The sphere of growing and diminishing is believed to be magnitude. Are we to suppose that body and magnitude come-to-be out of something which, though potentially magnitude and body, is actually incorporeal and devoid of magnitude? And since this description may be understood in two different ways, in which of these two ways are we to apply it to the process of [30] growth? Is the matter, out of which growth takes place, separate and existing alone by itself, or contained in another body?

Perhaps it is impossible for growth to take place in either of these ways. For since the matter is separate, either it will occupy no place (as if it were a point), or it [320<sup>b</sup>1] will be a void, i.e. a non-perceptible body. But the first of these is impossible, and in the second the matter must be *in* something. For since what comes-to-be out of it will always be somewhere, it too must be somewhere—either intrinsically or indirectly. But if it is to be in something and yet remains separate in such a way that

[5] it is in no sense a part of that body (neither intrinsically nor accidentally, many impossibilities will result. It is as if we were to suppose that when, e.g., air comes-to-be out of water the process were due not to a change of the water, but to the matter of the air being contained in the water as in a vessel. For there is nothing [10] to prevent an indeterminate number of matters being thus contained in the water, so that they might come-to-be actually; and we do not in fact see air coming-to-be out of water in this fashion, viz. withdrawing out of it and leaving it to persist.

It is therefore better to suppose that in all instances of coming-to-be the matter is inseparable, being numerically identical and one, though not one in definition. [15] But the same reasons also forbid us to regard the matter of the body as points or lines. The matter is that of which points and lines are limits, and it is something that can never exist without quality and without form.

Now it is no doubt true, as we have also established elsewhere, that one thing comes-to-be (in the unqualified sense) out of another thing; and further it is true that the efficient cause of its coming-to-be is either an actual thing (which is the [20] same as the effect either *generically* or *specifically*, as e.g. fire is the efficient cause of fire or one man of another), or an actuality (for what is hard does not come-to-be through what is hard).<sup>6</sup> Nevertheless, since there is also a matter out of which corporeal substance itself comes-to-be (corporeal substance, however, already characterized as such-and-such a determinate body, for there is no such thing as body in general), this same matter is also the matter of magnitude and quality—being separable from these matters in definition, but not separable in place unless [25] qualities are, in their turn, separable.

It is evident, from the preceding discussion of difficulties, that growth is not a change out of something which, though potentially a magnitude, actually possesses no magnitude. For, if it were, the void would exist in separation; but we have explained in a former work<sup>7</sup> that this is impossible. Moreover, a change of that kind is not peculiarly distinctive of growth, but characterizes coming-to-be in general. [30] For growth is an increase, and diminution is a lessening, of the magnitude which is there already—that, indeed, is why the growing thing must possess some magnitude. Hence growth must not be regarded as a process from a matter without magnitude to an actuality of magnitude; for this would be a body's coming-to-be rather than its growth.

We must therefore come to closer quarters and as it were grapple

with our [321<sup>a</sup>1] enquiry from its beginning to determine the precise character of the growing and diminishing whose causes we are investigating.

It is evident that any and every part of the growing thing has increased, and that similarly in diminution every part has become smaller; also that a thing grows by the accession, and diminishes by the departure, of something. Hence it must [5] grow by the accession either of something incorporeal or of a body. Now, if it grows by the accession of something incorporeal, there will exist *separate* a void; but (as we have stated before) it is impossible for a *matter of magnitude* to exist separate. If, on the other hand, it grows by the accession of a body, there will be two bodies—that which grows and that which increases it—in the same place; and this too is impossible.

But neither is it open to us to say that growth or diminution occurs in the way [10] in which e.g. air is generated from water. For, although the volume has then become greater, the change will not be growth, but a coming-to-be of the one—viz. of that into which the change is taking place—and a passing-away of the contrasted body. It is not a *growth* of either. Nothing grows in the process; unless indeed there be something common to both things (to that which is coming-to-be and to that which passed-away), e.g. body, and this grows. The water has not grown, nor has the air; [15] but the former has passed-away and the latter has come-to-be, and—if anything has grown—there has been a growth of body. Yet this too is impossible. For our account of growth must preserve the characteristics of that which is growing and diminishing. And these characteristics are three: any and every part of the growing magnitude is made bigger (e.g. if flesh grows, every particle of the flesh gets [20] bigger); by the accession of something; and thirdly in such a way that the growing thing is preserved and persists. For whereas a thing does not persist in the processes of unqualified coming-to-be or passing-away, that which grows or alters persists in its identity through the altering and through the growing or diminishing, though the quality (in alteration) and the size (in growth) do not remain the same. Now if [25] the generation of air from water is to be regarded as growth, a thing might grow without the accession (and without the persistence) of anything, and diminish without the departure of anything—and that which grows need not persist. But this characteristic must be preserved; for the growth we are discussing has been assumed to be thus characterized.

One might raise a further difficulty. What is that which grows? Is it that to [30] which something is added? If, e.g., a man grows in his shin,

is it the shin which is greater—but not that whereby he grows, viz. not the food? Then why have not both grown? For when A is added to B, both A and B are greater, as when you mix wine with water; for each ingredient is alike increased in volume. Perhaps the explanation is that the substance of the one remains unchanged, but the substance of the other (viz. of the food) does not. For indeed, even in the mixture of wine and water, it is the prevailing ingredient which is said to have increased in volume. We say, e.g., that the wine has increased, because the whole mixture acts as wine but not as [321<sup>b</sup>1] water. A similar principle applies also to alteration. Flesh is said to have been altered if, while its character and essence remain, some property which was not there before, now qualifies it in its own right; on the other hand, that whereby it has been altered may have undergone no change, though sometimes it too has been [5] affected. The altering agent, however, and the source of the process are in the growing thing and in that which is being altered; for the mover is in these. No doubt what has come in, may sometimes expand as well as the body that has consumed it (that is so, e.g., if, after having come in, it is converted into wind), but when it has undergone this change it has passed-away; and the mover is not in it. [10]

We have now developed the difficulties sufficiently and must therefore try to find a solution of the problem while preserving the theses that the growing thing persists, that it grows by the accession (and diminishes by the departure) of something, further that every perceptible particle of it has become either larger or [15] smaller, the growing body is not void and that yet there are not two magnitudes in the same place, and that it does not grow by the accession of something incorporeal.

We must grasp the cause after previously determining, first, that the non-homoeomerous parts grow by the growth of the homoeomerous parts (for every organ is composed of these); and secondly, that flesh, bone, and every such [20] part—like every other thing which has its form in matter—has a twofold nature; for the form as well as the matter is called flesh or bone.

Now, that any and every part should grow—and grow by the accession of something—is possible in respect of form, but not in respect of matter. For we must think of the process as being like what happens when a man measures water with [25] the same measure; for what comes-to-be is always different. And it is in this sense that the matter of the flesh grows, some flowing out and some flowing in; not in the sense that fresh matter accedes to every particle of it. There is, however, an accession to every part of its figure or form.

That growth has taken place proportionally, is more manifest in the non-homoeomerous parts—e.g. in the hand. For *there* the fact that the matter is distinct [30] from the form is more manifest than in flesh and the homoeomeries. That is why there is a greater tendency to suppose that a corpse still possesses flesh and bone than that it still has a hand or an arm.

Hence in one sense it is true that any and every part of the flesh has grown; but in another sense it is false. For there has been an accession to every part of the flesh in respect to its form, but not in respect to its matter. The whole, however, has [322<sup>a</sup>1] become larger because of the accession of something, which is called food and is contrary to flesh, and the transformation of this food into the same form as that of flesh—as if, e.g., moist were to accede to dry and, having acceded, were to be transformed and to become dry. For in one sense like grows by like, but in another sense by unlike.

One might discuss what must be the character of that whereby a thing grows. [5] Clearly it must be potentially that which is growing—potentially flesh, e.g., if it is flesh that is growing. Actually, therefore, it must be other than the growing thing. This, then, has passed-away and come-to-be flesh. But it has not been transformed into flesh alone by itself (for that would have been a coming-to-be, not a growth); rather, the growing thing has done so *by* the food. In what way, then, has the food been modified by the growing thing? Perhaps we should say that it has been mixed with it, as if one were to pour water into wine and the wine were able to convert the [10] new ingredient into wine. And as fire lays hold of the inflammable, so the active principle of growth, dwelling in the growing thing (i.e. in that which is actually flesh), lays hold of an acceding food which is potentially flesh and converts it into actual flesh. The acceding food, therefore, must be *together with* the growing thing; for if it were apart from it, the change would be a coming-to-be. For it is possible to [15] produce fire by piling logs on to the already burning fire. That is growth. But when the logs themselves are set on fire, that is coming-to-be.

Quantity in general does not come-to-be any more than animal which is neither man nor any other of the specific forms of animal—the universal in this case corresponds to the quantity in that. But what does come-to-be in growth is flesh or bone—or a hand or arm and their homoeomeries. Such things come-to-be, then, by the accession not of a quantity of flesh but of a quantity of something. In so far as [20] this acceding food is potentially the double result—e.g. is potentially a

quantity of flesh—it produces growth; for it is bound to become actually both a *quantity* and *flesh*. But in so far as it is potentially flesh only, it nourishes; for it is thus that nutrition and growth differ by their definition. That is why a body's nutrition continues so long as it is kept alive (even when it is diminishing), though not its growth; and why nutrition, though the same as growth, is yet different from it in its [25] being. For in so far as that which accedes is potentially a quantity of flesh it tends to increase flesh; whereas, in so far as it is potentially flesh only, it is nourishment.

The form is a kind of power in matter—a duct, as it were. If, then, a matter accedes which is potentially a duct and also potentially possesses determinate [30] quantity, then these ducts will become bigger. But if it is no longer able to act just as water, continually mixed in greater and greater quantity with wine, in the end makes the wine watery and converts it into water—then it will cause a diminution of the *quantum*; though still the form persists.

6 · We must first investigate the *matter*, i.e. the so-called elements. We must [322<sup>b</sup>1] ask whether they really are elements or not, i.e. whether each of them is eternal or whether there is a sense in which they come-to-be; and, if they do come-to-be, whether all of them come-to-be in the same manner, reciprocally out of one another, or whether one amongst them is something primary. Hence we must begin by explaining certain matters about which the statements now current are vague. [5]

For all those who generate the elements as well as those who generate the bodies that are compounded of the elements—make use of dissociation and association, and of action and passion. Now association is combination; but the meaning of combining has not been clearly explained. Again, without an agent and a patient there cannot be altering any more than there can be dissociating and [10] associating. For not only those who postulate a plurality of elements employ their reciprocal action and passion to generate the compounds: those who derive things from a single element are equally compelled to introduce acting. And in this respect Diogenes is right when he argues that unless all things were derived from one, reciprocal action and passion could not occur. The hot thing, e.g., would not be [15] cooled and the cold thing in turn be warmed; for heat and cold do not change reciprocally into one another, but what changes (it is clear) is the *substratum*. Hence, whenever there is action and passion between things, that which underlies them must be a

single something. No doubt, it is not true to say that *all* things are of [20] this character; but it is true of all things between which there is reciprocal action and passion.

But if we must investigate action and passion and combination, we must also investigate contact. For action and passion (in the proper sense of the terms) can [25] only occur between things which are such as to touch one another; nor can things enter into combination at all unless they have come into a certain kind of contact. Hence we must give a definite account of these three things—of contact, combination, and acting.

Let us start as follows. All things which admit of combination must be capable of reciprocal contact; and the same is true of any two things, of which one acts and the other suffers action in the proper sense of the terms. For this reason we must treat of contact first.

[30] Now no doubt, just as every other name is used in many senses (in some cases homonymously, in others one use being derived from other and prior uses), so too is it with contact. Nevertheless contact *in the proper sense* applies only to things which have position. And position belongs only to those things which also have a [323<sup>a</sup>1] place; for in so far as we attribute contact to the mathematical things, we must also attribute place to them, whether they exist in separation or in some other fashion. Assuming, therefore, that to touch is—as we have defined it in a previous work <sup>8</sup>—to have the extremes together, only those things will touch one another which, being [5] separate magnitudes and possessing position, have their extremes together. And since position belongs only to those things which also have a place, while the primary differentiation of place is the above and the below (and the similar pairs of opposites), all things which touch one another will have weight or lightness—*either* both these qualities *or* one or the other of them. But bodies which are heavy or light [10] are such as to act and suffer action. Hence it is clear that those things are by nature such as to touch one another, which (being separate magnitudes) have their extremes together and are able to move, and be moved by, one another.

The manner in which the mover moves the moved is not always the same: whereas one kind of mover can only impart motion by being itself moved, another kind can do so though remaining itself unmoved. Clearly therefore we must [15] recognize a corresponding variety in speaking of the acting thing too; for the mover is said to act and the acting thing to impart motion. Nevertheless there is a difference and we must draw a distinction. For not every mover can act, if we are to contrast agent with

patient and patient is to be applied only to those things whose motion is a quality—i.e. a quality, like white or hot, in respect to which they are [20] altered: on the contrary, moving is wider than acting. Still, so much, at any rate, is clear: the things which are such as to impart motion in one sense will touch the things which are such as to be moved by them, but in another sense they will not. But the definition of touching in general applies to things which, having position, are such that one is able to impart motion and the other to be moved, while reciprocal touching holds between two things, one able to impart motion and the other able to be moved in such a way that action and passion are predicable of them.

[25] As a rule, no doubt, if A touches B, B touches A. For indeed practically all the movers within our ordinary experience impart motion by being moved: in their case, what touches must, and evidently does, touch something which touches it. Yet it is possible—as we sometimes say—for the mover merely to touch the moved, and that which touches need not touch a thing which touches it. Nevertheless it is commonly supposed that touching must be reciprocal, because movers which belong to the [30] same kind as the moved impart motion by being moved. Hence if anything imparts motion without itself being moved, it may touch the moved and yet itself be touched by nothing—for we say sometimes that the man who grieves us touches us, but not that we touch him.

7 · The account just given may serve to define the contact which occurs in [323<sup>b</sup>1] the things of nature. Next in order we must discuss action and passion. Our predecessors' theories on the subject are conflicting. For most thinkers are unanimous in maintaining that like is always unaffected by like, because (as they argue) neither is more apt than the other either to act or to suffer action, since all [5] the properties which belong to the one belong identically and in the same degree to the other; and that unlikes, i.e. differents, are by nature such as to act and suffer action reciprocally. For even when the smaller fire is destroyed by the greater, it suffers this effect (they say) owing to its contrariety—since the great is contrary to the small. But Democritus dissented from all the other thinkers and maintained [10] a theory peculiar to himself. He asserts that agent and patient are identical, i.e. like. It is not possible (he says) that others, i.e. differents, should suffer action from one another: on the contrary, even if two things, being others, do act in some way on one another, this happens to them not *qua* others but *qua* possessing an



identical property.

Such, then, are the views, and it looks as if the statements of their advocates [15] were in manifest conflict. But the reason of this conflict is that each group is in fact stating *a part*, whereas they ought to have taken a view of the subject *as a whole*. For if two things are like—absolutely and in all respects without difference from one another—it is reasonable to infer that neither is in any way affected by the other. Why, indeed, should the one of them tend to act any more than the other? [20] Moreover, if like can be affected by like, a thing can also be affected by itself; and yet if that were so—if like tended in fact to act *qua* like—there would be nothing indestructible or immovable, for everything would move itself. And the same consequence follows if the two things are absolutely other, i.e. in no respect identical. Whiteness could not be affected in any way by a line nor a line by [25] whiteness—except perhaps accidentally, viz. if the line happened to be white or black; for unless two things either are, or are composed of, contraries, neither drives the other out of its natural condition. But since only those things which either involve a contrariety or are contraries—and not any things selected at random—are [30] such as to suffer action and to act, agent and patient must be like (i.e. identical) in kind and yet unlike (i.e. contrary) in species. (For by nature body is affected by body, flavour by flavour, colour by colour, and so in general what belongs to any kind by a member of the same kind—the reason being that contraries are in every [324<sup>a</sup>1] case within a single identical kind, and it is contraries which reciprocally act and suffer action.) Hence agent and patient must be in one sense identical, but in another sense other than (i.e. unlike) one another. And since patient and agent are [5] generically identical (i.e. like) but specifically unlike, while it is contraries that exhibit this character: it is clear that contraries and their intermediates are such as to suffer action and to act reciprocally—for indeed it is these that constitute the entire sphere of passing-away and coming-to-be.

We can now understand why fire heats and the cold thing cools, and in general [10] why the active thing assimilates to itself the patient. For agent and patient are contrary to one another, and coming-to-be is a process into the contrary: hence the patient *must* change into the agent, since it is only thus that coming-to-be will be a process into the contrary. And, again, it is intelligible that the advocates of both [15] views, although their theories are not the same, are yet in contact with the nature of the facts. For sometimes we speak of the *substratum* as suffering action (e.g. of the man as being healed, being warmed and chilled, and

similarly in all the other cases), but at other times we say what is cold is being warmed, what is sick is being healed: and in both these ways of speaking we express the truth, since in one sense it is the matter, while in another sense it is the contrary, which suffers action. (We make the [20] same distinction in speaking of the agent; for sometimes we say that the man, but at other times that what is hot, produces heat.) Now the one group of thinkers supposed that agent and patient must possess something identical because they fastened their attention on the matter; while the other group maintained the opposite because their attention was concentrated on the contraries.

[25] We must conceive the same account to hold of action and passion as that which is true of being moved and imparting motion. For things are called movers in two ways. Both that which contains the origin of the motion is thought to impart motion (for the origin is first amongst the causes), and also that which is last in relation to the moved thing and to the coming-to-be. A similar distinction holds also of the [30] agent; for we speak both of the doctor and of the wine as healing. Now, in motion, there is nothing to prevent *the first mover* being unmoved (indeed, as regards some this is actually necessary) although *the last mover* always imparts motion by being itself moved; and, in action, there is nothing to prevent *the first agent* being unaffected, while *the last agent* only acts by suffering action itself. For if things have not the same matter, the agent acts without being affected; thus the art of healing produces health without itself being acted upon in any way by that which is [324<sup>b</sup>1] being healed. But the food, in acting, is itself in some way acted upon: for, in acting, it is simultaneously heated or cooled or otherwise affected. Now the art of healing corresponds to an origin, while the food corresponds to the last (i.e. contiguous) mover.

Those active powers, then, whose forms are not embodied in matter, are [5] unaffected; but those whose forms are in matter are such as to be affected in acting. For we maintain that one and the same matter is *equally*, so to say, the basis of either of the two opposed things—being as it were a kind; and that *that which can be hot* must be made hot, provided the heating agent is there, i.e. comes near. Hence [10] (as we have said) some of the active powers are unaffected while others are such as to be affected; and what holds of motion is true also of the active powers. For as in motion the first mover is unmoved, so among the active powers the first agent is unaffected.

The active power is a cause in the sense of that from which the process originates; but the end, for the sake of which it takes place, is not

active. (That is [15] why *health* is not active, except metaphorically.) For when the agent is there, the patient *becomes* something; but when states are there, the patient no longer *becomes* but already *is*—and forms (i.e. ends) are a kind of state. As to the matter, it (*qua* matter) is passive. Now fire contains the hot embodied in matter; but a hot separate from matter (if such a thing existed) could not suffer any action. Perhaps, indeed, it is impossible that the hot should exist in separation from matter; but if [20] there are any entities thus separable, what we are saying would be true of them.

We have thus explained what action and passion are, what things exhibit them, why they do so, and in what manner. We must go on to discuss how it is possible for action and passion to take place.

8 · Some philosophers think that the last agent—the agent in the strictest [25] sense—enters in through certain pores, and so the patient suffers action. It is in this way, they assert, that we see and hear and exercise all our other senses. Moreover, according to them, things are seen through air and water and other transparent bodies, because such bodies possess pores, invisible indeed owing to their minute-ness, [30] but close-set and arranged in rows—the more transparent the body, the more so.

Such was the theory which some philosophers (including Empedocles) advanced in regard to the structure of certain bodies. They do not restrict it to the bodies which act and suffer action; but combination too, they say, takes place only between bodies whose pores are in reciprocal symmetry. The most systematic theory, however, and one that applied to all bodies, was advanced by Leucippus and [325<sup>a</sup>1] Democritus: and, in maintaining it, they took as their starting-point what naturally comes first.

For some of the older philosophers thought that what is must of necessity be one and immovable. The void, they argue, is not; but unless there is a void with a separate being of its own, what is cannot be moved—nor again can it be many, since [5] there is nothing to keep things apart. And they hold that the view that the universe is not continuous but consists of separate things in contact is no different from the view that there are many (and not one) and a void. For if it is divisible through and through, there is no one, and no many either, but the Whole is void; while to maintain that it is divisible at some points, but not at others, looks like an [10] arbitrary fiction. For up to what limit is it divisible?

And for what reason is part of the Whole indivisible, i.e. a *plenum*, and part divided? Further, they maintain, it is equally necessary to deny the existence of motion.

Arguing in this way, therefore, they were led to transcend sense-perception, and to disregard it on the ground that one ought to follow reason; and so they assert that the universe is one and immovable. Some of them add that it is infinite, since [15] the limit (if it had one) would be a limit against the void.

There were, then, certain thinkers who, for the reasons we have stated, enunciated views of this kind about the truth . . . Moreover,<sup>9</sup> although these opinions appear to follow logically, yet to believe them seems next door to madness when one considers the facts. For indeed no lunatic seems to be so far out of his [20] senses as to suppose that fire and ice are one: it is only between what is right, and what *seems* right from habit, that some people are mad enough to see no difference.

Leucippus, however, thought he had a theory which harmonized with sense-perception [25] and would not abolish either coming-to-be and passing-away or motion and the multiplicity of things. Making these concessions to the phenomena and conceding to the Monists that there could be no motion without a void, he states that void is not-being, and no part of what is is not-being; for what is in the strict sense of the term is an absolute *plenum*. This *plenum*, however, is not one: on the contrary, it [30] is a many infinite in number and invisible owing to the minuteness of their bulk. The many move in the void (for there is a void); and by coming together they produce coming-to-be, while by separating they produce passing-away. Moreover, they act and suffer action wherever they chance to be in contact (for they are not thereby one), and they generate by being put together and becoming intertwined. From the genuinely one, on the other hand, there never could have come-to-be a multiplicity, nor from the genuinely many a one: that is impossible. But just as [325<sup>b</sup>1] Empedocles and some of the other philosophers say that things suffer action through their pores, so all alteration and all passion take place in this way, breaking-up (i.e. passing-away) being affected by means of the void, and so too [5] growth—solids creeping in to fill the void places.

Empedocles too is practically bound to adopt the same theory as Leucippus. For he must say that there are certain solids which, however, are indivisible—unless there are continuous pores all through the body. But this is impossible; for *then* there will be nothing solid beside the pores but all of it will be void. It is necessary, therefore, for his contiguous

things to be indivisible, while the intervals between [10] them—which he calls pores—must be void. But this is precisely Leucippus's theory of action and passion.

Such, approximately, are the accounts of the manner in which some things act while others suffer action. And as regards the Atomists, it is not only clear what their explanation is: it is also obvious that it stands in tolerable consistency with the [15] assumptions they employ. But this is less clear in the case of the other thinkers. It is not clear, for instance, how, on the theory of Empedocles, there is to be passing-away as well as alteration. For the primary bodies of the Atomists—the primary constituents of which bodies are composed, and the ultimate elements into which they are dissolved—are indivisible, differing from one another only in figure. In the [20] philosophy of Empedocles, on the other hand, it is evident that all the other bodies down to the elements have their coming-to-be and their passing-away; but it is not clear how the elements themselves, severally in their aggregated masses, come-to-be and pass-away. Nor is it possible for Empedocles to explain how they do so, since he does not assert that Fire too (and similarly every one of his other elements) [25] possesses elementary constituents of itself, as Plato does in the *Timaeus*<sup>10</sup>. For Plato differs from Leucippus inasmuch as the indivisibles of Leucippus are solids, while those of Plato are planes, and are characterized by an infinite variety of figures, while the characterizing figures employed by Plato are limited in number—though *both* hold that the elements are indivisible and are determined by figures. Thus the [30] comings-to-be and the dissociations result from the indivisibles *according to* Leucippus through the void and through contact (for it is at the point of contact that each of the composite bodies is divisible), but *according to Plato* in virtue of contact alone, since he denies there is a void.

Now we have discussed indivisible planes in our earlier discussions.<sup>11</sup> But with regard to the assumption of indivisible solids, although we must not now enter upon [35] a detailed study of its consequences, let us make a short digression.

They are committed to the view that every indivisible is incapable alike of [326<sup>a</sup>1] being acted upon (for nothing can suffer action except through the void) and of producing a quality—no indivisible can be either hard or cold. Yet it is surely absurd that an exception is made of the hot—the hot being assigned as peculiar to the spherical figure; for, that being so, its contrary also (the cold) is bound to belong [5] to another of the figures. If, however, these properties (heat and cold) do belong to the

indivisibles, it is a further absurdity that they should not possess heaviness and lightness, and hardness and softness. And yet Democritus says that the more any indivisible exceeds, the heavier it is—so that clearly it will also be hotter. But if *that* [10] is their character, it is impossible they should not be affected by one another: the slightly hot indivisible, e.g., will suffer action from one which far exceeds it in heat. Again, if any indivisible is hard, there must also be one which is soft; but the soft derives its very name from the fact that it suffers a certain action—for soft is that which yields to pressure. But further, not only is it absurd that no property except [15] figure should belong to the indivisibles: it is also absurd that, if other properties do belong to them, one only of these additional properties should attach to each—e.g. that *this* indivisible should be cold and *that* indivisible hot. For, on that supposition, their nature would not even be uniform. And it is equally impossible that more than one of these additional properties should belong to the single indivisible. For, being *indivisible*, it will possess these properties in the same point—so that, if it suffers action by being chilled, it will also, *qua* chilled, act or suffer action in some other [20] way. And the same line of argument applies to all the other properties too; for the difficulty we have just raised confronts all who advocate indivisibles (whether solids or planes), since their indivisibles cannot become either rarer or denser inasmuch as there is no void in them. It is a further absurdity that there should be small indivisibles, but not large ones. For it is in fact reasonable that larger bodies should [25] be more liable to fracture than the small ones, since they (viz. the large bodies) are easily broken up because they collide with many other bodies. But why should indivisibility *as such* be the property of small, rather than of large, bodies? Again, is the nature of all those solids uniform, or do they differ from one another—as if, e.g., [30] some of them were fiery, others earthy in their bulk? For if all of them are uniform in nature, what is it that separated one from another? Or why, when they come into contact, do they not coalesce into one, as drops of water run together when drop touches drop (for the two cases are precisely parallel)? On the other hand if they differ, how are they characterized? It is clear, too, that *these*, rather than the figures, ought to be postulated as principles and causes from which the phenomena result. Moreover, if they differed in nature, they would both act and suffer action on [326<sup>b</sup>1] coming into reciprocal contact. Again, what is it which sets them moving? For if their mover is other than themselves, they are such as to suffer action. If, on the other hand, each of them sets itself in motion, either it will be divisible

(imparting [5] motion here, being moved there), or contrary properties will attach to it in the same respect and its matter will be identical in potentiality as well as numerically identical.

As to the thinkers who explain modification of property through the movement in the pores, if this is supposed to occur notwithstanding the fact that the pores are filled their postulate of pores is superfluous. For if the whole body suffers action under these conditions, it would suffer action in the same way even if it had no pores [10] but were just its own continuous self. Moreover, how can their account of vision through a *medium* be correct? It is impossible to penetrate the transparent bodies at their contacts or through their pores if every pore be full. For how will that differ from having no pores at all? The body will be uniformly full throughout. But, [15] further, even if these passages, though they must *contain* bodies, are void, the same consequence will follow once more. And if they are too minute to admit any body, it is ridiculous to suppose there is a 'minute' void and yet to deny the existence of a big one of whatever size, or to imagine 'the void' means anything else than a body's [20] place—whence it clearly follows that to every body there will correspond a void of equal bulk.

As a general criticism we must urge that to postulate pores is superfluous. For if the agent produces no effect by touching the patient, neither will it produce any by passing through its pores. On the other hand, if it acts by contact, then—even without pores—some things will suffer action and others will act, provided they are by nature adapted for reciprocal action and passion. Our arguments have shown [25] that it is either false or futile to advocate pores in the sense in which some thinkers conceive them. But since bodies are divisible through and through the postulate of pores is ridiculous; for, *qua* divisible, a body can fall into separate parts.

9 · Let us explain the way in which things possess the power of generating, [30] and of acting and suffering action; and let us start from the principle we have often enunciated. For, assuming, the distinction between that which is *potentially* and that which is *actually* such-and-such, it is the nature of the first, in so far as it is what it is, to suffer action *through and through*, not merely to be susceptible in some parts while insusceptible in others. But its susceptibility varies in degree, according as it is more or less such-and-such, and one would be more justified in speaking of pores in this connexion—just as in metals there are veins of

susceptible stuff stretching continuously through the substance.

[327<sup>a</sup>1] So long, indeed, as any body is naturally coherent and one, it is insusceptible. So, too, bodies are insusceptible so long as they are not in contact either with one another or with other bodies which are by nature such as to act and suffer action. (To illustrate my meaning: Fire heats not only when in contact, but also from a [5] distance. For the fire heats the air, and the air—being by nature such as both to act and suffer action—heats the body.) But the supposition that a body suffers action in some parts, but not in others ḥis only possible for those who hold an erroneous view concerning the divisibility of magnitudes. For usá<sup>12</sup> the following account results from the distinctions we established at the beginning. For if magnitudes are not divisible through and through—if, on the contrary, there are indivisible solids or planes—then indeed nothing would be susceptible through and through: but neither would anything be continuous. Since, however, this is false, i.e. since every body is [10] divisible, there is no difference between having been divided into parts which remain in contact and being divisible. For if a body *can* be separated at the contacts (as some say), then, even though it has not yet been divided, it will be in a state of dividedness—for it *can* be divided, since nothing impossible results. And in general it is absurd that passion should occur in this manner *only*, viz. by the bodies being [15] split. For this theory abolishes alteration; but we see the same body *liquid* at one time and *solid* at another, without losing its continuity. It has suffered this change not by division and composition, nor yet by ‘turning’ and ‘intercontact’ as Democritus asserts; for it has passed from the liquid to the solid state without any [20] reordering or transposition in its nature. Nor are there contained within it those hard (i.e. congealed) particles indivisible in their bulk; on the contrary, it is liquid—and again, solid and congealed—uniformly all through. This theory, it must be added, makes growth and diminution impossible also. For if there is to be *apposition* (instead of the growing thing having changed as a whole, either by the admixture of something or by its own transformation), increase of size will not have [25] resulted in any and every part.

So much, then, to establish that things generate and are generated, act and suffer action, reciprocally; and to distinguish the way in which these processes *can* occur from the (impossible) way in which some say they occur.

10 · But we have still to explain combination, for that was the third



of the [30] subjects we originally proposed to discuss. Our explanation will proceed on the same method as before. We must inquire: What is combination, and what is that which can combine? Of what things, and under what conditions, is combination a property? And, further, does combination exist in fact, or is it false to assert its existence?

For, according to some thinkers, it is impossible for one thing to be combined with another. They argue that if the combined constituents continue to exist and [327<sup>b</sup>1] are unaltered, they are no more combined now than they were before, but are in the same condition; while if *one* has been destroyed, the constituents have not been combined—on the contrary, one constituent *is* and the other *is not*, whereas combination demands uniformity of condition in them both; and on the same principle even if *both* the combining constituents have been destroyed as the result [5] of their coalescence, *they* cannot be combined since *they* have no being at all.

What we have in this argument is, it would seem, a demand for the precise distinction of combination from coming-to-be and passing-away (for it is obvious that combination, if it exists, must differ from these processes) and for the precise distinction of the combinable from that which is such as to come-to-be and [10] pass-away. As soon, therefore, as these distinctions are clear, the difficulties raised by the argument would be solved.

Now we do not speak of the wood as combined with the fire, nor of its burning as a combining either of its particles with one another or of itself with the fire: what we say is that the fire is coming-to-be, but the wood is passing-away. Similarly, we [15] speak neither of the food as combining with the body, nor of the shape as combining with the wax and thus fashioning the lump. Nor can body combine with white, nor (to generalize) properties and states with things; for we see them persisting unaltered. But again white and knowledge cannot be combined either, nor anything else which is not separable. (Indeed, this is a blemish in the theory of those who [20] assert that once all things were together and combined. For not everything can combine with everything. On the contrary, both of the constituents that are combined must originally have existed in separation; but no property can have separate existence.)

Since, however, some things *are potentially* while others *are actually*, the constituents can be in a sense and yet not-be. The compound may *be actually* other [25] than the constituents from which it has resulted; nevertheless each of them may still *be potentially* what it was before they were combined, and both of them may survive undestroyed. (For this was

the difficulty that emerged in the previous argument; and it is evident that the combining constituents not only coalesce, having formerly existed in separation, but also can again be separated out from the compound.) The constituents, therefore, neither *persist actually*, as body and white [30] persist; nor are they *destroyed* (either one of them or both), for their potentiality is preserved. Hence these difficulties may be dismissed; but the problem immediately connected with them—whether combination is something relative to perception—must be set out and discussed.

When the combining constituents have been divided into parts so small, and have been juxtaposed in such a manner, that perception fails to discriminate them one from another, have they then been combined? Or is it rather when any and [328<sup>a</sup>1] every part of one constituent is juxtaposed to a part of the other? The term, no doubt, is applied in the latter sense: we speak, e.g., of wheat having been combined with barley when each *grain* of the one is juxtaposed to a *grain* of the other. But every body is divisible and therefore, since body combined with body is uniform, *any* [5] *and every part* of each constituent ought to be juxtaposed to a part of the other.

No body, however, can be divided into its least parts; and composition is not identical with combination, but other than it. Thus it is clear that so long as the constituents are preserved in small particles, we must not speak of them as combined. (For this will be a composition instead of a blending or combination; nor will the part exhibit the same ratio between its constituents as the whole. But we [10] maintain that, if combination has taken place, the compound *must* be uniform—any part of such a compound being the same as the whole, just as any part of water is water; whereas, if combination is composition of the small particles, nothing of the kind will happen. On the contrary, the constituents will only be combined relatively to perception; and the same thing will be combined to one percipient, if his [15] sight is not sharp—while to the eye of Lynceus nothing will be combined.) Clearly too we must not speak of the constituents as combined in virtue of a division such that *any and every part* of each is juxtaposed to a part of the other; for it is impossible for them to be thus divided. Either, then, there is no combination, or we have still to explain the manner in which it can take place.

Now, as we maintain, some things are such as to act and others such as to suffer action from them. Moreover, some things—viz. those which have the same [20] matter—reciprocate, i.e. are such as to act upon one another and to suffer action from one another; while other things, viz.

agents which have not the same matter as their patients, act without themselves suffering action. Such agents cannot combine—that is why neither the art of healing nor health produces health by combining with the bodies of the patients. Amongst those things, however, which are both active and passive, some are easily divisible. Now if a great quantity (or a large bulk) of one of these materials be brought together with a little (or with a [25] small piece) of another, the effect produced is not combination, but increase of the dominant; for the other material is transformed into the dominant. (That is why a drop of wine does not combine with ten thousand gallons of water; for its form is dissolved, and it is changed so as to merge in the total volume of water.) On the other hand, when there is a certain equilibrium between their powers, then each of them changes out of its own nature towards the dominant; yet neither becomes the [30] other, but both become an intermediate with properties common to both.

Thus it is clear that only those agents are combinable which involve a contrariety—for these are such as to suffer action reciprocally. And, further, they combine more freely if small pieces of each of them are juxtaposed. For in that condition they change one another more easily and more quickly; whereas this effect takes a long time when agent and patient are present in bulk.

Hence, amongst the divisible susceptible materials, those whose shape is [328<sup>b</sup>1] readily adaptable have a tendency to combine; for they are easily divided into small particles, since that is precisely what being readily adaptable in shape implies. For instance, liquids are the most combinable of all bodies—because, of all divisible materials, the liquid is most readily adaptable in shape, unless it be viscous. Viscous liquids, it is true, produce no effect except to increase the bulk. But when one of the [5] constituents is alone susceptible—or superlatively susceptible, the other being susceptible in a very slight degree—the compound resulting from their combination is either no greater in volume or only a little greater. This is what happens when tin is combined with bronze. For some things display a hesitating and ambiguous attitude towards one another—showing a slight tendency to combine and also an [10] inclination to behave as receptive matter and form. The behaviour of these metals is a case in point. For the tin almost vanishes, behaving as if it were an immaterial property of the bronze: having been combined, it disappears, leaving no trace except the colour it has imparted to the bronze. The same phenomenon occurs in other instances too.

It is clear, then, from the foregoing account, that combination occurs,

what it [15] is, to what it is due, and what kind of thing is combinable. The phenomenon depends upon the fact that some things are such as to be reciprocally susceptible and readily adaptable in shape, i.e. easily divisible. For such things can be combined without its being necessary *either* that they should have been destroyed *or* that they should survive absolutely unaltered; and their combination need not be a composition, nor [20] merely relative to perception. On the contrary: anything is combinable which, being readily adaptable in shape, is such as to suffer action and to act; and it is combinable with another thing similarly characterized (for the combinable is relative to the combinable); and combination is unification of the combinables, resulting from their alteration.

## BOOK II

1 · We have explained under what conditions combination, contact, and action and passion are attributable to the things which undergo natural change. Further, we have discussed unqualified coming-to-be and passing-away, and explained under what conditions they occur, in what subject, and owing to what [30] cause. Similarly, we have also discussed alteration, and explained what altering is and how it differs from coming-to-be and passing-away. But we have still to investigate the so-called elements of bodies.

For coming-to-be and passing-away occur in naturally constituted substances only given the existence of sensible bodies. But as to the matter which underlies these perceptible bodies, some maintain it is single, supposing it to be, e.g., Air or Fire, or an intermediate between these two (but still a body with a separate [329<sup>a</sup>1] existence). Others, on the contrary, postulate more than one—ascribing to their association and dissociation, or to their alteration, the coming-to-be and passing-away of things. (Some, for instance, postulate Fire and Earth; some add Air, making three; and some, like Empedocles, reckon Water as well, thus postulating four.)

[5] Now we may agree that the primary materials, whose change (whether it be association and dissociation or a process of another kind) results in coming-to-be and passing-away, are rightly described as principles or elements. But those thinkers are in error who postulate, beside the bodies we have mentioned, a single [10] matter—and that a corporeal and separable matter. For this body cannot possibly exist without a perceptible contrariety—this ‘Boundless’, which some thinkers identify with the principle, must be either light or heavy, either cold or hot. And what Plato has written in the *Timaeus*<sup>13</sup> is not based on any precisely-articulated [15] conception. For he has not stated clearly whether his ‘Omnirecipient’ exists in separation from the elements; nor does he make any use of it. He says, indeed, that it is a *substratum* prior to the so-called elements—underlying them, as gold underlies the things that are fashioned of gold. (And yet this comparison, if thus expressed, is itself open to criticism. Things which come-to-be and pass-away [20] cannot be called by the name of the material out of which they have come-to-be: it is only the results of alteration which retain the name. However, he actually says that far the truest account is to affirm that each of them is gold.) Nevertheless he carries his analysis of the elements—

solids though they are—back to planes, and it is impossible for ‘the Nurse’ (i.e. the primary matter) to be identical with the planes.

Our own doctrine is that although there is a matter of the perceptible bodies (a [25] matter out of which the so-called elements come-to-be), it has no separate existence, but is always bound up with a contrariety. A more precise account of this has been given in another work;<sup>14</sup> we must, however, give a detailed explanation of the primary bodies as well, since they too are similarly derived from the matter. We must reckon as a principle and as primary the matter which underlies, though it is [30] inseparable from, the contrary qualities; for the hot is not matter for the cold nor the cold for the hot, but the *substratum* is matter for them both. Thus as principles we have *firstly* that which is potentially perceptible body, *secondly* the contraries (I mean, e.g., heat and cold), and *thirdly* Fire, Water, and the like. For these bodies change into one another (they are not immutable as Empedocles and other thinkers [329<sup>b</sup>1] assert, since alteration would then have been impossible), whereas the contraries do not change.

Nevertheless, even so the question remains: What sorts of contraries, and how many of them, are to be accounted principles of body? For all the other thinkers assume and use them without explaining why they are *these* or why they [5] are just *so many*.

2 · Since, then, we are looking for principles of perceptible body; and since perceptible is equivalent to tangible, and tangible is that of which the perception is touch, it is clear that not all the contraries constitute forms and principles of body, but only those which correspond to touch. For it is in accordance with a [10] contrariety—a contrariety, moreover, of *tangible* qualities—that the primary bodies are differentiated. That is why neither whiteness and blackness, nor sweetness and bitterness, nor similarly any of the other perceptible contraries either, constitutes an element. And yet vision is prior to touch, so that its object also is prior. The object of vision, however, is a quality of tangible body not *qua* tangible, [15] but *qua* something else—even if it is naturally prior.

Accordingly, we must segregate the tangible differences and contraries, and distinguish which amongst them are primary. Contraries correlative to touch are the following: hot-cold, dry-moist, heavy-light, hard-soft, viscous-brittle, rough-smooth, [20] coarse-fine. Of these heavy and light are neither active nor susceptible. Things are not called heavy and light because they act upon, or suffer action from, other

things. But the elements must be reciprocally active and susceptible, since they combine and are transformed into one another. On the other hand, hot and cold, and dry and moist, are terms, of which the first pair implies *power to act* and [25] the second pair *susceptibility*. Hot is that which associates things of the same kind (for dissociating, which people attribute to Fire as its function, is associating things of the same class, since its effect is to eliminate what is foreign), while cold is that which brings together, i.e. associates, homogeneous and heterogeneous things alike. [30] And moist is that which, being readily adaptable in shape, is not determinable by any limit of its own; while dry is that which is readily determinable by its own limit, but not readily adaptable in shape.

From these are derived the fine and coarse, viscous and brittle, hard and soft, and the remaining differences. For since the moist has no determinate shape, but is readily adaptable and follows the outline of that which is in contact with it, it is [330<sup>a</sup>1] characteristic of it to be such as to fill up. Now the fine is such as to fill up. For the fine consists of subtle particles; but that which consists of small particles is such as to fill up, inasmuch as it is in contact whole with whole—and the fine exhibits this character in a superlative degree. Hence it is evident that the fine derives from the moist, while the coarse derives from the dry. Again the viscous derives from the [5] moist; for the viscous (e.g. oil) is a moist thing modified in a certain way. The brittle, on the other hand, derives from the dry; for brittle is that which is *completely* dry—so completely, that it has actually solidified due to failure of moisture. Further the soft derives from the moist. For soft is that which yields by retiring into itself, though it does change position, as the moist does—which [10] explains why the moist is not soft, although the soft derives from the moist. The hard, on the other hand, derives from the dry; for hard is that which is solidified, and the solidified is dry.

The terms 'dry' and 'moist' have more senses than one. For the damp, as well as the moist, is opposed to the dry: and again the solidified, as well as the dry, is [15] opposed to the moist. But all these derive from the dry and moist we mentioned first. For the dry is opposed to the damp; and the damp is that which has foreign moisture on its surface (sodden being that which is penetrated to its core), while dry is that which has lost foreign moisture. Hence it is evident that the damp will derive from the moist, and the dry which is opposed to it will derive from the primary dry. Again [20] the moist and the solidified derive in the same way from the primary pair. For moist is that which contains moisture *of its own* deep within it (sodden being that which contains *foreign* moisture),

whereas solidified is that which has lost this inner moisture. Hence these too derive one from the dry and the other from the moist.

[25] It is clear, then, that all the other differences reduce to the first four, but that these admit of no further reduction. For the hot is not *essentially* moist or dry, nor the moist *essentially* hot or cold; nor are the cold and the dry derivative forms, either of one another or of the hot and the moist. Hence these must be four.

[30] **3** · The elements are four, and any four terms can be combined in six couples. Contraries, however, refuse to be coupled; for it is impossible for the same thing to be hot and cold, or moist and dry. Hence it is evident that the couplings of the elements will be four: hot with dry and moist with hot, and again cold with dry [330<sup>b</sup>1] and cold with moist. And these four couples have attached themselves to the *apparently* simple bodies (Fire, Air, Water, and Earth) in a manner consonant with theory. For Fire is hot and dry, whereas Air is hot and moist (Air being a sort of [5] vapour); and Water is cold and moist, while Earth is cold and dry. Thus the differences are reasonably distributed among the primary bodies, and the number of the latter is consonant with theory. For all who make the simple bodies elements postulate either one, or two, or three, or four. Now those who assert there is *one* only, and then generate everything else by condensation and rarefaction, are in [10] effect making their principles two, viz. the rare and the dense, or rather the hot and the cold; for it is these which are the moulding forces, while the one underlies them as matter. But those who postulate *two* from the start—as Parmenides postulated Fire and Earth—make the intermediates (e.g. Air and Water) blends of these. The [15] same course is followed by those who advocate *three*. (We may compare what Plato does in the divisions<sup>15</sup>; for he makes ‘the middle’ a blend.) Indeed, there is practically no difference between those who postulate *two* and those who postulate *three*, except that the former split the middle element into two, while the latter treat it as only one. But some advocate *four* from the start, e.g. Empedocles; yet he too [20] draws them together so as to reduce them to *the two*, for he opposes all the others to Fire.

In fact, however, fire and air, and each of the bodies we have mentioned, are not simple, but combined. The simple bodies are indeed similar in nature to them, but not identical with them. Thus the simple body corresponding to fire is fire-like, not fire; that which corresponds to air is air-like; and so on with the rest of them. But [25] fire is an excess of



heat, just as ice is an excess of cold. For freezing and boiling are excesses of cold and heat respectively. Assuming, therefore, that ice is a freezing of moist and cold, fire analogously will be a boiling of dry and hot—a fact which explains why nothing comes-to-be either out of ice or out of fire. [30]

The simple bodies, since they are four, fall into two pairs which belong to the two regions, each to each; for Fire and Air are forms of the body moving towards the limit, while Earth and Water are forms of the body which moves towards the centre. Fire and Earth, moreover, are extremes and purest; Water and Air, on the contrary, are intermediates and more combined. And, further, the members of either pair are [331<sup>a</sup>1] contrary to those of the other, Water being contrary to Fire and Earth to Air; for they are constituted from contrary qualities. Nevertheless, since they are four, each of them is characterized simply by a single quality: Earth by dry rather than by cold, Water by cold rather than by moist, Air by moist rather than by hot, and Fire [5] by hot rather than by dry.

4 · It has been established before that the coming-to-be of the simple bodies is reciprocal. At the same time, it is manifest, on the evidence of perception, that they *do* come-to-be; for otherwise there would not have been alteration, since alteration is change in respect to the qualities of the objects of touch. Consequently, [10] we must explain what is the manner of their reciprocal transformation, and whether every one of them can come-to-be out of every one—or whether some can do so, but not others.

Now it is evident that all of them are by nature such as to change into one another; for coming-to-be is a change into contraries and out of contraries, and the elements all involve a contrariety in their mutual relations because their distinctive [15] qualities are contrary. For in some of them *both* qualities are contrary—e.g. in Fire and Water, the first of these being dry and hot, and the second moist and cold; while in others *one* of the qualities is contrary—e.g. in Air and Water, the first being [20] moist and hot, and the second moist and cold. It is evident, therefore, if we consider them in general, that every one is by nature such as to come-to-be out of every one; and when we come to consider them severally, it is not difficult to see the manner in which their transformation is effected. For, though all will result from all, both the speed and the facility of their conversion will differ in degree.

Thus the process of conversion will be quick between those which tally with one [25] another, but slow between those which do not. The

reason is that it is easier for a single thing to change than for many. Air, e.g., will result from Fire if a single quality changes; for Fire, as we saw, is hot and dry while Air is hot and moist, so that there will be Air if the dry be overcome by the moist. Again, Water will result [30] from Air if the hot be overcome by the cold; for Air, as we saw, is hot and moist while Water is cold and moist, so that, if the hot changes, there will be Water. So too, in the same manner, Earth will result from Water and Fire from Earth, since both tally with both. For Water is moist and cold while Earth is cold and dry—so that, if the moist be overcome, there will be Earth; and again, since Fire is dry and [331<sup>b</sup>1] hot while Earth is cold and dry, Fire will result from Earth if the cold pass-away.

It is evident, therefore, that the coming-to-be of the simple bodies will be cyclical; and that this method of transformation is the easiest, because the *consecutive* elements tally. On the other hand the transformation of Fire into Water [5] and of Air into Earth, and again of Water and Earth into Fire and Air, though possible, is more difficult because it involves the change of more qualities. For if Fire is to result from Water, both the cold and the moist must pass-away; and again, both the cold and the dry must pass-away if Air is to result from Earth. So, too, if [10] Water and Earth are to result from Fire and Air—both must change.

This second method of coming-to-be, then, takes a longer time. But if one quality in each of two elements pass-away, the transformation, though easier, is not reciprocal. Still, from Fire and Water there will result Earth and Air, and from Air [15] and Earth Fire and Water. For there will be Air, when the cold of the Water and the dry of the Fire have passed-away (since the hot of the latter and the moist of the former are left); whereas, when the hot of the Fire and the moist of the Water have passed-away, there will be Earth, owing to the survival of the dry of the Fire and the cold of the Water. So, too, in the same way, Fire and Water will result from Air and [20] Earth. For there will be Water, when the hot of the Air and the dry of the Earth have passed-away (since the moist of the former and the cold of the latter are left); whereas, when the moist of the Air and the cold of the Earth have passed-away, there will be Fire, owing to the survival of the hot of the Air and the dry of the Earth—qualities constitutive of Fire. Moreover, this mode of Fire's coming-to-be is [25] confirmed by perception. For flame is *par excellence* Fire; but flame is burning smoke, and smoke consists of Air and Earth.

No transformation, however, into any of the bodies can result from the passing-away of one quality in each of two elements when they are

taken in their consecutive order, because either *identical* or *contrary* qualities are left—and from them no body can be formed. E.g. if the dry of Fire and the moist of Air were to [30] pass-away, the hot is left in both; and if the hot pass-away out of both, the contraries—dry and moist—are left. A similar result will occur in all the others too; for all the *consecutive* bodies contain one identical and one contrary quality. Hence, too, it clearly follows that, when one is transformed into one, the coming-to-be is [35] effected by the passing-away of a single quality; whereas, when two are transformed into a third, more than one quality must have passed-away.

5 · We have stated that all the bodies come-to-be out of any one of them; [332<sup>a</sup>1] and we have explained the manner in which their mutual conversion takes place. Let us nevertheless supplement our theory by the following speculations concerning them.

If Water, Air, and the like are a matter of which the natural bodies consist, as [5] some thinkers in fact believe, they must be either one, or two, or more. Now they cannot all of them be *one*—they cannot, e.g., all be Air or Water or Fire or Earth—because change is into contraries. For if they all were Air, then (assuming Air to persist) there will be alteration instead of coming-to-be. Besides, nobody supposes it to persist in such a way that it is Water as well as Air (or anything else) *at the same time*. So there will be a certain contrariety, i.e. a differentiating quality; [10] and the other member of this contrariety, e.g. heat, will belong to Fire. But Fire will certainly not be ‘hot Air’. For a change of that kind is alteration, and is not what is observed. Moreover if Air is again to result out of the Fire, it will do so by the conversion of the hot into its contrary; this contrary, therefore, will belong to Air, [15] and Air will be a cold something; hence it is impossible for Fire to be hot Air, since in that case the same thing will be simultaneously hot and cold. Both Fire and Air, therefore, will be something else which is the same; i.e. there will be some other matter common to both.

The same argument applies to all, proving that there is no single one of them out of which they all originate. But neither is there anything else beside these [20] four—something intermediate, e.g., between Air and Water (coarser than Air, but finer than Water), or between Air and Fire (coarser than Fire, but finer than Air). For the supposed intermediate will be Air and Fire when a pair of contrasted qualities is added to it; but, since one of every two contrary qualities is a privation, the intermediate

never can exist—as some thinkers assert the ‘Boundless’ or the [25] ‘Environing’ exists—in isolation. It is, therefore, indifferently any one of them, or else it is nothing.

Since, then, there is nothing *perceptible* prior to these, they must be all. That being so, either they must always persist and not be transformable into one another; or they must undergo transformation—either all of them, or some only (as Plato wrote in the *Timaeus*)<sup>16</sup> Now it has been proved before that they must undergo [30] reciprocal transformation, and that the speed with which they come-to-be one out of another is not uniform—since the process of reciprocal transformation is relatively *quick* between those that tally, but relatively *slow* between those which do not.

Assuming, then, that the contrariety, in respect to which they are transformed, is *one*, they must be two; for matter is the mean between the two contraries, and is [332<sup>b</sup>1] imperceptible and inseparable. Since, however, the elements are seen to be more than two, the contrarieties must at the least be two. But the contrarieties being two, the elements must be four (as they evidently are) and cannot be three; for the couplings are four, since, though six are possible, the two in which the qualities are contrary to one another cannot occur.

[5] These subjects have been discussed before; but the following arguments will make it clear that, since the elements are transformed into one another, it is impossible for any one of them—whether it be at the end or in the middle—to be a principle of the rest. There can be no such principle at the ends; for all of them would then be Fire or Earth, and this theory amounts to the assertion that all things [10] are made of Fire or Earth. Nor can a middle element be such a principle—as some thinkers suppose that Air is transformed both into Fire and into Water, and Water both into Air and into Earth, while the end elements are not further transformed into one another. For the process must come to a stop, and cannot continue *ad infinitum* in a straight line in either direction, since otherwise an infinite number of [15] contrarieties would attach to the single element. Let E stand for Earth, W for Water, A for Air, and F for Fire. Then since A is transformed into F and W, there will be a contrariety belonging to A and F. Let these contraries be whiteness and blackness. Again since A is transformed into W, there will be another contrariety; for W is not the same as F. Let this second contrariety be dryness and moistness, D [20] being dryness and M moistness. Now if the white persists, Water will be moist and white; but if it does not persist, Water will be black, since change is into contraries. Water, therefore, must be

either white or black. Let it then be the first. On similar grounds, therefore, D (dryness) will also belong to F. Consequently F (Fire) as well [25] will be able to be transformed into Water; for it has qualities contrary to those of Water, since Fire was *first* taken to be black and *then* to be dry, while Water was moist and *then* showed itself white. Thus it is evident that all will be able to be transformed out of one another; and that, in the instances we have taken, E (Earth) also will contain the remaining two tallies, viz. the black and the moist (for these [30] have not yet been coupled).

We have dealt with this last topic before the thesis we set out to prove. That thesis—viz. that the process cannot continue *ad infinitum*—will be clear from the following considerations. If Fire (which is represented by F) is not to revert, but is to be transformed in turn into some other element (e.g. into Q), a new contrariety, other than those mentioned, will belong to Fire and Q; for it has been assumed that [333<sup>a</sup>1] Q is not the same as any of the four, E W A and F. Let K, then, belong to F and Y to Q. Then K will belong to all four, E W A and F; for they are transformed into one another. This last point, however, we may admit, has not yet been proved; but at any rate it is clear that if Q is to be transformed in turn into yet another element, yet [5] another contrariety will belong not only to Q but also to F (Fire). And, similarly, every addition of a new element will carry with it the attachment of a new contrariety to the preceding elements. Consequently, if the elements are infinitely many, there will also belong *to the single element* an infinite number of contraries. But if that be so, it will be impossible to define any element; impossible also for any to come-to-be. For if one is to result from another, it will have to pass through so many contraries—and then more. Consequently into [10] some elements transformation will never be effected—viz. if the intermediates are infinite in number, as they must be if the elements are infinitely many; further there will not even be a transformation of Air into Fire, if the contraries are infinitely many; moreover all the elements become one. For all the contraries of the elements above F must belong to those below F, and *vice versa*: hence they will all be [15] one.

6 · As for those who agree with Empedocles that the elements of body are more than one, so that they are not transformed into one another—one may well wonder in what sense it is open to them to maintain that the elements are comparable. Yet Empedocles says ‘For

these are all equal...'<sup>17</sup> [20]

If it is meant that they are comparable in their amount, all the comparables must possess an identical something whereby they are measured. If, e.g., one pint of Water yields ten of Air, both are measured by the same unit; and therefore both were from the first an identical something. On the other hand, suppose they are not comparable in their amount in the sense that so much of the one yields so much of the other, but comparable in power of action (a pint of Water, e.g., having a power [25] of cooling equal to that of ten pints of Air); even so, they *are* comparable in their amount, though not *qua* amount but *qua* having power. Instead of comparing their powers by the measure of their amount, they might be compared as terms in an analogy: e.g., 'as *x* is hot, so *y* is white.' But 'as', though it means equality in quantity, means similarity in quality. Thus it is manifestly absurd that the bodies, [30] though they are not transformable, are comparable not by analogy, but by a measure of their powers; i.e. that so much Fire is comparable with many times that amount of Air, as being equally or similarly hot. For the same thing, if it be greater in amount, will, since it belongs to the same kind, have its *ratio* correspondingly increased.

A further objection to the theory of Empedocles is that it makes *growth* impossible, unless it be increase by addition. For his Fire increases by Fire: 'And [333<sup>b</sup>1] Earth increases its own frame and Ether increases Ether.'<sup>18</sup> These, however, are cases of addition; but it is not by addition that growing things are believed to increase. And it is far more difficult for him to account for the *coming-to-be* which occurs in nature. For the things which come-to-be by natural process all do so either [5] always or for the most part in a given way; while any exceptions—any results which occur neither always nor for the most part—are products of chance and spontaneity. Then what is the cause determining that man comes-to-be from man, that wheat (instead of an olive) comes-to-be from wheat, either always or for the most part? Are we to say that bone comes-to-be if the elements be put together in such-and-such a manner? For, according to his own statements, nothing comes [10] to-be from their coming together as chance has it, but only from their coming together in a certain proportion. What, then, is the cause of this? Presumably not Fire or Earth. But neither is it Love and Strife; for the former is a cause of association only, and the latter only of dissociation. No: the cause in question is the substance of each thing—not merely (to quote his words) 'a combining and a [15] divorce of what has been combined'. And *chance*, not *proportion*, 'is the name given to these occurrences';<sup>19</sup> for things can be

combined as chance has it.

The cause, therefore, of the things which exist by nature is that they are in such and such a condition; and it is *this* which constitutes the nature of each thing—a nature about which he says nothing. What he says, therefore, tells us nothing About Nature.<sup>20</sup> Moreover, it is *this* which is both the excellence of each thing and its good; whereas he assigns the whole credit to the combining. (And yet [20] *the elements* at all events are dissociated not by Strife, but by Love; since the elements are by nature prior to god, and they too are gods.)

Again, his account of motion is too simple. For it is not an adequate explanation to say that Love and Strife set things moving, unless the essence of Love is a movement of *this* kind and the essence of Strife a movement of *that* kind. He [25] ought, then, either to have defined or to have postulated these characteristic movements, or to have demonstrated them—whether strictly or laxly or in some other fashion. Moreover, since the bodies are seen to move naturally as well as by compulsion, i.e. in a manner contrary to nature (fire, e.g., moves upwards without compulsion, though by compulsion downwards); and since what is natural is contrary to that which is due to compulsion, and movement by compulsion actually [30] occurs; it follows that natural movement also occurs. Is *this*, then, the movement that Love sets going? No: for, on the contrary, the natural movement moves Earth downwards and resembles dissociation, and Strife rather than Love is its cause—so that in general, too, Love rather than Strife would seem to be contrary to nature. And unless Love or Strife is actually setting them in motion, the bodies themselves have absolutely no movement or rest. But this is absurd; and what is more, they do [334<sup>a</sup>] in fact obviously move. For though Strife dissociated, it was not by Strife that the Ether was borne upwards. On the contrary, sometimes he attributes its movement to something like *chance* ('For *thus*, as it ran, it *happened* to meet them then, though often otherwise'),<sup>21</sup> while at other times he says it is the *nature* of Fire to be [5] borne upwards, but 'the Ether' (to quote his words) 'sank down upon the Earth with long roots'.<sup>22</sup> With such statements, too, he combines the assertion that the Order of the World is the same *now*, in the reign of Strife, as it was *formerly* in the reign of Love. What, then, is the first mover and the cause of motion? Presumably not Love and Strife: on the contrary, these are causes of a *particular* motion, if at least we assume that first mover to be a principle.

[10] An additional absurdity is that the soul should consist of the elements, or that it should be one of them. How are the soul's alterations

to take place? How, e.g., is the change from being musical to being unmusical, or how is memory or forgetting, to occur? For clearly, if the soul be Fire, only such properties will belong to it as characterize Fire *qua* Fire; while if it be compounded, only the corporeal modifications will occur in it. But the changes we have mentioned are none of them corporeal.

7 · The discussion of these difficulties, however, is a task appropriate to a [15] different investigation:<sup>23</sup> let us return to the elements of which bodies are composed. The theories that there is something common to all the elements, and that they are reciprocally transformed, are so related that those who accept *either* are bound to accept *the other* as well. Those, on the other hand, who do not make their coming-to-be reciprocal—who refuse to suppose that any one of the ‘elements’ comes-to-be out of any other *taken singly*, except in the sense in which bricks come-to-be out of a wall—are faced with an absurdity. How, on their theory, are [20] flesh and bones or any of the other compounds to result from the elements?

Indeed, the point we have raised constitutes a problem even for those who generate the elements out of one another. In what manner does anything other than, and beside, the elements come-to-be out of them? Let me illustrate my meaning. Water can come-to-be out of Fire and Fire out of Water; for their *substratum* is something common to them both. But flesh too, presumably, and marrow [25] come-to-be out of them. How, then, do such things come-to-be? For how is the manner of their coming-to-be to be conceived by those who maintain a theory like that of Empedocles? They must conceive it as *composition*—just as a wall comes-to-be out of bricks and stones; and this mixture will be composed of the elements, these being preserved in it unaltered but with their small particles juxtaposed each to each. That will be the manner, presumably, in which flesh and [30] every other compound results from the elements. Consequently, it follows that Fire and Water do not come-to-be out of any and every part of flesh. For instance, although a sphere might come-to-be out of *this* part of a lump of wax and a pyramid out of *some other* part, it was nevertheless possible for either figure to have come-to-be out of either part indifferently: *that* is the manner of coming-to-be when both come-to-be out of any and every part of flesh. Those, however, who maintain the theory in question, are not at liberty to conceive things in that manner, but only as a stone and a brick both come-to-be out of a wall—viz. each out of a different [334<sup>b1</sup>] place or part. Similarly even for



those who postulate a single matter of their elements there is a certain difficulty in explaining how anything is to result from two of them taken together—e.g. from cold and hot, or from Fire and Earth. For if flesh consists of both and is neither of them, nor again is a composition of them in [5] which they are preserved unaltered, what alternative is left except to identify the resultant of the two elements with their matter? For the passing-away of either element produces *either* the other *or* the matter.

Now since there are differences of degree in hot and cold, then although when either is actual without qualification, the other will exist potentially; yet, when [10] neither exists in the full completeness of its being, but both by combining destroy one another's excesses so that there exist instead a hot which (for a hot) is cold and a cold which (for a cold) is hot; then there will exist neither their matter, nor either of the contraries in actuality without qualification, but rather an intermediate; and this intermediate, according as it is potentially more hot than cold or *vice versa*, will [15] in accordance with that proportion be potentially twice as hot or as cold—or three times or whatever. Thus all the other bodies will result from the contraries, or from the elements, in so far as these have been combined; while the elements will result from the contraries, in so far as these exist potentially in a special sense—not as matter exists potentially, but in the sense explained above. And when a thing [20] comes-to-be in *this* manner, the process is combination; whereas what comes-to-be in the other manner is matter. Moreover contraries also suffer action, in accordance with the definition established in the early part of this work.<sup>24</sup> For the actually hot is potentially cold and the actually cold potentially hot; so that hot and cold, unless they are equally balanced, are transformed into one another (and all the other contraries behave in a similar way). It is thus, then, that *in the first place* the [25] elements are transformed; and that out of the elements there come-to-be flesh and bones and the like—the hot becoming cold and the cold becoming hot when they have been brought to the mean. For at the mean is neither hot nor cold. The mean, however, is of considerable extent and not indivisible. Similarly, it is in virtue of a mean condition that the dry and the moist and the rest produce flesh and bone and [30] the remaining compounds.

8 · All the compound bodies—all of which exist in the region belonging to the central body—are composed of all the simple bodies. For

they all contain Earth because every simple body is to be found specially and most abundantly in its own place. And they all contain Water because the compound must possess a definite outline and Water, alone of the simple bodies, is readily adaptable in shape; [335<sup>a</sup>1] moreover Earth has no power of cohesion without the moist. On the contrary, the moist is what holds it together; for it would fall to pieces if the moist were eliminated from it completely.

They contain Earth and Water, then, for the reasons we have given; and they [5] contain Air and Fire, because these are contrary to Earth and Water (Earth being contrary to Air and Water to Fire, in so far as one Substance can be contrary to another). Now comings-to-be result from contraries, and one pair of the contrary extremes is present; hence the other pair must also be present, so that every compound will include all the simple bodies.

[10] Additional evidence seems to be furnished by the food each compound takes. For all of them are fed by what they are constituted from, and all of them are fed by more things than one. Indeed, even plants, though it might be thought they are fed by one thing only, viz. by Water, are fed by more than one; for Earth has been mixed with the Water. That is why farmers too endeavour to mix before watering. Although food is akin to the matter, that which is fed is the figure—i.e. the [15] form—taken along with the matter. Hence it is reasonable that, whereas all the simple bodies come-to-be out of one another, Fire is the only one of them which (as our predecessors also assert) is fed. For Fire alone—or more than all the rest—is akin to the form because it tends by nature to be borne towards the limit. Now each of them naturally tends to be borne towards its own place; but the figure—i.e. the [20] form—of them all is at the limits.

Thus we have explained that all bodies are composed of all the simple bodies.

9 · Since some things are such as to come-to-be and pass-away, and since coming-to-be in fact occurs in the region about the centre, we must explain the [25] *number* and the *nature* of the principles of all coming-to-be alike; for a grasp of any universal facilitates the understanding of its specific forms.

The principles, then, are equal in number to, and identical in kind with, those in the sphere of the eternal and primary things. For there is *one* in the sense of matter, and a *second* in the sense of form; and, in

addition, the *third* must be present [30] as well. For the two are not sufficient to bring things into being, any more than they are adequate to account for the primary things.

Now cause, in the sense of matter, for the things which are such as to come-to-be is that which can be and not be; and this is identical with that which can come to be and pass away, since the latter, while it *is* at one time, at another time *is not*. (For whereas some things *are* of necessity, viz. the eternal things, others of necessity *are not*. And of these two sets of things, since they cannot diverge from the [335<sup>b</sup>1] necessity of their nature, it is impossible for the first *not to be* and impossible for the second *to be*. Other things, however, can both *be* and *not be*.) Hence coming-to-be and passing-away must occur within the field of that which can be and not be. This, therefore, is cause in the sense of matter for the things which are such as to [5] come-to-be; while cause, in the sense of their end, is their figure or form—and that is the formula expressing the substance of each of them.

But the third principle must be present as well—the cause vaguely dreamed of by all our predecessors, definitely stated by none of them. On the contrary some amongst them thought the nature of the Forms was adequate to account for coming-to-be. Thus Socrates in the *Phaedo* first blames everybody else for having [10] given no explanation;<sup>25</sup> and then lays it down that some things are Forms, others participants in the Forms, and that while a thing is said to be in virtue of the Form, it is said to come-to-be *qua* sharing in, to pass-away *qua* losing, the Form. Hence he thinks that assuming the truth of these theses, the Forms *must* be causes both of [15] coming-to-be and of passing-away. On the other hand there were others who thought the matter was adequate by itself to account for coming-to-be, since the movement originates from the matter.

Neither of these theories, however, is sound. For if the Forms are causes, why is their generating activity intermittent instead of perpetual and continuous—since there always *are* participants as well as Forms? Besides, in some instances we *see* [20] that the cause is other than the Form. For it is the doctor who implants health and the man of science who implants science, although Health itself and Science itself *are* as well as the participants; and the same principle applies to everything else that is produced in accordance with a capacity. On the other hand to say that matter [25] generates owing to its movement would be, no doubt, more scientific than to make such statements as are made by the thinkers we have been criticizing. For what alters and transfigures plays a greater part in bringing things into being; and we are everywhere accustomed, in the

products of nature and of art alike, to look upon that which can initiate movement as the producing cause. Nevertheless this second theory is not right either.

30 For, to begin, with, it is characteristic of matter to suffer action, i.e. to be moved; but to move, i.e. to act, belongs to a different power. This is obvious both in the things that come-to-be by art and in those that come-to-be by nature. Water does not of itself produce out of itself an animal; and it is the art, not the wood, that makes a bed. Nor is this their only error. They make a second mistake in omitting the more controlling cause; for they eliminate the essential nature, i.e. the form. [336<sup>a</sup>1] And what is more, since they remove the formal cause, they invest the forces they assign to the simple bodies—the forces which enable these bodies to bring things into being—with too instrumental a character. For since (as they say) it is the nature of the hot to dissociate, of the cold to bring together, and of each remaining [5] contrary either to act or to suffer action, it is out of such materials and by their agency (so they maintain) that everything else comes-to-be and passes-away. Yet it is evident that even Fire is itself moved, i.e. suffers action. Moreover their procedure is virtually the same as if one were to treat the saw (and the various instruments of [10] carpentry) as the cause of the things that come-to-be; for the wood *must* be divided if a man saws, *must* become smooth if he planes, and so on with the remaining tools. Hence, however true it may be that Fire is active, i.e. sets things moving, there is a further point they fail to observe—viz. that Fire is inferior to the tools or instruments in the manner in which it sets things moving.

10 · As to our own theory—we have given a general account of the causes in an earlier work,<sup>26</sup> and we have now explained and distinguished the matter and the [15] form. Further, since the change which is motion has been proved to be eternal, the continuity of coming-to-be follows necessarily from what we have established; for the eternal motion, by causing the generator to approach and retire, will produce coming-to-be uninterruptedly. At the same time it is clear that we were also right when, in an earlier work,<sup>27</sup> we called motion (not coming-to-be) the primary form of [20] change. For it is far more reasonable that *what is* should cause the coming-to-be of *what is not*, than that *what is not* should cause the being of *what is*. Now that which is being moved *is*, but that which is coming-to-be *is not*: hence motion is prior to coming-to-be.

We have assumed, and have proved, that coming-to-be and passing-

away happen to things continuously; and we assert that motion causes coming-to-be. That [25] being so, it is evident that, if the motion be single, *both* processes cannot occur since they are contrary to one another; for nature by the same cause, provided it remain in the same condition, always produces the same effect, so that either coming-to-be or passing-away will always result. The movements must be more than one, and they [30] must be one another either by the sense of their motion or by its irregularity; for contrary effects demand contraries as their causes.

This explains why it is not the primary motion that causes coming-to-be and passing-away, but the motion along the inclined circle; for this motion not only possesses the necessary continuity, but includes a duality of movements as well. For if coming-to-be and passing-away are always to be continuous, there must be some [336<sup>b</sup>1] body always being moved (in order that these changes may not fail) and moved with a duality of movements (in order that both changes, not one only, may result). Now the continuity of this movement is caused by the motion of the whole; but the approaching and retreating of the moving body are caused by the inclination. For the consequence of the inclination is that the body becomes alternately remote and [5] near; and since its distance is thus unequal, its movement will be irregular. Therefore, if it generates by approaching and by its proximity, it—this very same body—destroys by retreating and becoming remote; and if it generates by many successive approaches, it also destroys by many successive retirements. For contrary effects demand contraries as their causes; and the natural processes of passing-away and coming-to-be occupy equal periods of time. Hence, too, the [10] times—i.e. the lives—of the several kinds of things have a number by which they are distinguished; for there is an order for all things, and every time (i.e. every life) is measured by a period. Not all of them, however, are measured by the same period, but some by a smaller and others by a greater one; for to some of them the period, which is their measure, is a year, while to some it is longer and to others [15] shorter.

And there are facts of observation in manifest agreement with our theories. Thus we see that coming-to-be occurs as the sun approaches and decay as it retreats; and we see that the two processes occupy equal times. For the durations of the natural processes of passing-away and coming-to-be are equal. Nevertheless it often happens that things pass-away in too short a time, because of their mutual [20] commingling. For their matter is irregular, i.e. is not everywhere the same; hence the processes by which they come-to-be must be irregular too, i.e. some too

quick and others too slow. Consequently the phenomenon in question occurs, because the coming-to-be of these things is the passing-away of other things.

Coming-to-be and passing-away will, as we have said, always be continuous, [25] and will never fail owing to the cause we stated. And this continuity has a sufficient reason. For in all things, as we affirm, nature always strikes after the better. Now being (we have explained elsewhere the variety of meanings we recognize in this term) is better than not-being; but not all things can possess being, since they are [30] too far removed from the principle. God therefore adopted the remaining alternative, and fulfilled the perfection of the universe by making coming-to-be uninterrupted; for the greatest possible coherence would thus be secured to existence, because that coming-to-be should itself come-to-be perpetually is the closest approximation to eternal being.

[337<sup>a</sup>1] The cause of this as we have often said, is circular motion; for that is the only motion which is continuous. That, too, is why all the other things—the things, I mean, which are reciprocally transformed in virtue of their qualities and their powers, e.g. the simple bodies—imitate circular motion. For when Water is [5] transformed into Air, Air into Fire, and the Fire back into Water, we say the coming-to-be has completed the circle, because it reverts again to the beginning. Hence it is by imitating circular motion that rectilinear motion too is continuous.

These considerations serve at the same time to explain what is to some people a puzzle—viz. why the bodies, since each of them is travelling towards its own place, [10] have not become dis severed from one another in the infinite lapse of time. The reason is their reciprocal transformation. For, had each of them persisted in its own place instead of being transformed by its neighbour, they would have got dis severed long ago. They are transformed, however, owing to the motion with its dual character; and because they are transformed, none of them is able to persist in any [15] fixed place.

It is clear from what has been said that coming-to-be and passing-away actually occur, what causes them, and what subject undergoes them. But if there is to be movement (as we have explained elsewhere, in an earlier work)<sup>28</sup> there must be something which initiates it; if there is to be movement always, there must always be something which initiates it; if the movement is to be continuous, what initiates it [20] must be single, unmoved, ungenerated, and incapable of alteration; and if the circular movements are more than one, they must all of them, in spite of their plurality, be in some way subordinated to a single principle. Further since

time is continuous, movement must be continuous, inasmuch as there can be no time without movement. Time, therefore, is a number of some continuous movement—a [25] number, therefore, of the circular movement, as was established in the discussions at the beginning.<sup>29</sup> But is movement continuous because of the continuity of that which is moved, or because that in which the movement occurs (I mean, e.g., the place or the quality) is continuous? The answer must clearly be because that which is moved is continuous. (For how can the quality be continuous except in virtue of the continuity of the thing to which it belongs? But if the continuity of ‘that in [30] which’ makes the movement continuous, this is true only of the place in which; for that has magnitude.) But amongst bodies which are moved, only that which is moved in a circle is continuous in such a way that it always preserves its continuity with itself. The conclusion therefore is that *this* is what produces continuous movement, viz. the body which is being moved in a circle; and its movement makes time continuous.

11 · Wherever there is continuity in any process (coming-to-be or alteration [337<sup>b</sup>1] or any kind of change whatever) we observe consecutiveness, i.e. *this* coming-to-be after *that* in such a way that there is no cessation. Hence we must investigate whether there is anything which will necessarily exist, or whether everything may fail to come-to-be. For that some of them may fail to occur, is clear—and that is why ‘it will be’ and ‘it is going to be’ are different. For if it be true to say of something that it will be, it must at some time be true to say of it that it is; whereas, [5] though it be true to say of something *now* that it is going to be, it is quite possible for it not to come-to-be—thus a man might not go for a walk, though he is now going to go for a walk. And since in general amongst the things which are some are capable also of not being, it is clear that the same character will attach to them when they are coming-to-be: in other words, their coming-to-be will not be necessary.

Then are all the things that come-to-be of this character? Or, on the contrary, [10] is it absolutely necessary for some of them to come-to-be? Is there, in fact, a distinction in the field of coming-to-be corresponding to the distinction, within the field of being, between things that cannot possibly not be and things that can not be? For instance, is it necessary that solstices shall come-to-be, i.e. impossible that they should fail to be able to occur?

Assuming that what is prior must have come-to-be if what is posterior

is to be (e.g. that foundations must have come-to-be if there is to be a house; clay, if there [15] are to be foundations), is the converse also true? If foundations have come-to-be, must a house come-to-be? It seems that this is not so, unless it is necessary absolutely for the latter to come-to-be. If that be the case, however, a house must come-to-be if foundations have come-to-be. For the prior was assumed to be so related to the posterior that, if the latter is to be, the prior must have come-to-be before it. If, therefore, it is necessary that the posterior should come-to-be, the prior [20] also must have come-to-be; and if the prior has come-to-be, then the posterior also must come-to-be—not, however, because of the prior, but because its future being was assumed as necessary. Hence, whenever the being of the posterior is necessary, the *nexus* is reciprocal—in other words, when the prior has come-to-be the posterior must always come-to-be too.

Now if the sequence of occurrences is to proceed *ad infinitum* downwards, the [25] coming-to-be of any determinate later member will not be *absolutely*, but only *conditionally*, necessary. For it will always be necessary that some other member shall have come-to-be beforehand, on account of which it is necessary that this should come-to-be: consequently, since what is infinite has no beginning, neither will there be any primary member which will make it necessary for the remaining members to come-to-be.

Nor again will it be possible to say with truth, even in regard to the members of [30] a limited sequence, that it is absolutely necessary for any one of them to come-to-be e.g. a house, when foundations have been laid; for (unless it is *always* necessary for a house to come-to-be) we should be faced with the consequence that, when foundations have been laid, a thing, which need not always be, must always be. No: if its coming-to-be is to be necessary, it must be always in its coming-to-be. For what is of necessity coincides with what is always, since that which must be cannot not be. Hence a thing is eternal if it is of [338<sup>a</sup>1] necessity; and if it is eternal, it is of necessity. And if, therefore, the coming-to-be of a thing is necessary, its coming-to-be is eternal; and if eternal, necessary.

It follows that the coming-to-be of anything, if it is absolutely necessary, must [5] be cyclical—i.e. must return upon itself. For coming-to-be must either be limited or not limited; and if not limited, it must be either rectilinear or cyclical. But the first of these last two alternatives is impossible if coming-to-be is to be eternal, because there could not be any beginning, whether the members be taken downwards (as future events) or upwards (as past events). Yet coming-to-be must have a



beginning [10] ἥ if it is to be necessary and therefore eternal<sup>α</sup>, nor can it be eternal if it is limited.<sup>30</sup> Consequently it must be cyclical. Hence the *nexus* must be reciprocal. By this I mean that the necessary occurrence of this involves the necessary occurrence of something prior; and conversely that, given the prior, it is also necessary for the posterior to come-to-be. And this will hold continuously throughout the sequence; for it makes no difference whether we take two, or by many, members.

[15] It is in circular movement, therefore, and in cyclical coming-to-be that the absolutely necessary is to be found. In other words, if the coming-to-be of any things is cyclical, it is necessary that each of them is coming-to-be and has come-to-be; and if it is necessary, their coming-to-be is cyclical.

And this is reasonable; for circular motion, i.e. the revolution of the heavens, was seen on other grounds to be eternal since precisely those movements which [338<sup>b</sup>1] belong to, and depend upon this eternal revolution come-to-be of necessity, and of necessity will be. For since the revolving body is always setting something in motion, the movement of the things it moves must also be circular. Thus, since the upper movement is cyclical, the sun<sup>31</sup> moves in this determinate manner; and since the sun moves *thus*, the seasons in consequence come-to-be in a cycle, i.e. return upon themselves; and since they come-to-be cyclically, so in their turn do the things [5] whose coming-to-be the seasons initiate.

Then why do some things manifestly come-to-be in this fashion (as, e.g., showers and air come-to-be cyclically, so that it must rain if there is to be a cloud and, conversely, there must be a cloud if it is to rain), while men and animals do not return upon themselves so that the same individual comes-to-be a second time (for [10] though your coming-to-be presupposes your father's, his coming-to-be does not presuppose yours)? Why, on the contrary, does this coming-to-be seem to constitute a rectilinear sequence?

In discussing this, we must begin by inquiring whether all things return upon themselves in a uniform manner; or whether, on the contrary, though in some sequences what recurs is *numerically* the same, in other sequences it is the same *only in species*. Now it is evident that those things, whose substance—that which is undergoing the process—is imperishable, will be numerically the same; for the [15] character of the process is determined by the character of that which undergoes it. Those things, on the other hand, whose substance is perishable (not imperishable) must return upon themselves specifically, not numerically. That is why, when Water comes-to-be from Air and Air from Water, the

Air is the same specifically, not numerically; and if these too recur numerically the same, at any rate this does not happen with things whose substance comes-to-be—whose substance is such that it is capable of not-being.

**\*\*TEXT:** H. H. Joachim, *Aristotle on Coming-to-be and Passing-away*, Clarendon Press, Oxford, 1922

<sup>1</sup>Frag. 8 Diels-Kranz.

<sup>2</sup>Frag. 21, lines 3 and 5, Diels-Kranz.

<sup>3</sup>See *Physics* I 6–9.

<sup>4</sup>See *Physics* 258<sup>b</sup>10ff.

<sup>5</sup>Below, II 10.

<sup>6</sup>Joachim excises the parenthetical sentence. (In the Oxford Translation he preferred to transpose it to follow ‘ . . . either *generically*’ in line 19.)

<sup>7</sup>See *Physics* IV 6–9.

<sup>8</sup>See *Physics* 226<sup>b</sup>21–3.

<sup>9</sup>‘One or more arguments against the Eleatic theory appear to have dropped out’ (Joachim).

<sup>10</sup>See *Timaeus* 53Aff.

<sup>11</sup>See esp. *On the Heavens* III 1.

<sup>12</sup>Joachim marks a lacuna in the Greek text after τῆ δὲ μῆ, line 6: the words within pointed brackets are his attempt to fill in the gap.

<sup>13</sup>See *Timaeus* 49Dff.

<sup>14</sup>See *Physics* I 6–9.

<sup>15</sup>The ancient commentators take Aristotle to be referring to Plato’s ‘unwritten doctrines’; Joachim thinks that the reference is to *Timaeus* 35Aff.

<sup>16</sup>See *Timaeus* 54BD.

<sup>17</sup>Frag. 17, line 17, Diels-Kranz.

<sup>18</sup>Empedocles, frag. 37 Diels-Kranz.

<sup>19</sup>See Empedocles, frag. 8 Diels-Kranz.

<sup>20</sup>*About Nature* (περὶ Φύσεως) was the title of Empedocles’ scientific poem.

<sup>21</sup>Empedocles, frag. 53 Diels-Kranz.

<sup>22</sup>*ib.*, frag. 54.

<sup>23</sup>See *On the Soul* I 4–5.

<sup>24</sup>See I 7.

<sup>25</sup>See *Phaedo* 96Aff.

<sup>26</sup>See *Physics* II 3–4.

<sup>27</sup>See *Physics* 260<sup>a</sup>26ff.

<sup>28</sup>See *Physics* 255<sup>b</sup>31ff.

<sup>29</sup>See *Physics* 217<sup>b</sup>29ff.

<sup>30</sup>The text is corrupt at this point.

<sup>31</sup>Reading κύκλω ὁ ἥλιος.

# METEOROLOGY\*\*

*E. W. Webster*

## BOOK I

1 · We have already discussed the first causes of nature, and all natural [338<sup>a</sup>20] motion, also the stars ordered in the motion of the heavens, and the corporeal elements—enumerating and specifying them and showing how they change into one another—and becoming and perishing in general. There remains for consideration a part of this inquiry which all our predecessors called meteorology. It is concerned with events that are natural, though their order is less perfect than that of the first [338<sup>b</sup>20] of the elements of bodies. They take place in the region nearest to the motion of the stars. Such are the milky way, and comets, and the movements of meteors. It studies also all the affections we may call common to air and water, and the kinds and parts of the earth and the affections of its parts. These throw light on the causes of winds and earthquakes and all the consequences of their motions. Of these things some [339<sup>a</sup>1] puzzle us, while others admit of explanation in some degree. Further, the inquiry is concerned with the falling of thunderbolts and with whirlwinds and fire-winds, and further, the recurrent affections produced in these same bodies by concretion. [5] When the inquiry into these matters is concluded let us consider what account we can give, in accordance with the method we have followed, of animals and plants, both generally and in detail. When that has been done we may say that the whole of our original undertaking will have been carried out.

After this introduction let us begin by discussing our immediate subject. [10]

2 · We have already laid down that there is one principle which makes up the nature of the bodies that move in a circle, and besides this

four bodies owing their existence to the four principles, the motion of these latter bodies being of two kinds: either from the centre or to the centre. These four bodies are fire, air, water, earth. [15] Fire occupies the highest place among them all, earth the lowest, and two elements correspond to these in their relation to one another, air being nearest to fire, water to earth. The whole world surrounding the earth, then, the affections of which are our subject, is made up of these bodies. This world necessarily has a certain [20] continuity with the upper motions; consequently all its power is derived from them. (For the originating principle of all motion must be deemed the first cause. Besides, that element is eternal and its motion has no limit in space, but is always complete; [25] whereas all these other bodies have separate regions which limit one another.) So we must treat fire and earth and the elements like them as the material causes of the [30] events in this world (meaning by material what is subject and is affected), but must assign causality in the sense of the originating principle of motion to the power of the eternally moving bodies.

**3** · Let us first recall our original postulates and the definitions already given [35] and then explain the milky way and comets and the other phenomena akin to these.

Fire, air, water, earth, we assert, come-to-be from one another, and each of [339<sup>b</sup>1] them exists potentially in each, as all things do that can be resolved into a common and ultimate substrate.

The first difficulty is raised by what is called the air. What are we to take its [5] nature to be in the world surrounding the earth? And what is its position relatively to the other so-called elements of bodies? (For there is no question as to the relation of the bulk of the earth to the size of the bodies which exist around it, since astronomical researches have by this time shown us that it is actually far smaller [10] than some individual stars. As for the water, it is not observed to exist collectively and separately, nor can it do so apart from that volume of it which has its seat about the earth: the sea, that is, and rivers, which we can see, and any subterranean water that may be hidden from our observation.) The question is really about that which lies between the earth and the extreme stars. Are we to consider it to be one kind of [15] body or more than one? And if more than one, how many are there and what are the bounds of their regions?

We have already described the first element and its powers, and

explained that the whole world of the upper motions is full of that body.

[20] This is an opinion we are not alone in holding: it appears to be an old belief and one which men have held in the past, for the word 'ether' has long been used to denote that element. Anaxagoras, it is true, seems to me to think that the word means the same as fire. For he thought that the upper regions were full of fire, and that men<sup>1</sup> referred to those regions when they spoke of ether. In the latter point he [25] was right; for men seem to have assumed that a body that was eternally in motion was also divine in nature; and, as such a body was different from any of the terrestrial elements, they determined to call it 'ether'.<sup>2</sup>

For the same opinions appear in cycles among men not once nor twice nor occasionally, but infinitely often.

Now there are some who maintain that not only the bodies in motion but that [30] which contains them is pure fire, and the interval between the earth and the stars air; but if they had considered what is now satisfactorily established by mathematics, they might have given up this puerile opinion. For it is altogether childish to [35] suppose that the moving bodies are all of them of a small size, because they seem so to us, looking at them from the earth.

This is a matter which we have already discussed in our treatment of the upper region,<sup>3</sup> but we may return to the point now.

If the intervals were full of fire and the bodies consisted of fire every one of the [340<sup>a</sup>1] other elements would long ago have vanished.

However, they cannot simply be said to be full of air either; for even if there were two elements to fill the space between the earth and the heavens, the air would [5] far exceed the quantity required to maintain its proper proportion to the other elements. For the bulk of the earth (which includes the whole volume of water) is infinitesimal in comparison with the whole world that surrounds it. Now we find that the excess in volume is not proportionately great where water dissolves into air [10] or air into fire. Whereas the *proportion* between any given quantity however small of water and the air that is generated from it ought to hold good between the total amount of air and the total amount of water. Nor does it make any difference if any one denies that the elements come-to-be from one another, but asserts that they are equal in power. For on this view it is certain amounts of each that are equal in [15] power, just as would be the case if they actually came-to-be from one another.

So it is clear that neither air nor fire alone fills the intermediate

space.

It remains to explain, after a discussion of difficulties, the relation of the two elements air and fire to the position of the first element, and the reason why the [20] stars in the upper region impart heat to the earth and its neighbourhood. Let us first treat of the air, as we proposed, and then go on to these questions.

Since water is generated from air, and air from water, why are clouds not [25] formed in the upper region? They ought to form there the more, the further from the earth and the colder that region is. For it is neither appreciably near to the heat of the stars, nor to the rays reflected from the earth. It is these that dissolve any formation by their heat and so prevent clouds from forming near the earth. For [30] clouds gather at the point where the reflected rays disperse in the infinity of space and are lost. Thus either it is not all air from which water is generated, or, if it is produced from all air alike, what immediately surrounds the earth is not mere air, but a sort of vapour, for that reason it condenses back to water again. But if the whole of that vast region is vapour, the amount of air and of water will be [35] disproportionately great. For the spaces between the heavenly bodies must be filled by some element. This cannot be fire, for then all the rest would have been dried up. [340<sup>b</sup>1] Consequently, what fills it must be air and the water that surrounds the whole earth—vapour being water dissolved.

After this exposition of the difficulties involved, let us go on to state our own opinion, with a view at once to what follows and to what has already been said. The [5] upper region as far as the moon we affirm to consist of a body distinct both from fire and from air, but varying in degree of purity and in kind, especially towards its limit on the side of the air, and of the world surrounding the earth. Now the circular [10] motion of the first element and of the bodies it contains dissolves, and inflames by its motion, whatever part of the lower world is nearest to it, and so generates heat. From another point of view we may look at the motion as follows. The body that lies [15] below the circular motion of the heavens is, in a way, matter, and is potentially hot, cold, dry, moist, and possessed of whatever other qualities are derived from these. But it actually acquires or retains one of these in virtue of motion or rest, the cause and principle of which has already been explained. So at the centre and round it we [20] get earth and water, the heaviest and coldest elements, by themselves; round them and contiguous with them, air and what we commonly call fire. It is not really fire, for fire is an excess of heat and a sort of ebullition; but in reality, of what we call air, [25] the part



surrounding the earth is moist and warm, because it contains both vapour and a dry exhalation from the earth. But the next part, above that, is warm and dry. For vapour is naturally moist and cold, exhalation warm and dry; and vapour is potentially like water, exhalation potentially like fire. So we must take the reason [30] why clouds are not formed in the upper region to be this: that it is filled not with mere air but rather with a sort of fire.

However, it may well be that the formation of clouds in that upper region is also prevented by the circular motion. For the air round the earth is necessarily all [35] of it in motion, except that which is cut off inside the circumference which makes the earth a complete sphere. In the case of winds it is actually observable that they originate in marshy districts of the earth; and they do not seem to blow above the [341<sup>a</sup>1] level of the highest mountains. It is the revolution of the heaven which carries the air with it and causes its circular motion, fire being continuous with the upper element and air with fire. Thus its motion is a second reason why that air is not condensed into water.

[5] But whenever a particle of air grows heavy, the warmth in it is squeezed out into the upper region and it sinks, and other particles in turn are carried up together with the fiery exhalation. Thus the one region is always full of air and the other of fire, and each of them is perpetually in a state of change.

So much to explain why clouds are not formed and why the air is not condensed [10] into water, and what account must be given of the space between the stars and the earth, and what is the body that fills it.

As for the heat derived from the sun, the right place for a special and accurate [15] account of it is in the treatise about perception,<sup>4</sup> since heat is an affection of perception; but we may now explain how it can be produced by the heavenly bodies which are not themselves naturally hot.

We see that motion is able to dissolve and inflame the air; indeed, moving [20] bodies are often actually found to melt. Now the sun's motion alone is sufficient to account for the origin of warmth and heat. For a motion that is to have this effect must be rapid and near, and that of the stars is rapid but distant, while that of the moon is near but slow, whereas the sun's motion combines both conditions in a sufficient degree. That most heat should be generated where the sun is present is [25] easy to understand if we consider the analogy of terrestrial phenomena; for here, too, it is the air that is nearest to a thing in rapid motion which is heated most. This is just what we should expect, as it is the nearest air that is most dissolved by the motion of a solid body.

This then is one reason why heat reaches our world. Another is that the fire surrounding the air is often scattered by the motion of the heavens and driven [30] downwards in spite of itself.

Shooting-stars further suffice to prove that the upper region is not hot or fiery; for they do not occur there but below; yet the more and the faster a thing moves, the more apt it is to take fire. Besides, the sun, which most of all the stars is considered [35] to be hot, is really white and not fiery.

4 · Having determined these principles let us explain the cause of the [341<sup>b</sup>1] appearance in the sky of burning flames and of shooting-stars, and of ‘torches’, and ‘goats’, as some people call them. All these phenomena are one and the same thing, and are due to the same cause, the difference between them being one of degree. [5]

The origin of these and many other phenomena is this. When the sun warms the earth the exhalation which takes place is necessarily of two kinds, not of one only as some think. One kind is rather of the nature of vapour, the other of the nature of a windy exhalation. That which rises from the moisture contained in the earth and on its surface is vapour, while that rising from the earth itself, which is [10] dry, is like smoke. Of these the windy exhalation, being warm, rises above the moister vapour, which is heavy and sinks below the other. Hence the world surrounding the earth is ordered as follows. First below the circular motion comes the warm and dry element, which we call fire, for there is no word fully adequate to [15] every state of the smoky evaporation; but we must use this terminology since this element is the most inflammable of all bodies. Below this comes air. We must think of what we just called fire as being spread round the terrestrial sphere on the outside like a kind of fuel, so that a little motion often makes it burst into flame just as [20] smoke does; for flame is the ebullition of a dry exhalation. So whenever the circular motion stirs this stuff up in any way, it catches fire at the point at which it is most inflammable. The result differs according to the disposition and quantity of the fuel. If this is broad and long, we often see a flame burning as in a field of stubble; if [25] it burns lengthwise only, we see what are called ‘torches’ and ‘goats’ and shooting-stars. Now when the inflammable material is longer than it is broad sometimes it seems to throw off sparks as it burns. (This happens because matter [30] catches fire at the sides in small portions but continuously with the main body.) Then it is called a ‘goat’. When this does not happen it is a ‘torch’. But if

the whole length of the exhalation is scattered in small parts and in many directions and in breadth and depth alike, we get what are called shooting-stars.

The cause of these shooting-stars is sometimes the motion which ignites the exhalation. At other times the air is condensed by cold and squeezes out and ejects [342<sup>a</sup>1] the hot element; making their motion look more like that of a thing thrown than like a running fire. For the question might be raised whether the shooting of a star is the same thing as when you put an exhalation below a lamp and it lights the lower lamp [5] from the flame above. For here too the flame passes wonderfully quickly and looks like a thing thrown, and not as if one thing after another caught fire. Or is a star when it shoots a single body that is thrown? Apparently both cases occur: sometimes it is like the flame from the lamp and sometimes bodies are projected by [10] being squeezed out (like fruit stones from one's fingers) and so are seen to fall into the sea and on the dry land, both by night and by day when the sky is clear. They are thrown downwards because the condensation which propels them inclines downwards. Thunderbolts fall downwards for the same reason:<sup>5</sup> their origin is never [15] combustion but ejection under pressure, since naturally all heat tends upwards.

When the phenomenon is formed in the upper region<sup>6</sup> it is due to the combustion of the exhalation. When it takes place at a lower level it is due to the ejection of the exhalation by the condensing and cooling of the moister exhalation; [20] for this latter as it condenses and inclines downward contracts, and thrusts out the hot element and causes it to be thrown downwards. The motion is upwards or downwards or sideways according to the way in which the exhalation lies, and its disposition in respect of breadth and depth. In most cases the direction is sideways [25] because two motions are involved, a compulsory motion downwards and a natural motion upwards, and under these circumstances an object always moves obliquely. Hence the motion of shooting-stars is generally oblique.

So the material cause of all these phenomena is the exhalation, the efficient cause sometimes the upper motion, sometimes the contraction and condensation of [30] the air. Further, all these things happen below the moon. This is shown by their apparent speed, which is equal to that of things thrown by us; for it is because they are close to us, that these latter seem far to exceed in speed the stars, the sun, and the moon.

5 · Sometimes on a fine night we see a variety of appearances that form in the sky: ‘chasms’ for instance and ‘trenches’ and blood-red colours. These, too, have [342<sup>b</sup>1] the same cause. For we have seen that the upper air condenses into an inflammable condition and that the combustion sometimes takes on the appearance of a burning flame, sometimes that of moving torches and stars. So it is not surprising that this [5] same air when condensing should assume a variety of colours. For a weak light shining through a dense medium, and the air when it acts as a mirror, will cause all kinds of colours to appear, but especially crimson and purple. For these colours generally appear when fire-colour and white are combined by superposition. Thus [10] on a hot day, the stars when they rise and set look crimson when seen through a smoky medium. The air will also create colours by reflection when the mirror is such as to reflect colour only and not shape.

These appearances do not persist long, because the condensation of the air is transient.

[15] ‘Chasms’ get their appearance of depth from light breaking out of a dark blue or black background. When the process of condensation goes further in such a case we often find ‘torches’ ejected; but while the contraction is taking place a ‘chasm’ appears.

In general, white in contrast with black creates a variety of colours; like flame, for instance, through a medium of smoke. But by day the sun obscures them, and, with the exception of crimson, the colours are not seen at night because they are [20] dark.

These then must be taken to be the causes of shooting-stars and the phenomena of combustion and also of the other transient appearances of this kind.

6 · Let us go on to explain the nature of comets and the ‘milky way’, after a [25] preliminary discussion of the views of others.

Anaxagoras and Democritus declare that comets are a conjunction of the planets approaching one another and so appearing to touch one another.

Some of the Italians called Pythagoreans say that the comet is one of the [30] planets, but that it appears at great intervals of time and only rises a little above the horizon. This is the case with Mercury too; because it only rises a little above the horizon it often fails to be seen and consequently appears at great intervals of [35] time.

A view like theirs was also expressed by Hippocrates of Chios and his pupil Aeschylus. Only they say that the tail does not belong to the comet itself, but is [343<sup>a</sup>1] occasionally assumed by it on its course in certain situations, when our sight is reflected to the sun from the moisture attracted by the comet. It appears at greater intervals than the other stars because it is slowest to fall behind the sun and has [5] fallen behind to the extent of the whole of its circle before it reappears at the same point. It falls behind both towards the north and towards the south. In the space between the tropics it does not draw water to itself because that region is dried up by the sun on its course. When it moves towards the south it has no lack of the [10] necessary moisture, but because the segment of its circle which is above the horizon is small, and that below it many times as large, it is impossible for human sight to be reflected to the sun, either when it approaches the region of the tropic, or at the summer solstice. Hence in these regions it does not become a comet. But when it [15] falls behind towards the north it assumes a tail because the arc above the horizon is large and that below it small. For under these circumstances human sight is easily reflected to the sun. [20]

These views involve impossibilities, some of which are common to all of them, while others are peculiar to some only.

This is the case, first, with those who say that the comet is one of the planets. For all the planets fall behind in the circle of the zodiac, whereas many comets have been seen outside that circle. Again more comets than one have often appeared [25] simultaneously. Besides, if their tail is due to reflection, as Aeschylus and Hippocrates say, this planet ought sometimes to be visible without a tail since, as they say, it does not possess a tail in every place in which it falls behind. But, as a [30] matter of fact, no planet has been observed besides the five. And all of them are often visible above the horizon together at the same time. Further, comets are often found to appear, as well when all the planets are visible as when some are not, but [35] are obscured by the neighbourhood of the sun. Moreover the statement that a comet only appears in the north, with the sun at the summer solstice, is not true either. The [343<sup>b</sup>1] great comet which appeared at the time of the earthquake in Achaëa and the tidal wave<sup>7</sup> rose due west; and many have been known to appear in the south. Again in the [5] archonship of Euclees, son of Molon, at Athens<sup>8</sup> there appeared a comet in the north in the month Gamelion, the sun being about the winter solstice. Yet they themselves admit that reflection over so great a space is an impossibility.

An objection that tells equally against those who hold this theory and

those who say that comets are a conjunction of the planets is, first, the fact that some of [10] the fixed stars too get a tail. For this we must not only accept the authority of the Egyptians who assert it, but we have ourselves observed the fact. For a star in the thigh of the Dog had a tail, though a faint one. If you fixed your sight on it its light was dim, but if you just glanced at it, it appeared brighter. Besides, all the comets [15] that have been seen in our day have vanished without setting, gradually fading away above the horizon; and they have not left behind them either one or more stars. For instance the great comet we mentioned before appeared to the west in winter in [20] frosty weather when the sky was clear, in the archonship of Asteius. On the first day it set before the sun and was then not seen. On the next day it was seen, being ever so little behind the sun and immediately setting. But its light extended over a third part of the sky like a band<sup>9</sup> so that people called it a 'path'. This comet receded as [25] far as Orion's belt and there dissolved. Democritus, however, insists upon the truth of his view and affirms that certain stars have been seen when comets dissolve. But on his theory this ought to occur not occasionally but always. Besides, the Egyptians affirm that conjunctions of the planets with one another, and with the fixed stars, [30] take place, and we have ourselves observed Jupiter coinciding with one of the stars in the Twins and hiding it, and yet no comet was formed. Further, we can also give a rational proof of our point. It is true that some stars seem to be bigger than others, yet each one by itself looks indivisible. Consequently, just as, if they really had been [35] indivisible, their conjunction could not have created any greater magnitude, so now that they are not in fact indivisible but look as if they were, their conjunction will [344<sup>a</sup>1] not make them look any bigger.

Enough has been said, without further argument, to show that the causes brought forward to explain comets are false.

[5] **7** · We consider a satisfactory explanation of phenomena inaccessible to observation to have been given when our account of them is free from impossibilities. The phenomenon available suggest the following account of the matters in [10] question. We suppose that the dry and warm exhalation is the outermost part of the terrestrial world which falls below the circular motion. It, and a great part of the air that is continuous with it below, is carried round the earth by the motion of the circular revolution. In the course of this motion it often ignites wherever it may happen to be of the right consistency, and this we maintain to be

the cause of the shooting of scattered stars. We may say, then, that a comet is formed when the [15] upper motion introduces into a condensation of this kind a fiery principle not of such excessive strength as to burn up much of the material quickly, nor so weak as soon to be extinguished, but stronger and capable of burning up much material, and when exhalation of the right consistency rises from below and meets it. The kind of comet [20] varies according to the shape which the exhalation happens to take. If it is diffused equally on every side the star is a comet, if it stretches out in one direction it is called bearded. And just as when a phenomenon of this kind moves we seem to have a shooting-star, so when it stands still we seem to have a star standing still. We may compare these phenomena to a heap or mass of chaff into which a torch is thrust, or [25] a spark thrown. That is what a shooting-star is like. The fuel is so inflammable that the fire runs through it quickly in a line. Now if this fire were to persist instead of running through the fuel and perishing away, its course through the fuel would stop [30] at the point where the latter was densest, and then the whole might begin to move. Such is a comet—like a shooting-star that contains its beginning and end in itself.

When the matter begins to gather in the lower region independently the comet appears by itself. But when the exhalation is constituted by one of the fixed stars or the planets, owing to their motion, one of them becomes a comet. The fringe is not [344<sup>b1</sup>] close to the stars themselves. Just as haloes appear to follow the sun and the moon as they move, when the air is dense enough for them to form along under the sun's [5] course, so too the tail stands in the relation of a halo to the stars, except that the colour of the halo is due to reflection, whereas in the case of comets the colour is something that appears actually on them.

Now when this matter gathers in relation to a star the comet necessarily appears to follow the same course as the star. But when the comet is formed [10] independently it falls behind; for such is the motion of the terrestrial sphere. It is this fact, that a comet often forms independently, indeed oftener than round one of the regular stars, that makes it impossible to maintain that a comet is a sort of reflection, not indeed, as Hippocrates and his school say, to the sun, but to the very [15] star it is alleged to accompany—in fact, a kind of halo in the pure fuel.

As for the halo we shall explain its cause later.

The fact that comets when frequent foreshadow wind and drought must be [20] taken as an indication of their fiery constitution. For their origin is plainly due to the plentiful supply of that secretion. Hence the

air is necessarily drier and the moist evaporation is so dissolved and dissipated by the quantity of the hot exhalation as not readily to condense into water.—But this phenomenon too will be explained more clearly later when the time comes to speak of the winds.—So when [25] there are many comets and they are frequent, it is as we say, and the years are clearly dry and windy. When they are fewer and fainter this effect does not appear in the same degree, though as a rule the wind is found to be excessive either in [30] duration or strength. For instance when the stone at Aegospotami fell out of the air—it had been carried up by a wind and fell down in the daytime—then too a comet happened to have appeared in the west. And at the time of the great comet the winter was dry and north winds prevailed, and the wave was due to an opposition [345<sup>a</sup>1] of winds. For in the gulf a north wind blew and outside it a violent south wind. Again in the archonship of Nicomachus<sup>10</sup> a comet appeared for a few days about the equinoctial circle (this one had not risen in the west), and simultaneously with it there happened the storm at Corinth.

[5] That there are few comets and that they appear rarely and outside the tropic circles more than within them is due to the motion of the sun and the stars. For this motion does not only cause the hot principle to be secreted but also dissolves it when it is gathering. But the chief reason is that most of this stuff collects in the region of [10] the milky way.

8 · Let us now explain the origin, cause, and nature of the milky way. And here too let us begin by discussing the statements of others on the subject.

Of the so-called Pythagoreans some say that this is the path of one of the stars [15] that fell from heaven during the alleged destruction at the time of Phaethon. Others say that the sun used once to move in this circle. Thus this region was scorched or met with some other affection of this kind, because of the motion of these bodies.

But it is absurd not to see that if this were the reason the circle of the Zodiac [20] ought to be affected in the same way, and indeed more so than that of the milky way, since not the sun only but all the planets move in it. We can see the whole of this circle (half of it being visible at any time of the night), but it shows no signs of any such affection except where a part of it touches the circle of the milky way.

[25] Anaxagoras, Democritus, and their schools say that the milky way is the light of certain stars. For, they say, when the sun passes below the earth some of the stars are hidden from it. Now the light of those on



which the sun shines is invisible, being obscured by the rays of the sun. But the milky way is the peculiar light of those stars [30] which are shaded by the earth from the sun's rays.

This, too, is obviously impossible. The milky way is always unchanged and among the same constellations (for it is clearly a greatest circle), whereas, since the sun does not remain in the same place, what is hidden from it differs at different [35] times. Consequently with the change of the sun's position the milky way ought to change its position too; but we find that this does not happen. Besides, if current [345<sup>b</sup>1] astronomical demonstrations are correct and the size of the sun is greater than that of the earth and the distance of the stars from the earth many times greater than [5] that of the sun (just as the sun is further from the earth than the moon), then the cone made by the rays of the sun would terminate at no great distance from the earth, and the shadow of the earth (what we call night) would not reach the stars. On the contrary, the sun shines on all the stars and the earth screens none of them.

[10] There is a third theory about the milky way. Some say that it is a reflection of our sight to the sun, just as they say that the comet is.

But this too is impossible. For if the eye and the mirror and the whole of the object were severally at rest, then the same part of the image would appear at the same point in the mirror. But if the mirror and the object move, keeping the same [15] distance from the eye which is at rest, but at different rates of speed and so not always at the same interval from one another, then it is impossible for the same image always to appear in the same part of the mirror. Now the constellations included in the circle of the milky way move; and so does the sun, the object to [20] which our sight is reflected; but we stand still. And the distance of those two from us is constant and uniform, but their distance from one another varies. For the Dolphin sometimes rises at midnight, sometimes in the morning. But in each case the same parts of the milky are found near it. But if it were a reflection and not a genuine affection of these regions, this ought not to be the case. [25]

Again, we can see the milky way reflected at night in water and similar mirrors. But under these circumstances it is impossible for our sight to be reflected to the sun.

These considerations show that the milky way is not the path of one of the planets, nor the light of stars unseen by the sun, nor a reflection. And those are pretty well the only views handed down by others hitherto. [30]

Let us recall our fundamental principle and then explain our views. We have already laid down that the outermost part of what is called the air has the powers of fire and that therefore when the air is dissolved by motion, there is separated off a kind of matter—and of this matter we assert that comets consist. We must suppose [35] that what happens is the same as in the case of the comets when the matter does not form independently but is formed by one of the fixed stars or the planets. Then these [346<sup>a</sup>1] stars appear as comets, because matter of this kind follows their course. In the same way, a certain kind of matter follows the sun, and we explain the halo as a reflection [5] from it when the air is of the right constitution. Now we must assume that what happens in the case of the stars severally happens in the case of the whole of the heavens and all the upper motion. For it is natural to suppose that, if the motion of a single star excites a flame, that of all the stars should have a similar result,<sup>11</sup> and especially in that region in which the stars are biggest and most numerous and [10] nearest to one another. Now the circle of the zodiac dissolves this kind of matter because of the motion of the sun and the planets, and for this reason most comets are found outside the tropic circles. Again, no tail appears round the sun or moon; [15] for they dissolve such matter too quickly to admit of its formation. But this circle in which the milky way appears to our sight is the greatest circle, and its position is such that it extends far outside the tropic circles. Besides the region is full of the biggest and brightest constellations and also of what are called ‘scattered’ stars (you [20] have only to look to see this clearly). So for these reasons all this matter is continually and ceaselessly collecting there. A proof of the theory is this: in the circle itself the light is stronger in the half where the milky way is double, and in it the constellations are more numerous and closer to one another than in the other [25] half; which shows that the cause of the light is the motion of the constellations and nothing else. For if it is found in the circle in which there are most constellations and at that point in the circle in which they are densest and contain the biggest and the [30] most stars, it is natural to suppose that they are the most appropriate cause of the affection in question. The circle and the constellations in it may be seen in the diagram. The so-called ‘scattered’ stars it is not possible to set down in the same way on the sphere because none of them has an evident permanent position; but if you [35] look up to the sky the point is clear. For in this circle alone are the intervals full of these stars: in the other circles there are obvious gaps. Hence if we accept the cause [346<sup>b</sup>1] assigned for the appearance of comets as plausible we must assume that

the same kind of thing holds good of the milky way. For the tail which in the former case is an [5] affection of a single star here forms in the same way in relation to a whole circle. So if we are to define the milky way we may call it the tail attaching to the greatest circle, and due to the matter secreted. This, as we said before, explains why there are few comets and why they appear rarely; it is because at each revolution of the heavens this matter has always been and is always being separated off and gathered into this region.

[10] We have now explained the phenomena that occur in that part of the terrestrial world which is continuous with the motions of the heavens, namely, shooting-stars and the burning flame, comets and the milky way, these being the [15] chief affections that appear in that region.

9 · Let us go on to treat of the region which follows next in order after this and which immediately surrounds the earth. It is the region common to water and air, and the processes attending the formation of water above take place in it. We must consider their principles and causes too.

[20] The efficient and chief and first of the principles is the circle in which the sun moves. For the sun as it approaches or recedes, obviously causes dissipation and condensation and so gives rise to generation and destruction. Now the earth remains [25] but the moisture surrounding it is made to evaporate by the sun's rays and the other heat from above, and rises. But when the heat which was raising it leaves it, in part dispersing to the higher region, in part quenched through rising so far into the upper [30] air, then the vapour cools because its heat is gone and because of the place, and condenses again and turns from air into water. And after the water has formed it falls down again to the earth.

The exhalation of water is vapour: air condensing into water is cloud. Mist is what is left over when a cloud condenses into water, and is therefore rather a sign of [35] fine weather than of rain; for mist might be called a barren cloud.

So we get a circular process that follows the course of the sun. For according as [347<sup>a</sup>1] the sun moves to this side or that, the moisture in this process rises or falls. We must think of it as a river flowing up and down in a circle and made up partly of air, partly of water. When the sun is near, the stream of vapour flows upwards; when it [5] recedes, the stream of water flows down; and the order of sequence, at all events, in

this process always remains the same. So if 'Oceanus' had some secret meaning in early writers, perhaps they may have meant this river that flows in a circle about the earth.

So the moisture is always raised by the heat and descends to the earth again when it gets cold. These processes and, in some cases, their varieties are [10] distinguished by special names. When the water falls in small drops it is called a drizzle; when the drops are larger it is rain.

10 · Some of the vapour that is formed by day does not rise high because the ratio of the fire that is raising it to the water that is being raised is small. When this cools and descends at night it is called dew and hoar-frost. When the vapour is [15] frozen before it has condensed to water again it is hoar-frost; and this appears in winter and is commoner in cold places. It is dew when the vapour has condensed into water and the heat is not so great as to dry up the moisture that has been raised, nor [20] the cold sufficient (owing to the warmth of the climate or season) for the vapour itself to freeze. For dew is more commonly found when the season or the place is warm, whereas the opposite, as has been said, is the case with hoar-frost. For obviously vapour is warmer than water, having still the fire that raised it: consequently more cold is needed to freeze it. [25]

Both dew and hoar-frost are found when the sky is clear and there is no wind. For the vapour could not be raised unless the sky were clear, and if a wind were blowing it could not condense.

The fact that hoar-frost is not found on mountains contributes to prove that these phenomena occur because the vapour does not rise high. One reason for this is [30] that it rises from hollow and water places, so that the heat that is raising it, bearing as it were too heavy a burden, cannot lift it to a great height but soon lets it fall again. A second reason is that the motion of the air is more pronounced at a height, and this dissolves a gathering of this kind. [35]

Everywhere, except in Pontus, dew is found with south winds and not with north winds. There the opposite is the case and it is found with north winds and not with south. The reason is the same as that which explains why dew is found in warm [347<sup>b</sup>1] weather and not in cold. For the south wind brings warm, and the north, wintry weather. For the north wind is cold and so, bringing wintry weather, quenches the heat of the evaporation. But in Pontus the south wind does not bring warmth enough [5] to cause evaporation, whereas the coldness of the north wind

surrounds and concentrates the heat, so that there is more evaporation and not less. This is a thing which we can often observe in other places too. Wells, for instance, give off more vapour in a north than in a south wind. But the north winds quench the heat before any considerable quantity of vapour has gathered, while in a south wind the [10] evaporation is allowed to accumulate. The water itself does not freeze in the way that it does in the region of the clouds.

**11** · From that region there fall three bodies condensed by cold, namely water, snow, hail. Two of these correspond to the phenomena on the lower level and are due to the same causes, differing from them only in degree and quantity. [15]

Snow and hoar-frost are one and the same thing, and so are rain and dew: only there is a great deal of the former and little of the latter. For rain is due to the cooling of a great amount of vapour; for the region from which and the time during [20] which the vapour is collected are considerable. But of dew there is little; for the vapour collects for it in a single day and from a small area, as its quick formation and scanty quantity show.

The relation of hoar-frost and snow is the same: when cloud freezes there is snow, when vapour freezes there is hoar-frost. Hence snow is a sign of a cold season [25] or country. For a great deal of heat is still present and unless the cold were overpowering it the cloud would not freeze. For there still survives in it a great deal of the heat which<sup>12</sup> caused the moisture to rise as vapour from the earth.

Hail on the other hand is found in the upper region, but the corresponding phenomenon in the vaporous region near the earth is lacking. For, as we said, to [30] snow in the upper region corresponds hoar-frost in the lower, and to rain in the upper region, dew in the lower. But there is nothing here to correspond to hail in the upper region. Why this is so will be clear when we have explained the nature of hail.

**12** · But we must go on to collect the facts bearing on the origin of it, both [35] those which raise no difficulties and those which seem paradoxical.

Hail is ice, and water freezes in winter; yet hailstorms occur chiefly in spring [348<sup>a</sup>1] and autumn and less often in the late summer, but rarely in winter and then only when the cold is less intense. And in general

hailstorms occur in warmer, and snow in colder places. Again, there is a difficulty about water freezing in the upper [5] region. It cannot have frozen before becoming water; and water cannot remain suspended in the air for any space of time. Nor can we say that the case is like that of particles of moisture which are carried up owing to their small size and rest on the [10] air (the water swimming on the air just as small particles of earth and gold often swim on water). In that case large drops are formed by the union of many small, and so fall down. This cannot take place in the case of hail, since frozen bodies cannot coalesce like liquid ones. Clearly then drops of that size were suspended in the air or else they could not have been so large when frozen.

[15] Some think that the cause and origin of hail is this. The cloud is thrust up into the upper region, which is colder because the reflection of the sun's rays from the earth ceases there, and upon its arrival there the water freezes. They think that this explains why hailstorms are commoner in summer and in warm countries; the heat [20] is greater and it thrusts the clouds further up from the earth. But the fact is that hail does not occur at all at a great height: yet it ought to do so, on their theory, just as we see that snow falls most on high mountains. Again, clouds have often been observed moving with a great noise close to the earth, terrifying those who heard [25] and saw them as portents of some catastrophe. Sometimes, too, when such clouds have been seen, without any noise, there follows a violent hailstorm, and the stones are of incredible size, and angular in shape. This shows that they have not been falling for long and that they were frozen near to the earth, and not as that theory [30] would have it. Moreover, where the hailstones are large, the cause of their freezing must be present in the highest degree; for hail is ice, as every one can see. Now those hailstones are large which are angular in shape. And this shows that they froze close to the earth; for those that fall far are worn away by the length of their fall and [35] become round and smaller in size.

It clearly follows that the freezing does not take place because the cloud is thrust up into the cold upper region. [348<sup>b</sup>1]

Now we see that warm and cold react upon one another. Hence in warm weather the lower parts of the earth are cold and in a frost they are warm. The same thing, we must suppose, happens in the upper region, so that in the warmer seasons [5] the cold is concentrated by the surrounding heat and causes the cloud to go over into water suddenly. (For this reason rain-drops are much larger on warm days than in winter, and showers more violent. A shower is said to be more violent in

proportion [10] as the water comes down in a body, and this happens when the condensation takes place quickly—though this is just the opposite of what Anaxagoras says. He says that this happens when the cloud has risen into the cold air; whereas we say that it happens when the cloud has descended into the warm air, and that the more the further the cloud has descended). But when the cold has been concentrated within [15] still more by the outer heat, it freezes the water it has formed and there is hail. We get hail when the process of freezing is quicker than the descent of the water. For if the water falls in a certain time and the cold is sufficient to freeze it in less, there is [20] no difficulty about its having frozen in the air, provided that the freezing takes place in a shorter time than its fall. The nearer to the earth, and the more intensely, this process takes place, the more violent is the rain that results and the larger the raindrops and the hailstones because of the shortness of their fall. For the same reason large raindrops do not fall thickly. Hail is rarer in summer than in spring and [25] autumn, though commoner than in winter, because the air is drier in summer, whereas in spring it is still moist, and in autumn it is beginning to grow moist. It is for the same reason that hailstorms sometimes occur in the late summer too, as we [30] have said.

The fact that the water has previously been warmed contributes to its freezing quickly; for so it cools sooner. (Hence many people, when they want to cool water quickly, begin by putting it in the sun. So the inhabitants of Pontus when they encamp on the ice to fish (they cut a hole in the ice and then fish) pour warm water round their rods that it may freeze the quicker; for they use the ice like lead to fix [349a1 the rods.) Now it is in hot countries and seasons that the water which forms soon grows warm.

It is for the same reason that rain falls in summer and not in winter in Arabia [5] and Ethiopia too, and that in torrents and repeatedly on the same day. For the concentration due to the extreme heat of the country cools the clouds quickly.

So much for an account of the nature and causes of rain, dew, snow, hoar-frost, [10] and hail.

**13** · Let us explain the nature of winds, and all windy vapours, also of rivers and of the sea. But here, too, we must first discuss for ourselves the difficulties [15] involved; for, as in other matters, so in this nothing has been handed down to us that anyone could not have thought of.

Some say that what is called air, when it is motion and flows, is wind,

and that this same air when it condenses again becomes cloud and water, implying that the [20] nature of wind and water is the same. So they define wind as a motion of the air. Hence some, wishing to say a clever thing, assert that all the winds are one wind, because the air that moves is in fact all of it one and the same; they maintain that the winds appear to differ owing to the region from which the air may happen to [25] flow on each occasion, but really do not differ at all. This is just like thinking that all rivers are one and the same river, and the ordinary unscientific view is better than a scientific theory like this. If all rivers flow from one source, and the same is true in the case of the winds, there might be some truth in this theory; but if it is no more [30] true in the one case than in the other, this ingenious idea is plainly false. What requires investigation is this: the nature of wind and how it originates, its efficient cause and whence they derive their source; whether one ought to think of the wind as issuing from a sort of vessel and flowing until the vessel is empty, as if let out of a [349<sup>b</sup>1] wineskin, or, as painters represent the winds, as drawing their source from themselves.

We find analogous views about the origin of rivers. It is thought that the water is raised by the sun and descends in rain and gathers below the earth and so flows [5] from a great hollow, all the rivers from one, or each from a different one. No water at all is generated, but the volume of the rivers consists of the water that is gathered into such reservoirs in winter. Hence rivers are always fuller in winter than in summer, and some are perennial, others not. Rivers are perennial where the hollow [10] is large and so enough water has collected in it to last out and not be used up before the winter rain returns. Where the reservoirs are smaller there is less water in the rivers, and they are dried up and their vessel empty before the fresh rain comes on.

[15] But if any one will picture to himself a reservoir adequate to the water that is continuously flowing day by day, and consider the amount of the water, it is obvious that a receptacle that is to contain all the water that flows in the year would be larger than the earth, or, at any rate, not much smaller.

[20] Though it is evident that many reservoirs of this kind do exist in many parts of the earth, yet it is unreasonable for any one to refuse to admit that air becomes water in the earth for the same reason as it does above it. If the cold causes the vaporous air to condense into water above the earth we must suppose the cold in the [25] earth to produce this same effect, and recognize that there not only exists in it and flows out of it actually formed water, but that water is continually forming in it too.



Again, even in the case of the water that is not being formed from day to day but exists as such, we must not suppose as some do that rivers have their source in [30] definite subterranean lakes. On the contrary, just as above the earth small drops form and these join others, till finally the water descends in a body as rain, so too we must suppose that in the earth the water at first trickles together little by little, and that the sources of the rivers are formed where the earth gushes out, as it were, at a single point. This is proved by facts. When men construct irrigation works they collect the water in pipes and trenches, as if the earth in the higher ground were [350<sup>a</sup>1] sweating the water out. Hence, too, the head-waters of rivers are found to flow from mountains, and from the greatest mountains there flow the most numerous and greatest rivers. Again, most springs are in the neighbourhood of mountains and of [5] high ground, whereas if we except rivers, water rarely appears in the plains. For mountains and high ground, suspended over the country like a saturated sponge, make the water ooze out and trickle together in minute quantities but in many places. They receive a great deal of water falling as rain (for it makes no difference [10] whether a spongy receptacle is concave and turned up or convex and turned down: in either case it will contain the same volume of matter) and they also cool the vapour that rises and condense it back into water.

Hence, as we said, we find that the greatest rivers flow from the greatest mountains. This can be seen by looking at maps: what is recorded in them consists [15] either of things which the writer has seen himself or of such as he has compiled after inquiry from those who have seen them.

In Asia we find that the most numerous and greatest rivers flow from the mountain called Parnassus, admittedly the greatest of all mountains towards the [20] south-east. When you have crossed it you see the outer ocean, the further limit of which is unknown to the dwellers in our world. Besides other rivers there flow from it the Bactrus, the Choaspes, the Araxes: from the last a branch separates off and flows into lake Maeotis as the Tanais. From it, too, flows the Indus, the volume of [25] whose stream is greatest of all rivers. From the Caucasus flows the Phasis, and very many other great rivers besides. Now the Caucasus is the greatest of the mountains that lie to the north-east, both as regards its extent and its height. A proof of its height is the fact that it can be seen from the so-called 'deeps' and from the entrance [30] to the lake. Again, the sun shines on its peaks for a third part of the night before sunrise and again after sunset. Its extent is proved by the fact that though it contains many

inhabitable regions which are occupied by many nations and in which there are said to be great lakes, yet they say that all these regions are visible up to the last peak. From Pyrene (this is a mountain towards the west in Celtice) [350<sup>b</sup>1] there flow the Istrus and the Tartessus. The latter flows outside the pillars, while the Istrus flows through all Europe into the Euxine. Most of the remaining rivers flow northwards from the Hercynian mountains, which are the greatest in height [5] and extent about that region. In the extreme north, beyond furthest Scythia, are the mountains called Rhipae. The stories about their size are altogether too fabulous: however, they say that the most and (after the Istrus) the greatest rivers flow from [10] them. So, too, in Libya there flow from the Aethiopian mountains the Aegon and the Nyses; and from the so-called Silver Mountain the two greatest of named rivers, the river called Chremetes that flows into the outer ocean, and the main source of the Nile. Of the rivers in the Greek world, the Achelous flows from Pindus, the [15] Inachus from the same mountain; the Strymon, the Nessus, and the Hebrus all three from Scombrus; many rivers, too, flow from Rhodope.

All other rivers would be found to flow in the same way, but we have [20] mentioned these as examples. Even where rivers flow from marshes, the marshes in almost every case are found to lie below mountains or gradually rising ground.

It is clear then that we must not suppose rivers to originate from definite reservoirs; for the whole earth, we might almost say, would not be sufficient (any [25] more than the region of the clouds would be) if we were to suppose that they were fed by actually existing water only and it were not the case that as some water passed out of existence some more came into existence, but rivers always drew their stream from an existing store. Secondly, the fact that rivers rise at the foot of mountains proves that a place transmits the water it contains by gradual percolation [30] of many drops, little by little, and that this is how the sources of rivers originate. However, there is nothing impossible about the existence of such places containing a quantity of water like lakes: only they cannot be big enough to produce the supposed effect, any more than one could suppose that rivers drew all their water from the sources we see (for most rivers do flow from springs). So it is no more reasonable to [35] suppose those lakes to contain the whole volume of water than these springs.

That there exist such chasms and cavities in the earth we are taught by the [351<sup>a</sup>1] rivers that are swallowed up. They are found in many parts of the earth: in the Peloponnesus, for instance, there are many such

rivers in Arcadia. The reason is that Arcadia is mountainous and there are no channels from its valleys to the sea. [5] So these places get full of water, and this, having no outlet, under the pressure of the water that is added above, finds a way out for itself underground. In Greece this kind of thing happens on quite a small scale; but there is the lake at the foot of the [10] Caucasus, which the inhabitants of these parts call a sea. Many great rivers fall into it and it has no visible outlet but issues below the earth off the land of the Coraxi about the so-called deeps of Pontus. This is a place of unfathomable depth in the sea: at any rate no one has yet been able to find bottom there by sounding. At this [15] spot, about three hundred stadia from land, there comes up sweet water over a large area, not all of it together but in three places. And in Liguria a river equal in size to the Rhodanus is swallowed up and appears again elsewhere: the Rhodanus being a navigable river.

14 · The same parts of the earth are not always moist or dry, but they [20] change according as rivers come into existence and dry up. And so the relation of land to sea changes too and a place does not always remain land or sea throughout all time, but where there was dry land there comes to be sea, and where there is now [25] sea, there one day comes to be dry land. But we must suppose these changes to follow some order and cycle. The principle and cause of these changes is that the interior of the earth has its periods of maturity, like the bodies of plants and animals. Only in the case of these latter the process does not go on by parts, but each [30] of them necessarily grows or decays as a whole, whereas it does go on by parts in the case of the earth. Here the causes are cold and heat, which increase and diminish on account of the sun and its course. It is owing to them that the parts of the earth come to have a different character, so that some parts remain moist for a certain time, and then dry up and grow old, while other parts in their turn are filled with life and moisture. Now when places become drier the springs necessarily give out, and when this happens the rivers first decrease in size and then finally become dry; and when [35] rivers change and disappear in one part and come into existence correspondingly in another, the sea must needs be affected.

For where the sea is pushed out by rivers and encroaches upon the land, it [5] necessarily leaves that place dry when it recedes; and where it becomes dry, being silted up by the rivers when at their full, the time must come when this place will be flooded again.<sup>13</sup>

But the whole vital process of the earth takes place so gradually and in periods of time which are so immense compared with the length of our life, that these [10] changes are not observed, and before their course can be recorded from beginning to end whole nations perish and are destroyed. Of such destructions the most utter and sudden are due to wars; but pestilence or famine cause them too. Famines, again, are either severe or else gradual. In the latter case the disappearance of a nation is [15] not noticed because some leave the country while others remain; and this goes on until the land is unable to maintain any inhabitants at all. So a long period of time is likely to elapse from the first departure to the last, so that no one remembers and the [20] lapse of time destroys all record even before the last inhabitants have disappeared. In the same way a nation must be supposed to lose account of the time when it first settled in a land that was changing from a marshy and watery state and becoming dry. Here, too, the change is gradual and lasts a long time and men do not [25] remember who came first, or when, or what the land was like when they came. This has been the case with Egypt. Here it is obvious that the land is continually getting drier and that the whole country is a deposit of the river Nile. But because the [30] neighbouring peoples settled in the land gradually as the marshes dried, the lapse of time has hidden the beginning of the process. Thus, all the mouths of the Nile, with the single exception of that at Canopus, are obviously artificial and not natural. And Egypt was originally what is called Thebes, as Homer, too, shows, modern [35] though he is in relation to such changes. For Thebes is the place that he mentions; which implies that Memphis did not yet exist, or at any rate was not as important as [352<sup>a</sup>1 it is now. That this should be so is natural, since the lower land came to be inhabited later than that which lay higher. For the parts that lie nearer to the place where the river is depositing the silt are necessarily marshy for a longer time since the water always lies most in the newly formed land. But in time this land changes its [5] character, and in its turn enjoys a period of prosperity. For these places dry up and come to be in good condition while the places that were formerly well-tempered some day grow excessively dry and deteriorate. This happened to the land of Argos and Mycenae in Greece. In the time of the Trojan wars the Argive land was marshy [10] and could only support a small population, whereas the land of Mycenae was in good condition (and for this reason Mycenae was the superior). But now the opposite is the case, for the reason we have mentioned: the land of Mycenae has become completely dry and barren, while the Argive land that was formerly barren owing to the water has

now become fruitful. Now the same process that has taken [15] place in this small district must be supposed to be going on over whole countries and on a large scale.

Men whose outlook is narrow suppose the cause of such events to be change in the universe, in the sense of a coming to be of the world as a whole. Hence they say [20] that the sea is being dried up and is growing less, because this is observed to have happened in more places now than formerly. But this is only partially true. It is true that many places are now dry, that formerly were covered with water. But the opposite is true too; for if they look they will find that there are many places where [25] the sea has invaded the land. But we must not suppose that the cause of this is that the world is in process of becoming. For it is absurd to make the universe to be in process because of small and trifling changes, when the bulk and size of the earth are surely as nothing in comparison with the whole world. Rather we must take the [30] cause of all these changes to be that, just as winter occurs in the seasons of the year, so in determined intervals in some great period of time there comes a great winter and with it excess of rain. But this excess does not always occur in the same place. The so-called flood in the time of Deucalion, for instance, took place chiefly in the Greek world and in it especially about ancient Hellas, the country about Dodona [352<sup>b</sup>1] and the Achelous, a river which has often changed its course. Here the Selli dwelt and those who were formerly called Graeci and now Hellenes. When, therefore, such an excess of rain occurs we must suppose that it suffices for a long time. Just as [5] some say that the size of the subterranean cavities is what makes some rivers perennial and others not, whereas we maintain that the size of the mountains is the cause, and their density and coldness (for they catch and keep and create most water: whereas if the mountains that overhang the sources of rivers are small or [10] porous and stony and clayey, these rivers run dry earlier); so too we must realize that where such abundance of rain falls it tends to make the moisture of those places almost everlasting. But as time goes on places of the latter type dry up more,<sup>14</sup> while [15] those of the former, moist type, do so less:<sup>15</sup> until at last the beginning of the same cycle returns.

Since there is necessarily some change in the whole world, but not in the way of coming into existence or perishing (for the universe is permanent), it must be, as we say, that the same places are not for ever moist through the presence of sea and rivers, nor for ever dry. And the facts prove this. The whole land of the Egyptians, [20] whom we take to be the most ancient of men, has evidently come into existence and been

produced by the river. This is clear from an observation of the country itself, and the facts about the Red Sea suffice to prove it too. One of their kings tried to [25] make a canal to it (for it would have been of no little advantage to them for the whole region to have become navigable; Sesostriis is said to have been the first of the ancient kings to try), but he found that the sea was higher than the land. So he first, and Darius afterwards, stopped making the canal, lest the sea should mix with the [30] river water and spoil it. So it is clear that all this part was once one unbroken sea. For the same reason Libya—the country of Ammon—is, strangely enough, lower and hollower than the land to the seaward of it. For it is clear that a barrier of silt was formed and after it lakes and dry land, but in the course of time the water that was left behind in the lakes dried up and is now all gone. Again the silting up of the [353<sup>a</sup>1] lake Maeotis by the rivers has advanced so much that the limit to the size of the ships which can now sail into it to trade is much lower than it was sixty years ago. Hence it is easy to infer that it, too, like most lakes, was originally produced by the [5] rivers and that it must end by drying up entirely.

Again, this process of silting up causes a continuous current through the Bosphorus; and in this case we can directly observe the nature of the process. Whenever the current from the Asiatic shore threw up a sandbank, there first formed a small lake behind it. Later it dried up and a second sandbank formed in [10] front of the first and a second lake. This process went on uniformly and without interruption. Now when this has been repeated often enough, in the course of time the strait must become like a river, and in the end the river itself must dry up.

So it is clear, since there will be no end to time and the world is eternal, that [15] neither the Tanais nor the Nile has always been flowing, but that the region whence they flow was once dry; for their action has an end, but time does not. And this will be equally true of all other rivers. But if rivers come into existence and perish and [20] the same parts of the earth were not always moist, the sea must needs change correspondingly. And if the sea is always advancing in one place and receding in another it is clear that the same parts of the whole earth are not always either sea or land, but that all this changes in the course of time.

So we have explained that the same parts of the earth are not always land or [25] sea and why that is so; and also why some rivers are perennial and others not.

## BOOK II

1 · Let us explain the nature of the sea and the reason why such a large mass of water is salt and the way in which it originally came to be.

The old writers who concerned themselves with theogonies say that the sea has springs, for they want earth and sea to have origins and roots. Presumably they [353<sup>b</sup>1] thought that this view was grander and more impressive as implying that our earth was an important part of the universe. For they believed that the whole world had been built up round our earth and for its sake, and that the earth was the most important and primary part of it. Others, wiser in human knowledge, give an [5] account of its origin. At first, they say, the earth was surrounded by moisture. Then the sun began to dry it up, part of it evaporated and is the cause of winds and the turnings back of the sun and the moon, while the remainder forms the sea. So the [10] sea is being dried up and is growing less, and will end by being some day entirely dried up. Some of them say that the sea is a kind of sweat exuded by the earth when the sun heats it, and that this explains its saltness; for all sweat is salt. Others say [15] that the saltness is due to the earth. Just as water strained through ashes becomes salt, so the sea owes its saltness to the admixture of earth with similar properties.

We must now consider the facts which prove that the sea cannot have springs. The waters we find on the earth either flow or are stationary. All flowing water has [20] springs. (By a spring, as we have explained above, we must not understand a source from which waters are ladled<sup>16</sup> as it were from a vessel, but a first point at which<sup>17</sup> the water which is continually forming and percolating gathers.)<sup>18</sup> Stationary water is either that which has collected and has been left standing, marshy pools, for [25] instance, and lakes, which differ merely in size, or else it comes from springs. In this case it is always artificial, I mean as in the case of wells. For the spring must always be higher than the stream. Hence the water from fountains and rivers flows of itself, whereas wells need to be worked artificially. All the waters that exist belong to one [30] or other of these classes.

On the basis of this division we can see that the sea cannot have springs. For it falls under neither of the two classes; it does not flow and it is not artificial; whereas all water from springs belongs to one or other

of them. Natural standing water from springs is never found on such a large scale.

[354<sup>a</sup>1] Again, there are several seas that have no communication with one another at all. The Red Sea, for instance, communicates but slightly with the ocean outside the straits, and the Hyrcanian and Caspian seas are distinct from this ocean and people [5] dwell all round them. Hence, if these seas had had any springs anywhere they must have been discovered.

It is true that in straits, where the land on either side contracts an open sea into a small space, the sea evidently flows. But this is because it is swinging to and fro. In the open sea this motion is not observed, but where the land narrows and contracts [10] the sea the motion that was slight in the open necessarily seems great.

The whole of the Mediterranean does actually flow, according to the depth of the basins and the number of rivers. Maeotis flows into Pontus and Pontus into the [15] Aegean. After that the flow of the remaining seas is not so easy to observe. The current of Maeotis and Pontus is due to the number of rivers (more rivers flow into the Euxine and Maeotis than into areas many times their size), and to their own shallowness. For we find the sea getting deeper and deeper. Pontus is deeper than [20] Maeotis, the Aegean than Pontus, the Sicilian sea than the Aegean; the Sardinian and Tyrrhenic being the deepest of all. (Outside the pillars of Herakles the sea is shallow owing to the mud, but calm, for it lies in a hollow.) We see, then, that just as single rivers flow from mountains, so it is with the earth as a whole: the greatest volume of water flows from the higher regions in the north. Their alluvium makes [25] the northern seas shallow, while the outer seas are deeper. Some further evidence of the height of the northern regions of the earth is afforded by the view of many of the ancient meteorologists. They believed that the sun did not pass below the earth, but round its northern part, and that it was the height of this which obscured the sun [30] and caused night.

So much to prove that there cannot be sources of the sea and to explain its observed flow.

2 · We must now discuss the origin of the sea, if it has an origin, and the [354<sup>b</sup>1] cause of its salt and bitter taste.

What made earlier writers consider the sea to be the source and main body of all water is this. It seems reasonable to suppose that, just as each of the other [5] elements has a main bulk which by reason of its mass is



the origin of that element, and any parts which change and mix with the other elements come from it—thus the main body of fire is in the upper region; that of air occupies the place next inside the region of fire; while the mass of the earth is that round which the rest of the elements are seen to lie. So we must clearly look for something analogous in the case [10] of water. But here we can find no such single mass, as in the case of the other elements, except the sea. River water is not a unity, nor is it stable, but is seen to be in a continuous process of becoming from day to day. It was this difficulty which made people regard the sea as the source of moisture and of all water. And so we [15] find it maintained that rivers not only flow into the sea but originate from it, the salt water becoming sweet by filtration.

But this view involves another difficulty. If this body of water is the source of [20] all water, why is it salt and not sweet? The reason for this, besides answering this question, will ensure our having a right first conception of the nature of the sea.

The earth is surrounded by water, just as that is by the sphere of air, and that again by the sphere called that of fire (which is the outermost both on the common [25] view and on ours). Now the sun, moving as it does, sets up processes of change and becoming and decay, and by its agency the finest and sweetest water is every day carried up and is dissolved into vapour and rises to the upper region, where it is [30] condensed again by the cold and so returns to the earth. This, as we have said before, is the regular course of nature.

Hence all my predecessors who supposed that the sun was nourished by moisture are absurdly mistaken. Some go on to say that the solstices are due to this, [355<sup>a</sup>1] the reason being that the same places cannot always supply the sun with nourishment and that without it he must perish. For the fire we are familiar with lives as long as it is fed, and the only food for fire is moisture. This supposes that the [5] moisture that is raised reaches the sun or that its ascent is really like that performed by flame as it comes into being, and to which they supposed the case of the sun to be analogous. Really there is no similarity. A flame is in a process of becoming, involving a constant interchange of moist and dry. It cannot be said to be nourished [10] since it scarcely persists as one and the same for a moment. This cannot be true of the sun; for if it were nourished like that, as they say it is, we should obviously not only have a new sun every day, as Heraclitus says, but a new sun every moment. Again, [15] when the sun causes the moisture to rise, this is like fire heating water. So, as the fire is not fed by the water above it, it is absurd to suppose that the

sun is, even if its heat made all the water in the world evaporate. Again, it is absurd, considering the number and size of the stars, that these thinkers should consider the sun only and [20] overlook the question how the rest of the heavenly bodies survive. Again, they are met by the same difficulty as those who say that at first the earth itself was moist and the world round the earth was warmed by the sun, and so air was generated and [25] the whole firmament grew, and the air caused winds and the solstices. For we always plainly see the water that has been carried up coming down again. Even if the same amount does not come back in a year or in a given country, yet in a certain fixed period all that has been carried up is returned. This implies that the celestial bodies do not feed on it, and that we cannot distinguish between some air which [30] preserves its character once it is generated and some other which is generated but becomes water again and so perishes; on the contrary, all the moisture alike is dissolved and all of it condensed back into water.

The drinkable, sweet water, then, is light and is all of it drawn up: the salt water is heavy and remains behind, but not in its proper place. For this is a question which has been sufficiently discussed (for it would be unreasonable if there were no [355<sup>b1</sup>] place for water as there is for the other elements), and the answer is this. The place which we see the sea filling is not its place but that of water. It seems to belong to the sea because the weight of the salt water makes it remain there, while the sweet, [5] drinkable water which is light is carried up. The same thing happens in animal bodies. Here, too, the food when it enters the body is sweet, yet the residuum and dregs of liquid food are found to be bitter and salt. This is because the sweet and [10] drinkable part of it has been drawn away by the natural heat and has passed into the flesh and the other parts of the body according to their several natures. Now just as here it would be wrong<sup>19</sup> for any one to refuse to call the belly the place of liquid food because that disappears from it soon, and to call it the place of the residuum [15] because this is seen to remain, so in the case of our present subject. This place, we say, is the place of water. Hence all rivers and all the water that is generated flow into it; for water flows into the deepest place, and the deepest part of the earth is filled by the sea. But part of it is all quickly carried up by the sun, while the rest [20] remains for the reason we have explained. It is quite natural that some people should have been puzzled by the old question why such a mass of water leaves no trace anywhere (for the sea does not increase though innumerable and vast rivers are flowing into it every day). But if one considers the matter the solution is easy. [25] The same amount of water

does not take as long to dry up when it is spread out as when it is gathered in a body, and indeed the difference is so great that in the one case it might persist the whole day long while in the other it might all disappear in a moment—as for instance if one were to spread out a cup of water over a large table. This is the case with the rivers: all the time they are flowing their water forms a [30] compact mass, but when it arrives at a vast wide place it quickly and imperceptibly evaporates.

But the theory of the *Phaedo*<sup>20</sup> about rivers and the sea is impossible. There it is said that the earth is pierced by intercommunicating channels and that the original head and source of all waters is what is called Tartarus—a mass of water [356<sup>a</sup>1] about the centre, from which all waters, flowing and standing, are derived. This primary and original water is always surging to and fro, and so it causes the rivers to flow; for it has no fixed seat but is always oscillating about the centre. Its motion up [5] and down is what fills rivers. Many of these form lakes in various places (our sea is an instance of one of these), but all of them come round again in a circle to the source of their flow, many at the same point, but some at a point opposite to that from which they issued; for instance, if they started from the other side of the [10] earth's centre, they might return from this side of it. They descend only as far as the centre, for after that all motion is upwards. Water gets its tastes and colours from the kind of earth the rivers happened to flow through.

But on this theory rivers do not always flow in the same sense. For since they [15] flow to the centre from which they issue forth they will not be flowing down any more than up, but in whatever direction the surging of Tartarus inclines to. But at this rate we shall get the proverbial rivers flowing upwards, which is impossible. Again, where is the water that is generated and what goes up again as vapour to [20] come from? For this must all of it simply be ignored, since the quantity of water is always the same and all the water that flows out from the original source flows back to it again. Yet all rivers are seen to end in the sea except where one flows into another. Not one of them ends in the earth, but even when one is swallowed up it comes to the surface again. And those rivers are large which flow for a long distance [25] through a low-lying country, for by their situation and length they cut off the course of many others and swallow them up. This is why the Istrus and the Nile are the greatest of the rivers which flow into our sea. Indeed, so many rivers fall into them that there is disagreement as to the sources of them both.<sup>21</sup> All of which is plainly [30] impossible on the theory, and the more so as it derives the sea from Tartarus.

Enough has been said to prove that this is the natural place of water and not of the sea, and to explain why sweet water is only found in rivers, while salt water is stationary and to show that the sea is the end rather than the source of water, [356<sup>b</sup>1] analogous to the residual matter of all food, and especially liquid food, in animal bodies.

**3** · We must now explain why the sea is salt, and ask whether it is always the same, or whether it did not exist at all once and some day will exist no longer, but [5] will dry up as some people think.

Every one admits this, that if the whole world originated the sea did too; for they make them come into being at the same time. It follows that if the universe is eternal the same must be true of the sea. Any one who thinks like Democritus that [10] the sea is diminishing and will disappear in the end reminds us of Aesop's tales. His story was that Charybdis had twice sucked in the sea: the first time she made the mountains visible; the second time the islands; and when she sucks it in for the last [15] time she will dry it up entirely. Such a tale is appropriate enough to Aesop in a rage with the ferryman, but not to serious inquirers. Whatever made the sea remain at first, whether it was its weight, as some even of those who hold these views say (for it [20] is easy to see the cause here), or some other reason—clearly the same thing must make it persist for ever. They must either deny that the water raised by the sun will return at all, or, if it does, they must admit that the sea persists for ever or as long as this process goes on, and again, that for the same period of time that sweet water [25] must be carried up beforehand. So the sea will never dry up; for before that can happen the water that has gone up beforehand will return to it;<sup>22</sup> for if you say that this happens once you must admit its recurrence. If you stop the sun's course there is no drying agency. If you let it go on it will draw up the sweet water as we have said [30] whenever it approaches, and let it descend again when it recedes. This notion about the sea was derived from the fact that many places are found to be drier now than they once were. Why this is so we have explained. The phenomenon is due to temporary excess of rain and not to any process of becoming in which the universe or its parts are involved. Some day the opposite will take place and after that the [357<sup>a</sup>1] earth will grow dry once again. We must recognize that this process always goes on thus in a cycle; for that is more reasonable than to suppose a change in the whole world in order to explain these facts. But we have dwelt longer on this point than it deserves.

[5] To return to the saltiness of the sea: those who create the sea once for all, or indeed generate it at all, cannot account for its saltiness. It makes no difference whether the sea is the residue of all the moisture that is about the earth and has been drawn up by the sun, or whether all the flavour existing in the whole mass of sweet [10] water is due to the admixture of a certain kind of earth. Since the total volume of the sea is the same once the water that evaporated has returned, it follows that it must either have been salt at first too, or, if not at first, then not now either. If it was salt from the very beginning, then we want to know why that was so; and why, if salt water was drawn up then, that is not the case now.

[15] Again, if it is maintained that an admixture of earth makes the sea salt (for they say that earth has many flavours and is washed down by the rivers and so makes the sea salt by its admixture), it is strange that rivers should not be salt too. [20] How can the admixture of this earth have such a striking effect in a great quantity of water and not in each river singly? For the sea, differing in nothing from rivers but in being salt, is evidently simply the totality of river water, and the rivers are the vehicle in which that is carried to their common destination.

It is equally absurd to suppose that anything has been explained by calling the sea 'the sweat of the earth', like Empedocles. Metaphors are poetical and so that [25] expression of his may satisfy the requirements of a poem, but as to knowledge of nature it is unsatisfactory. Even in the case of the body it is a question how the sweet liquid drunk becomes salt sweat—whether it is merely by the departure of some [30] element in it which is sweetest, or by the admixture of something, as when water is strained through ashes. Actually the saltiness seems to be due to the same cause as in the case of the residual liquid that gathers in the bladder. That, too, becomes bitter and salt though the liquid we drink and that contained in our food is sweet. If then the bitterness is due in these cases (as with the water strained through lye) to the [357<sup>b</sup>1] presence of a certain sort of stuff that is carried along by the urine (as indeed we actually find a salt deposit settling in chamber-pots) and is secreted from the flesh in sweat (as if the departing moisture were washing the stuff out of the body), then [5] no doubt the admixture of something earthy with the water is also what makes the sea salt.

Now in the body stuff of this kind, viz. the sediment of food, is due to failure to digest; but how there came to be any such thing in the earth requires explanation. Besides, how can the drying and warming of the earth cause the secretion of such a [10] great quantity of water;

especially as that must be a mere fragment of what is left in the earth? Again, waiving the question of quantity, why does not the earth sweat now when it happens to be in process of drying? (For the moisture and the sweat are bitter.) For if it did so then, it ought to do so now. But it does not: on the contrary, [15] when it is dry it grows moist, but when it is moist it does not secrete anything at all. How then was it possible for the earth at the beginning when it was moist to sweat as it grew dry? Indeed, the theory that maintains that most of the moisture departed and was drawn up by the sun and that what was left over is the sea is more [20] reasonable; but for the earth to sweat when it is moist is impossible.

Since all the attempts to account for the saltiness of the sea seem unsuccessful let us explain it by the help of the principle we have used already.

Since we recognize two kinds of exhalation, one moist, the other dry, it is clear [25] that the latter must be recognized as the source of phenomena like those we are concerned with.

But there is a question which we must discuss first. Does the sea always remain numerically one and consisting of the same parts, or is it one in form and volume while its parts are in continual change, like air and sweet water and fire? All of these are in a constant state of change, but the form of the quantity of each of them [30] is fixed, just as in the case of a flowing river or a burning flame. The answer is clear, and it is plausible that the same account must hold good of all these things alike. They differ in that some of them change more rapidly or more slowly than others; and they all are involved in a process of perishing and becoming which yet affects [358<sup>a</sup>1] them all in a regular course.

This being so we must go on to try to explain why the sea is salt. There are many signs which make it clear that this taste is due to the admixture of something. [5] First, in animal bodies what is least digested, the residue of liquid food, is salt and bitter, as we said before. All animal excreta are undigested, but especially that which gathers in the bladder (its extreme lightness indicates this; for everything [10] that is digested is condensed), and also sweat; in these then is excreted (along with other matter) an identical substance to which this flavour is due. The case of things burnt is analogous. What heat fails to overcome becomes the excrementary residue in animal bodies, and, in things burnt, ashes. That is why some people say that the [15] sea itself was made from burnt earth. To say that it was burnt earth is absurd; but to say that it was something like burnt earth is true. We must suppose that just as in the cases we have described, so in the world as a whole, everything that

grows and is naturally generated always leaves a residue, like that of things burnt, consisting of [20] this sort of earth, and all exhalation on dry land is of this nature; for it is this which accounts for its great quantity. Now since, as we have said, the moist and the dry exhalations are mixed, some quantity of this stuff must always be included in the clouds and the water that are formed by condensation, and must redescend to the [25] earth in rain. This process must always go on with such regularity as this world admits of, and it is the answer to the question how the sea comes to be salt.

It also explains why rain that comes from the south, and the first rains of [30] autumn, are brackish. The south is the warmest of winds, both in size and strength, and it blows from dry and hot regions. Hence it carries little moist vapour and that is why it is hot. (It makes no difference even if this is not its true character and it is originally a cold wind, for it becomes warm on its way by incorporating with itself a great quantity of dry exhalation from the places it passes over.) The north wind, on the other hand, coming from moist regions, is full of vapour and therefore cold. It [358<sup>b</sup>1] brings fine weather in our part of the world because it drives the clouds away before it, but in the south it is rainy; just as the south in Libya. So the rain that falls is charged with a great quantity of this stuff. Autumn rain is brackish because the [5] heaviest water must fall first; so that that which contains the greatest quantity of this kind of earth descends quickest.

This, too, is why the sea is warm. Everything that has been exposed to fire contains heat potentially, as we see in the case of lye and ashes and the dry and [10] liquid excreta of animals. Indeed those animals which are hottest in the belly have the hottest excreta.

The action of this cause is continually making the sea more brackish, but some part of it is always being drawn up with the sweet water. This is less than the sweet water in the same ratio in which the salt and brackish element in rain is less than the [15] sweet, and so the saltiness of the sea remains constant on the whole. When it turns into vapour it becomes sweet, and the vapour does not form salt water when it condenses again. This I know by experiment. The same thing is true in every case of the kind: wine and all fluids that evaporate and condense back into a liquid state [20] become water. They all are water modified by a certain admixture, the nature of which determines their flavour. But this subject must be considered on another more suitable occasion.

For the present let us say this. The sea is there and some of it is continually being drawn up and becoming sweet; this returns from above

with the rain. But it is [25] now different from what it was when it was drawn up, and its weight makes it sink below the sweet water. This process prevents the sea, as it does rivers, from drying up except locally (this must happen to sea and rivers alike); nor do the parts either of the earth or of the sea remain constant but only their whole bulk. (For the same [30] thing is true of the earth as of the sea.) Some of it is carried up and some comes down with the rain, and both that which remains on the surface and that which comes down again change their situations.

There is more evidence to prove that saltiness is due to the admixture of some substance, besides that which we have adduced. Make a vessel of wax and put it in the sea, fastening its mouth in such a way as to prevent any water getting in. Then [359<sup>a</sup>1] the water that percolates through the wax sides of the vessel is sweet, the earthy stuff, the admixture of which makes the water salt, being separated off as it were by [5] a filter. It is this stuff which makes salt water heavy (it weighs more than fresh water) and thick. The difference in consistency is such that ships with the same weight of cargo very nearly sink in a river when they are quite fit to navigate in the sea. Ignorance of this has before now caused loss to shippers freighting their ships in [10] a river. That the bulk is more dense when something<sup>23</sup> is mixed in is indicated by the fact that if you make strong brine by the admixture of salt, eggs, even when they are full, float in it. It almost becomes like mud; such a quantity of matter is there in the [15] sea. The same thing is done in salting fish.

Again if, as is fabled, there is a lake in Palestine, such that if you bind a man or beast and throw it in it floats and does not sink beneath the water, this would bear out what we have said. They say that this lake is so bitter and salt that no fish live in [20] it and that if you soak clothes in it and shake them it cleans them. The following signs all of them support our theory that it is some earthy stuff in the water which makes it salt. In Chaonia there is a spring of brackish water that flows into a [25] neighbouring river which is sweet but contains no fish. The local story is that when Heracles came from Erytheia driving the oxen and gave the inhabitants the choice, they chose salt in preference to fish. They get the salt from the spring. They boil off [30] some of the water and let the rest stand; when it has cooled and the heat and moisture have evaporated together it gives them salt, not in lumps but loose and light like snow. It is weaker than ordinary salt and must be added freely for seasoning, and it is not as white as salt generally is. Another instance of this is found in Umbria. There is a place there where reeds and rushes grow. They burn some of [359<sup>b</sup>1] these, put the ashes into water and boil it off. When a



little water is left and has cooled it gives a quantity of salt.

Most salt rivers and springs must once have been hot. Then the original fire in [5] them was extinguished but the earth through which they percolate preserves the character of lye or ashes. Springs and rivers with all kinds of flavours are found in many places. These flavours must in every case be due to the fire that is present or produced in them; for if you expose earth to different degrees of heat it assumes [10] various kinds and shades of flavour. It becomes full of alum and lye and other things of the kind, and the fresh water percolates through these and changes its character. [15] Sometimes it becomes acid as in Sicania, a part of Sicily. There they get a salt and acid water which they use as vinegar to season some of their dishes. In the neighbourhood of Lyncus, too, there is a spring of acid water, and in Scythia a bitter spring. The water from this makes the whole of the river into which it flows bitter. [20] These differences are explained by a knowledge of the particular mixtures that determine different savours. But these have been explained in another treatise.

We have now given an account of water and the sea, why they always persist, [25] how they change, what their nature is, and have explained their natural operations and affections.

4 · Let us proceed to the theory of winds. Its basis is a distinction we have already made. We recognize two kinds of exhalation, one moist, the other dry. The [30] former is called vapour: for the other there is no general name but we must call it a sort of smoke, applying to the whole of it a word that is proper to one of its forms. The moist cannot exist without the dry nor the dry without the moist: whenever we speak of either we mean that it predominates. Now when the sun in its circular course approaches, it draws up by its heat the moist evaporation: when it recedes the [360<sup>a</sup>1] cold makes the vapour that had been raised condense back into water which falls and is distributed over the earth. (This explains why there is more rain in winter and more by night than by day: though the fact is not recognized because rain by night is [5] more apt to escape observation than by day.) But there is a great quantity of fire and heat in the earth, and the sun not only draws up the moisture that lies on the surface of it, but warms and dries the earth itself. Consequently, since there are two kinds of exhalation, as we have said, one like vapour, the other like smoke, both of [10] them are necessarily generated. That in which moisture predominates is the source of rain, as we explained

before, while the dry one is the source and substance of all winds. That things must necessarily take this course is clear from the facts [15] themselves, for the exhalations must necessarily differ; and the sun and the warmth in the earth not only can but must produce them.

Since the two are specifically distinct, wind and rain obviously differ and their [20] substance is not the same, as those say who maintain that one and the same air when in motion is wind, but when it condenses again is water. Air, as we have explained in an earlier book, is made up of these as constituents. Vapour is moist and cold (for its fluidity is due to its moistness, and because it derives from water it is naturally cold, [25] like water that has not been warmed); whereas smoke is hot and dry. Hence each contributes a part, and air is moist and hot. It is absurd that this air that surrounds us should become wind when in motion, whatever be the source of its motion—on [30] the contrary the case of winds is like that of rivers. We do not call water that flows anyhow a river, even if there is a great quantity of it, but only if the flow comes from a spring. So too with the winds; a great quantity of air might be moved by the fall of some large object without flowing from any source or spring.

The facts bear out our theory. It is because the exhalation takes place uninterruptedly but differs in degree and quantity that clouds and winds always [360<sup>b</sup>1] appear in their natural season; and it is because there is now a great excess of the vaporous, now of the dry and smoky exhalation, that some years are rainy and wet, others windy and dry. Sometimes there is much drought or rain, and it prevails over [5] a continuous stretch of country. At other times it is local; the surrounding country often getting seasonable or even excessive rains while there is drought in a certain part; or, contrariwise, all the surrounding country gets little or even no rain while a [10] certain part gets rain in abundance. The reason for all this is that while the same affection is generally apt to prevail over a considerable district because adjacent places (unless there is something special to differentiate them) stand in the same relation to the sun, yet sometimes the dry exhalation will prevail in one part and the [15] moist in another, and sometimes the reverse. Again the reason for this latter is that each exhalation goes over to that of the neighbouring district: for instance, the dry evaporation circulates in its own place while the moist migrates to the next district or is even driven by winds to some distant place; or else the moist remains and the [20] dry moves away. Just as in the case of the body when the stomach is dry the lower belly is often in the contrary state, and when it is dry the stomach is moist and cold, so it often happens that the exhalations reciprocally take one another's place

and [25] interchange.

Further, after rain wind generally rises in those places where the rain fell, and when rain has come on the wind ceases. These are necessary effects of the principles [30] we have explained. After rain the earth is being dried by its own heat and that from above and gives off the exhalation which we saw to be the body of the wind. And whenever this separation occurs and winds prevail, then when they drop (since the heat is continually being separated and rising to the upper region), then the fall in temperature makes vapour form and condense into water. Water also forms and cools the dry exhalation when the clouds are driven together and the cold [361<sup>a</sup>1] concentrated in them. These are the causes that make wind cease on the advent of rain, and rain fall on the cessation of wind.

The cause of the predominance of winds from the north and from the south is [5] the same. (Most winds, as a matter of fact, are north winds or south winds.) These are the only regions which the sun does not visit: it approaches them and recedes from them, but its course is always over the west and the east. Hence clouds collect on either side, and when the sun approaches it provokes the moist exhalation, and [10] when it recedes to the opposition side there are storms and rain. So summer and winter are due to the sun's motion to and from the solstices, and water ascends and falls again for the same reason. Now since most rain falls in those regions towards [15] which and from which the sun turns and these are the north and the south, and since most exhalation must take place where the earth receives the greatest rainfall, just as green wood gives most smoke, and since this exhalation is wind, it is reasonable that the most and most important winds should come from these quarters. (The [20] winds from the north are called Boreae, those from the south Noti.)

The course of winds is oblique; for though the exhalation rises straight up from the earth, they blow round it because all the surrounding air follows the motion of [25] the heavens. Hence the question might be asked whether winds originate from above or from below. The motion comes from above: before<sup>24</sup> we feel the wind blowing the air betrays its presence even if there are clouds or a mist; for they show that the wind has begun to blow before it has actually reached us; and this implies [30] that the source of winds is above. But since wind is a quantity of dry exhalation from the earth moving round the earth, it is clear that while the origin of the motion is from above, the matter and the generation of wind come from below. For the direction of flow of the rising exhalation is caused from above; for the motion of the heavens determines the

processes that are at a distance from the earth, and the [35] motion from below is vertical and every cause is more active where it is nearest to the effect; but in its generation and origin wind plainly derives from the earth.

[361<sup>b</sup>1] The facts bear out the view that winds are formed by the gradual union of many exhalations just as rivers derive their sources from the water that oozes from the earth. Every wind is weakest in the spot from which it blows; as they proceed [5] and leave their source at a distance they gather strength. (Again, the winter in the north is windless and calm: that is, in the north itself; but the breeze that blows from there so gently as to escape observation becomes a great wind as it passes on.

We have explained the nature and origin of wind, the occurrence of drought [10] and rains, the reason why winds rise and fall after rain, the prevalence of north and south winds and also why wind moves in the way it does.

5 · The sun both checks the formation of winds and stimulates it. When the [15] exhalation is small in amount and faint the sun wastes it and<sup>25</sup> dissipates by its greater heat the lesser heat contained in the exhalation. It also dries up the earth before the outflow has appeared in bulk: just as, when you throw a little fuel into a [20] great fire, it is often burnt up before giving off any smoke. In these ways the sun checks winds and prevents them from rising at all: it checks them by wasting, and prevents their rising by drying up the earth quickly. Hence calm is very apt to prevail about the rising of Orion and lasts until the coming of the etesian winds and their forerunners.

[25] Calm is due to two causes. Either cold quenches the exhalation, for instance a sharp frost; or excessive heat wastes it. In the intermediate periods, too, the causes are generally either that the exhalation has not had time to develop or that it has passed away and there is none as yet to replace it.

[30] Both the setting and the rising of Orion are considered to be treacherous and stormy, because they take place at a change of season (namely of summer or winter; and the size of the constellation makes its rise last over many days) and a state of change is always indefinite and therefore liable to disturbance.

The etesian winds blow after the summer solstice and the rising of the dog-star: [362<sup>a</sup>1] not at the time when the sun is closest nor when it is distant; and they blow by day and cease at night. The reason is that when

the sun is near it dries up the earth before exhalation has taken place, but when it has receded a little its heat and the exhalation are present in the right proportion; so the ice melts and the earth, dried [5] by its own heat and that of the sun, smokes and vapours. They abate at night because the cold of the nights checks the melting of the ice. What is frozen gives off no evaporation, nor does that which contains no dryness at all: it is only where something dry contains moisture that it gives off evaporation under the influence of [10] heat.

The question is sometimes asked: why do the north winds which we call etesian blow continuously after the summer solstice, when there are no corresponding south winds after the winter solstice? The facts are reasonable enough: for the so-called 'white south winds' do blow at the corresponding season, though they are not [15] equally continuous and so escape observation and give rise to this inquiry. The reason for this is that the north wind blows from the arctic regions which are full of water and much snow. The sun thaws them and so the etesian winds blow after rather than at the summer solstice. (For the greatest heat is developed not when the [20] sun is nearest to the north, but when its heat has been felt for a considerable period and it has not yet receded far. The 'bird winds' blow in the same way after the winter solstice. They, too, are weak etesian winds, but they blow less and later than the etesians. They begin to blow only on the seventieth day because the sun is [25] distant and therefore weaker. They do not blow so continuously because only things on the surface of the earth and offering little resistance evaporate then, the thoroughly frozen parts requiring greater heat to melt them. So they blow intermittently till the true etesians come on again at the summer solstice; for from that time onwards the wind has an especial tendency to blow continuously.) But the [30] south wind blows from the tropic of Cancer and not from the antarctic region.

There are two inhabitable sections of the earth: one near our upper, or northern pole, the other near the other or southern pole; and their shape is like that of a drum. If you draw lines from the centre of the earth they cut out a drum-shaped [362<sup>b</sup>1] figure. The lines form two cones; the base of the one is the tropic, of the other the ever visible circle, their vertex is at the centre of the earth. Two other cones towards the south pole give corresponding segments of the earth. These sections alone are [5] habitable. Beyond the tropics no one can live; for there the shade would not fall to the north, whereas the earth is known to be uninhabitable before the shadow disappears or is thrown to the south; and the regions below the Bear are uninhabitable because of the cold.

[The Crown, too, moves over this region; for it is in the zenith when it is on our [10] meridian].<sup>26</sup>

So we see that the way in which they now draw maps of the earth is ridiculous. They depict the inhabited earth as round, but both observation and reason show this to be impossible. For reason proves that the inhabited region is limited in breadth, [15] while the climate admits of its extending all round the earth. For we meet with no excessive heat or cold in the direction of its length but only in that of its breadth; so that there is nothing to prevent our travelling round the earth unless the extent of the sea presents an obstacle anywhere. The observations made on journeys by sea [20] and land bear this out. They make the length far greater than the breadth. If we compute these voyages and journeys the distance from the Pillars of Heracles to India exceeds that from Aethiopia to Maeotis and the northernmost Scythians by a [25] ratio of more than 5 to 3, as far as such matters admit of accurate statement. Yet we know the whole breadth of the region we dwell in up to the uninhabited parts: in one direction no one lives because of the cold, in the other because of the heat.

But it is the sea which divides as it seems the parts beyond India from those beyond the Pillars of Heracles and prevents the earth from being inhabited all round.

[30] Now since there must be a region bearing the same relation to the southern pole as the place we live in bears to our pole, it will clearly correspond in the ordering of its winds as well as in other things. So just as we have a north wind, here they must have a corresponding wind from their pole. This wind cannot reach us [363<sup>a</sup>1] since our own north wind is like a land breeze and does not even reach<sup>27</sup> the limits of the region we live in. The prevalence of north winds here is due to our lying near the [5] north. Yet even here they give out and fail to penetrate far: in the southern sea beyond Libya east and west winds are always blowing alternately, like north and south winds with us. So it is clear that the south wind is not the wind that blows from the south pole. It is neither that nor the wind from the winter tropic. For symmetry [10] would require another wind blowing from the summer tropic, which there is not, since we know that only one wind blows from that quarter. So the south wind clearly blows from the torrid region. Now the sun is so near to that region that it has no [15] water, or snow<sup>28</sup> which might melt<sup>29</sup> and cause etesian winds. But because that place is far more extensive and open the south wind is greater and stronger and warmer than the north and penetrates farther to the north than the north wind does to the south.

The cause of these winds and their relation to one another has now been [20] explained.

6 · Let us now explain the position of the winds, their oppositions, which can blow simultaneously with which, and which cannot, their names and number, and any other of their affections that have not been treated among the particular [25] problems. What we say about their position must be followed with the help of the diagram. For clearness' sake we have drawn the circle of the horizon—that is why it is round—and it<sup>30</sup> must be taken to represent the zone in which we live; for the other [30] section too can be divided in the same way. Let us begin by laying down that those things are locally contrary which are locally most distant from one another just as things specifically most remote from one another are specific contraries. Now things that face one another from opposite ends of a diameter are locally most distant from one another.

Let A be the point where the sun sets at the equinox and B, the point opposite, the place where it rises at the equinox. Let there be another diameter cutting this at [363<sup>b</sup>1] right angles, and let the point G on it be the north and its diametrical opposite H the south. Let F be the rising of the sun at the summer solstice and E its setting at the summer solstice; D its rising at the winter solstice, and C its setting at the winter [5] solstice. Draw a diameter from F to C and from D to E. Then since those things are locally contrary which are locally most distant from one another, and points diametrically opposite are most distant from one another, those winds must necessarily be contrary to one another that blow from opposite ends of a diameter. [10]

The names of the winds according to their position are these. Zephyrus is the wind that blows from A, this being the point where the sun sets at the equinox. Its contrary is Apeliotes blowing from B the point where the sun rises at the equinox. The wind blowing from G, the north, is Boreas or Aparctias; while Notus blowing [15] from H is its contrary; for this point is the south and H is contrary to G, being diametrically opposite to it. Caecias blows from F, where the sun rises at the summer solstice. Its contrary is not the wind blowing from E but Lips blowing from C. For Lips blows from the point where the sun sets at the winter solstice and is diametrically opposite to Caecias: so it is its contrary. Eurus blows from D, coming [20] from the point where the sun rises at the winter solstice. It borders on Notus, and so we often find that people speak of Euro-Noti. Its contrary is not Lips blowing from C but the wind

that blows from E which some call Argestes, some Olympias, and some Sciron. This blows from the point where the sun sets at the summer solstice, [25] and is the only wind that is diametrically opposite to Eurus. These are the winds that are diametrically opposite to one another and which have contraries.

There are other winds which have no contraries. The wind they call Thrascias, which lies between Argestes and Aparctias, blows from I; the wind called Meses, which lies between Caecias and Aparctias, from K. (The diameter IK nearly [30] coincides with the ever visible circle, but not quite.) These winds have no contraries. Meses has not, or else there would be a wind blowing from the point M which is diametrically opposite. Thraskias corresponding to the point I has not, for then [364<sup>a</sup>1] there would be a wind blowing from N, the point which is diametrically opposite. (But perhaps a local wind which the inhabitants of those parts call Phoenicias blows from that point.)

These are the most important and definite winds and these their places. [5]

There are more winds from the north than from the south. The reason for this is that the region in which we live lies nearer to the north. Also, much more water and snow is pushed aside into this quarter because the other lies under the sun and its course. When this thaws and soaks into the earth and is exposed to the heat of the [10] sun and the earth it necessarily causes exhalation to rise in greater quantities and over a greater space.

Of the winds we have described Aparctias is the north wind in the strict sense. Thrascias and Meses are north winds too. (Caecias is half north and half east). [15] South are that which blows from due south and Lips. East, the wind from the rising of the sun at the equinox and Eurus. Phoenicias is half south and half east. West, the wind from the true west and that called Argestes. More generally these winds [20] are classified as northerly or southerly. The west winds are counted as northerly, for they blow from the place of sunset and are therefore colder; the east winds as southerly, for they are warmer because they blow from the place of sunrise. So the distinction of cold and hot or warm is the basis for the division of the winds into northerly and southerly. East winds are warmer than west winds because the sun [25] shines on the east longer, whereas it leaves the west sooner and reaches it later.

Since this is the distribution of the winds it is clear that contrary winds cannot blow simultaneously. They are diametrically opposite to one another and one of the two must be overpowered and cease. Winds



that are not diametrically opposite to [30] one another may blow simultaneously: for instance the winds from F and from D. Hence it sometimes happens that both of them, though different winds and blowing from different quarters, are favourable to sailors making for the same point.

Contrary winds commonly blow at opposite seasons. Thus Caecias and in [364<sup>b</sup>1] general the winds north of the summer solstice blow about the time of the spring equinox, but about the autumn equinox Lips; and Zephyrus about the summer solstice, but about the winter Solstice Eurus.

Aparctias, Thracias, and Argestes are the winds that fall on others most and [5] stop them. Their source is so close to us that they are greater and stronger than other winds. They bring fair weather most of all winds for the same reason; for, blowing as they do, from close at hand, they overpower the other winds and stop them; they also blow away the clouds that are forming and leave a clear sky—unless [10] they happen to be very cold. Then they do not bring fair weather, but being colder than they are strong they condense the clouds before driving them away.

Caecias does not bring fair weather because it returns upon itself. Hence the saying: ‘Bringing it on himself as Caecias does clouds’.

When they cease, winds are succeeded by their neighbours in the direction of [15] the movement of the sun. For an effect is most apt to be produced in the neighbourhood of its source, and the source of winds moves with the sun.

Contrary winds have either the same or contrary effects. Thus Lips and Caecias, sometimes called Hellespontias, are both rainy.<sup>31</sup> Argestes and Eurus are [20] dry: the latter being dry at first and rainy afterwards. Meses and Aparctias are coldest and bring most snow. Aparctias, Thracias, and Argestes bring hail. Notus, Zephyrus, and Eurus are hot. Caecias covers the sky with heavy clouds, Lips with [25] lighter ones. Caecias does this because it returns upon itself and combines the qualities of Boreas and Eurus. By being cold it condenses and gathers the vaporous air, and because it is easterly it carries with it and drives before it a great quantity of such vaporous matter. Aparctias, Thracias, and Argestes bring fair weather for the [30] reason we have explained before. These winds and Meses are most commonly accompanied by lightning. They are cold because they blow from nearby, and lightning is due to cold, being ejected when the clouds contract. Some of these same [365<sup>a</sup>1] winds bring hail with them for the same reason; namely, that they cause a sudden condensation.

Hurricanes are commonest in autumn, and next in spring: Aparctias, Thrascias, and Argestes give rise to them most. This is because hurricanes are generally formed when some winds are blowing and others fall on them; and these are the winds which are most apt to fall on others that are blowing; the reason for which, [5] too, we have explained before.

The etesian winds veer round, for dwellers in the west from Aparctias to Thrascias, Argestes, and Zephyrus, beginning from the north and ending far away;<sup>32</sup> for dwellers in the east they veer round as far as Apeliotes. [10]

So much for the winds, their origin and nature and the properties common to them all or peculiar to each.

7 · We must go on to discuss earthquakes and tremors of the earth next, for their cause is akin to our last subject. [15]

The theories that have been put forward up to the present date are three, and their authors three men, Anaxagoras of Clazomenae, and before him Anaximenes of Miletus, and later Democritus of Abdera.

Anaxagoras says that the ether, which naturally moves upwards, is caught in [20] hollows below the earth and so shakes it; for though the earth is really all of it equally porous, its surface is clogged up by rain. This implies that part of the whole sphere is above and part below: above being the part on which we live, below the other.

This theory is perhaps too primitive to require refutation. It is absurd to think [25] of up and down otherwise than as meaning that heavy bodies move to the earth from every quarter, and light ones, such as fire, upwards; especially as we see that, as far as our knowledge of the earth goes, the horizon always changes with a change in our [30] position, which proves that the earth is convex and spherical. It is absurd, too, to maintain that the earth rests on the air because of its size, and then to say that impact upwards from below shakes it right through. Besides he gives no account of the circumstances attendant on earthquakes; for not every country or every season [35] is subject to them.

Democritus says that the earth is full of water and that when a quantity of [365<sup>b1</sup>] rain-water is added to this an earthquake is the result. The hollows in the earth being unable to admit the excess of water it forces its way in and so causes an earthquake. Or again, the earth as it dries draws the water from the fuller to the [5] emptier parts, and the inrush of the water as it changes its place causes the earthquake.

Anaximenes says that the earth breaks up when it grows, wet or dry,

and earthquakes are due to the fall of these masses as they break away. Hence earthquakes take place in times of drought and again of heavy rain, since, as we have explained, the earth grows dry in time of drought and breaks up, whereas the [10] rain makes it sodden and destroys its cohesion.

But if this were the case the earth ought to be found to be sinking in many places. Again, why do earthquakes frequently occur in places which are not [15] excessively subject to drought or rain, as they ought to be on the theory? Besides, on this view, earthquakes ought always to be getting fewer, and should come to an end entirely some day: the notion of contraction by packing together implies this. So if [20] this is impossible the theory must be impossible too.

8 · We have already shown that wet and dry must both give rise to an exhalation: earthquakes are a necessary consequence of this fact. The earth is [25] essentially dry, but rain fills it with moisture. Then the sun and its own fire warm it and give rise to a quantity of wind both outside and inside it. This wind sometimes flows outwards in a single body, sometimes inwards, and sometimes it is divided. If [30] this cannot but be so, we must next find out what body has the greatest motive force. This will certainly be the body that naturally moves farthest and is most violent. Now that which has the most rapid motion is necessarily the most violent; for its [35] swiftness gives it impact the greatest force. Again, the rarest body, that which can most readily pass through every other body, is that which naturally moves farthest. [366<sup>a</sup>1] If, then, the nature of wind is of this kind, wind must be the body with the most motive force; for fire only becomes flame and moves rapidly when wind accompanies it: so that not water nor earth is the cause of earthquakes but wind—that is, the inrush of the external exhalation.

Hence, since the exhalation generally follows in a continuous body in the direction in which it first started, and either all of it flows inwards or all outwards, [5] most earthquakes and the greatest are accompanied by calm. It is true that some take place when a wind is blowing, but this presents no difficulty. We sometimes [10] find several winds blowing simultaneously. If one of these enters the earth we get an earthquake attended by wind. Only these earthquakes are less severe because their source and cause is divided.

Again most earthquakes and the severest occur at night or, if by day, about [15] noon, that being generally the calmest part of the day. For

when the sun exerts its full power (as it does about noon) it shuts the exhalation into the earth. Night, too, is calmer than day because of the absence of the sun. So the flood turns inward [20] again, like a sort of ebb tide, in the opposite direction to the outward flow; especially towards dawn, for the winds, as a rule, begin to blow then, and if their source changes about like the Euripus and flows inwards the quantity is greater and a more violent earthquake results.

[25] The severest earthquakes take place where the sea is full of currents or the earth spongy and cavernous: so they occur near the Hellespont and in Achaea and Sicily, and those parts of Euboea—where the sea is supposed to flow in channels below the earth. The hot springs, too, near Aedepsus are due to a cause of this kind. [30] It is the confined character of these places that makes them so liable to earthquakes. A violent wind which would naturally blow away from the earth, is thrust back into the earth by the onrush of the sea in a great mass. The countries that are spongy [366<sup>b</sup>1] below the surface are exposed to earthquakes because they have room for so much wind.

For the same reason earthquakes usually take place in spring and autumn and in times of wet and of drought—because these are the windiest seasons. Summer with its heat and winter with its frost cause calm: winter is too cold, summer too dry [5] for winds to form. In time of drought the air is full of wind; drought is just the predominance of the dry over the moist exhalation. Again, excessive rain causes more of the exhalation to form in the earth. Then this secretion is shut up in a [10] narrow compass and forced into a smaller space by the water that fills the cavities. Thus a great wind is compressed into a smaller space and so gets the upper hand, and then breaks out and beats against the earth and shakes it violently.

We must suppose the action of the wind in the earth to be analogous to the tremors and throbbings caused in us by the force of the wind contained in our [15] bodies. Thus some earthquakes are a sort of tremor, others a sort of throbbing. Again, we must think that the earth is affected as we often are after urinating—for a sort of tremor runs through the body as the wind returns inwards from without in [20] one volume.

The force wind can have may be gathered not only from what happens in the air (where one might suppose that it owed its power to produce such effects to its volume), but also from what is observed in animal bodies. Tetanus and spasms are [25] motions of wind, and their force is such that the united efforts of many men do not succeed in overcoming the movements of the patients. We must suppose, then (to

compare great things with small), that what happens in the earth is just like that.

Our theory has been verified by actual observation in many places. It has been [30] known to happen that an earthquake has continued until the wind that caused it burst through the earth into the air and appeared visibly like a hurricane. This happened lately near Heracleia in Pontus and some time past at the island Hieria, [367<sup>a</sup>1] one of the group called the Aeolian islands. Here a portion of the earth swelled up and sort of crested lump rose with a noise: finally it burst, and a great wind came out [5] of it and threw up cinders and ashes which buried the neighbouring town of Lipara and reached some of the towns in Italy. The spot where this eruption occurred is still to be seen.

Indeed, this must be recognized as the cause of the fire that is generated in the earth: the air is first broken up in small particles and then the wind is beaten about [10] and so catches fire.

A phenomenon in these islands affords further evidence of the fact that winds move below the surface of the earth. When a south wind is going to blow there is a premonitory indication: a sound is heard in the places from which the eruptions issue. This is because the sea is being pushed on from a distance and its advance [15] thrusts back into the earth the wind that was issuing from it. The reason why there is a noise and no earthquake is that the underground spaces are so extensive in proportion to the quantity of the air that is being driven on that the wind overflows into the void beyond.

Again, our theory is supported by the facts that the sun appears hazy and is [20] darkened in the absence of clouds, and that there is sometimes calm and sharp frost before earthquakes at sunrise. The sun is necessarily obscured and darkened when the wind which dissolves and rarefies the air begins to withdraw into the earth; and [25] there must be calm and cold towards sunrise and dawn. The calm we have already explained. There must as a rule be calm because the wind flows back into the earth, and it must be most marked before the more violent earthquakes; for when the wind [30] is not part outside the earth, part inside, but moves in a single body, its strength must be greater. The cold comes because the exhalation which is naturally and essentially hot enters the earth. (Wind is not recognized to be hot, because it sets the air in motion, and that is full of a quantity of cold vapour. It is the same with [367<sup>b</sup>1] the breath we blow from our mouth: close by it is warm, as it is when we huff, but there is so little of it that it is scarcely noticed, whereas at a distance it is cold for the [5] same reason as wind.) Well,

when this disappears into the earth the vaporous exhalation concentrates because of the moisture and causes cold in any place in which this disappearance occurs.

A sign which sometimes precedes earthquakes can be explained in the same way. Either by day or a little after sunset, in fine weather, a little, light, long-drawn [10] cloud is seen, like a long very straight line. This is because the wind is leaving the air and dying down. Something analogous to this happens on the sea-shore. When the sea breaks in great waves the breakers are very thick and crooked, but when the sea [15] is calm they are slight and straight (because the secretion is small). As the sea is to the earth so the wind is to the cloudy air; so, when the wind drops, this very straight and thin cloud is left, a sort of breaker in the air.

[20] An earthquake sometimes coincides with an eclipse of the moon for the same reason. When the earth is on the point of being interposed, but the light and heat of the sun has not quite vanished from the air but is dying away, the wind which causes the earthquake before the eclipse, turns off into the earth, and calm ensues. For [25] there often are winds before eclipses: at nightfall if the eclipse is at midnight, and at midnight if the eclipse is at dawn. They are caused by the lessening of the warmth from the moon when its path approaches the point at which the eclipse is going to [30] take place. So the influence which restrained and quieted the air weakens and the air moves again and a wind rises, and does so later, the later the eclipse.

A severe earthquake does not stop at once or after a single shock, but first the shocks go on, often for about forty days; after that, for one or even two years it gives [368<sup>a</sup>1] premonitory indications in the same place. The severity of the earthquake is determined by the quantity of wind and the shape of the passages through which it flows. Where it is beaten back and cannot easily find its way out the shocks are most [5] violent, and there it must remain in a cramped space like water in a vessel that cannot escape. Any throbbing in the body does not cease suddenly or quickly, but by degrees according as the affection passes off. So here the source which created the exhalation and the impulse of the wind clearly does not at once exhaust the whole of [10] the material from which it forms the wind which we call an earthquake. So until the rest of this is exhausted the shocks must continue, though more gently, and they must go on until there is too little of the exhalation left to have any perceptible effect on the earth at all.

Subterranean noises, too, are due to the wind; sometimes they precede [15] earthquakes but sometimes they have been heard without

any earthquake following. Just as the air gives off various sounds when it is struck, so it does when it strikes other things; for striking involves being struck and so the two cases are the same. The sound precedes the shock because sound is thinner and passes through things more readily than wind. But when it is too weak by reason of thinness to [20] cause an earthquake the absence of a shock is due to its filtering through readily, though by striking hard and hollow masses of different shapes it makes various noises, so that the earth sometimes seems to bellow as the marvel-mongers say. [25]

Water has been known to burst out during an earthquake. But that does not make water the cause of the earthquake. The wind is the cause whether it exerts its force along the surface or up from below: just as winds are the causes of waves and not waves of winds. Else we might as well say that earth was the cause; for it is upset [30] in an earthquake, just like water (for effusion is a form of upsetting). No, earth and water are material causes (being patients, not agents): the source is the wind.

The combination of a tidal wave with an earthquake is due to the presence of contrary winds. It occurs when the wind which is shaking the earth does not entirely succeed in driving off the sea which another wind is bringing on, but pushes it back [368<sup>b</sup>1] and heaps it up in a great mass in one place. Given this situation it follows that when this wind gives way the whole body of the sea, driven on by the opposite wind, will burst out and cause a flood. This is what happened in Achaea. There a south wind [5] was blowing, but outside<sup>33</sup> a north wind; then there was a calm and the wind entered the earth, and then the tidal wave came on and simultaneously there was an earthquake. This was the more violent as the sea allowed no exit to the wind that had entered the earth, but shut it in. So in their struggle with one another the wind [10] caused the earthquake, and the wave by its settling down the inundation.

Earthquakes are local and often affect a small district only; whereas winds are not local. Such phenomena are local when the exhalations at a given place are [15] joined by those from the next and unite; this, as we explained, is what happens when there is drought or excessive rain locally. Now earthquakes do come about in this way but winds do not. For the former have their source inside the earth, so that the exhalations all move in one direction; the sun has less power over them than over [20] those in the air so that, when once they have been given a start by its motion, which is determined by its various positions, they flow in one direction.

When the wind is present in sufficient quantity it causes an

earthquake which is horizontal like a tremor; except occasionally, in a few places, it runs vertically, upwards from below, like a throbbing. It is the vertical direction which makes this [25] kind of earthquake so rare. The source does not easily accumulate in great quantity in the position required, since the surface of the earth secretes far more than its depths. Wherever an earthquake of this kind does occur a quantity of stones comes [30] to the surface of the earth (as when you throw up things in a winnowing fan), as we see from Sipylus and the Phlegraean plain and the district in Liguria, which were devastated by this kind of earthquake.

Islands in the middle of the sea are less exposed to earthquakes than those near land. For the volume of the sea cools the exhalations and overpowers them by its weight and so crushes them. Again, the sea flows rather than shakes when mastered [369<sup>a</sup>1] by the winds. Again, it is so extensive that exhalations do not collect in it but issue from it, and these draw the exhalations from the earth after them. Islands near the [5] continent form part of it: the intervening sea is not enough to make any difference; but those in the open sea can only be shaken if the whole of the sea that surrounds them is shaken too.

We have now explained earthquakes, their nature and cause, and the most important of the circumstances attendant on their appearance.

[10] 9 · Let us go on to explain lightning and thunder, and further whirlwind, fire-wind, and thunderbolts; for the cause of them all must be supposed the same.

As we have said, there are two kinds of exhalation, moist and dry, and their [15] combination contains them both potentially. It, as we have said before, condenses into cloud, and the density of the clouds is highest at their upper limit. (For they must be denser and colder on the side where the heat escapes to the upper region [20] and leaves them. This explains why hurricanes and thunderbolts and all analogous phenomena move downwards in spite of the fact that everything hot has a natural tendency upwards. Just as the pips that we squeeze between our fingers are heavy but often jump upwards: so these things are necessarily squeezed out away from the [25] densest part of the cloud.) Now the heat that escapes disperses to the upper region. But if any of the dry exhalation is caught in the process as the air cools, it is squeezed out as the clouds contract, and is forcibly carried on and collides with the neighbouring clouds, and the sound of this collision is what we call thunder. This [30] collision is analogous, to compare small with great, to



the sound we hear in a flame which men call the laughter or the threat of Hephaestus or of Hestia. This occurs when the wood dries and cracks and the exhalation rushes on the flame in a body. So in the clouds, the exhalation is projected and its impact on dense clouds causes [369<sup>b</sup>1] thunder: the variety of the sound is due to the irregularity of the clouds and the hollows that intervene where their density is interrupted. This, then, is thunder, and this its cause.

[5] It usually happens that the wind that is ejected is inflamed and burns with a thin and faint fire: this is what we call lightning, where we see as it were the exhalation coloured in the act of its ejection. It comes into existence after the collision and the thunder, though we see it earlier because sight is quicker than [10] hearing. The rowing of triremes illustrates this: the oars are going back again before the sound of their striking the water reaches us.

However, there are some who maintain that there is actually fire in the clouds. Empedocles says that it consists of some of the sun's rays which are intercepted; Anaxagoras that it is part of the upper ether (which he calls fire) which has [15] descended from above. Lightning, then, is the gleam of this fire, and thunder the hissing noise of its extinction in the cloud.

But this involves the view that lightning actually is prior to thunder and does not merely appear to be so. Again, this intercepting of the fire is unreasonable on [20] either theory, but especially when it is said to be drawn down from the upper ether. Some reason ought to be given why that which naturally ascends should descend, and why it should not always do so, but only when it is cloudy—for when the sky is clear there is no lightning. The theory seems altogether too hasty.

The view that the heat of the sun's rays intercepted in the clouds is the cause of [25] these phenomena is equally implausible: this, too, is a most careless explanation. Thunder, lightning, and the rest must have a separate and determinate cause assigned to them on which they ensue. But this theory does nothing of the sort. It is [30] like supposing that water, snow, and hail existed all along and emerged when the time came and were not generated at all, as if the atmosphere brought each to hand out of its stock from time to time. They are concretions in the same way as thunder and lightning are discretions, so that if it is true of either that they are not generated but pre-exist, the same account must fit both. Again, how can any distinction be [370<sup>a</sup>1] made about the intercepting between this case and that of interception in denser substances? Water, too, is heated by the sun and by fire; yet when it contracts again and

grows cold and freezes no such ejection as they describe occurs, though it ought [5] on their theory to take place on a proportionate scale.<sup>34</sup> Boiling is due to the wind generated by fire; but it is impossible for it to exist in the water beforehand; and besides they call the noise hissing, not boiling. But hissing is really boiling on a small scale; for when that which is brought into contact with moisture and is in process of being extinguished gets the better of it, then it boils and makes the noise in [10] question.

Some—Cleidemus is one of them—say that lightning does not exist but appears. They compare it to what happens when you strike the sea with a rod by night and the water is seen to shine. They say that the moisture in the cloud is beaten about in the same way, and that lightning is the appearance of brightness [15] that ensues.

These men were not yet familiar with the theory of reflection, which is the cause of that phenomenon. The water appears to shine when struck because our sight is reflected from it to some bright object; hence the phenomenon occurs mainly by night: the appearance is not seen by day because the daylight is too [20] intense and obscures it.

These are the theories of others about thunder and lightning: some maintaining that lightning is a reflection, the others that lightning is fire shining through the cloud and thunder its extinction, the fire not being generated in each case but [25] existing beforehand. We say that the same stuff is wind on the earth, and earthquake under it, and in the clouds thunder. The substance of all these phenomena is the same: namely, the dry exhalation. If it flows in one way it is wind, in another it causes earthquakes; in the clouds, when they are in a process of change<sup>35</sup> and contract and condense into water, it is ejected<sup>36</sup> and causes thunder [30] and lightning and the other phenomena of the same nature.

So much for thunder and lightning.

## BOOK III

1 · Let us explain the remaining operations of this ejection in the same way [5] as we have treated the rest. When this wind is ejected in small and scattered quantities and frequently, and spreads, and its constitution is rare, it gives rise to thunder and lightning. But if it is ejected in a body and is denser, that is, less rare, we get a hurricane. That is why it is violent: it is due to the rapidity of the ejection. [10] Now when this ejection issues in a great and continuous current the result corresponds to what we get when the opposite development takes place and rain and a quantity of water are produced. As far as the matter from which they are developed goes both sets of phenomena are potentially present. As soon as a stimulus to the development of either potentiality appears, that of which there is the [15] greater quantity present in the cloud is at once secreted from it, and there results either rain, or if the other exhalation prevails, a hurricane.

Sometimes the wind in the cloud, when it is being secreted, collides with another under circumstances like those found when a wind is forced from an open into a narrow space in a gateway or a road. It often happens in such cases that the [20] first part of the moving body is deflected because of the resistance due either to the narrowness or to a contrary current, and so the wind forms a circle and eddy. It is prevented from advancing in a straight line: at the same time it is pushed on from behind; so it is compelled to move sideways in the direction of least resistance. The [25] same thing happens to the next part, and the next, till the series becomes one, that is, till a circle is formed; for if a figure is described by a single motion that figure must itself be one. This is how eddies are generated on the earth, and the case is the same in the clouds as far as the beginning of them goes. Only here (as in the case of the hurricane when the cloud is continually separated off and there is a continuous [30] wind) the cloud follows the exhalation unbroken, and the wind failing to break away from the cloud because of its density, first moves in a circle for the reason given and [371<sup>a</sup>1] then descends, because clouds are always densest on the side where the heat escapes. This phenomenon is called a whirlwind when it is colourless; and it is<sup>37</sup> a sort of undigested hurricane. There is never a whirlwind when the weather is northerly, nor a hurricane when there is snow. The reason is that all these [5] phenomena are wind, and wind is a dry and warm exhalation. Now frost and cold prevail over this principle and quench it at its birth: that

they do prevail is clear or there could be no snow or northerly rain, since these occur when the cold does prevail.

[10] So the whirlwind originates in the failure of an incipient hurricane to escape from its cloud: it is due to the resistance of the eddy, and occurs when the spiral descends to the earth and drags with it the cloud which it cannot shake off. It moves things by its wind in the direction in which it is blowing in a straight line, and whirls round by its circular motion and forcibly snatches up whatever it meets.

[15] When the cloud burns as it is drawn downwards,—that occurs when the wind becomes rarer—it is called a fire-wind; for its fire colours the neighbouring air and inflames it.

When there is a great quantity of wind and it is rare and is squeezed out in the cloud itself we get a thunderbolt. If it is exceedingly rare this rareness prevents the thunderbolt from scorching and the poets call it 'bright'; if the rareness is less it does [20] scorch and they call it 'smoky'. The former moves onward because of its rareness, and because of its rapidity passes through an object before setting fire to it or dwelling on it so as to blacken it: the slower one does blacken the object, but passes through it before it can actually burn it. That is why resisting substances are affected, unresisting ones are not. For instance, it has happened that the bronze of a [25] shield has been melted while the woodwork remained intact because its texture was so loose that the wind filtered through without affecting it. So it has passed through<sup>38</sup> clothes, too, without burning them, and has merely reduced them to shreds.

Such evidence is enough to show that the wind is at work in all these cases, but we sometimes get ocular evidence as well, as in the case of the conflagration of the [30] temple at Ephesus which we lately witnessed. There independent sheets of flame left the main fire and were carried bodily in many directions. Now that smoke is wind and that smoke burns is certain, and has been stated in another place before; [371<sup>b</sup>1] but when the flame moves bodily, then it can be seen clearly that it is wind. On this occasion what is seen in small fires appeared on a much larger scale because of the quantity of matter that was burning. The beams which were the source of the wind split, and a quantity of it rushed in a body from the place from which it issued forth [5] and went up in a blaze; so that the flame seemed to move away and to fall on the houses. For we must recognize that wind accompanies and precedes thunderbolts though it is colourless and so not seen. Hence, where the thunderbolt is going to strike, the object moves before it is struck, showing that the wind which is its origin [10] falls on the object first. Thunder, too, splits things not by

its noise but because the wind that strikes the object and makes the noise is ejected simultaneously. This splits the thing it strikes but does not scorch it at all.

We have now explained thunder and lightning and hurricane, and further fire-winds, whirlwinds, and thunder-bolts, and shown that they are all the same [15] thing and wherein they all differ.

2 · Let us now explain the nature and cause of halo, rainbow, mock suns, and rods, since the same causes account for them all. [20]

We must first describe the phenomena and the circumstances in which each of them occurs. The halo often appears as a complete circle: it is seen round the sun and the moon and bright stars, by night as well as by day, and at midday or in the [25] afternoon, more rarely about sunrise or sunset.

The rainbow never forms a full circle, nor any segment greater than a semicircle. At sunset and sunrise the circle is smallest and the segment largest: as the sun rises higher the circle is larger and the segment smaller. After the autumn equinox in the shorter days it is seen at every hour of the day, in the summer not [30] about midday. There are never more than two rainbows at one time. Each of them is [372<sup>a</sup>1] three-coloured; the colours are the same in both and their number is the same, but in the outer rainbow they are fainter and their position is reversed. In the inner rainbow the first and largest band is red; in the outer rainbow the band that is [5] nearest to this one and smallest is of the same colour: the other bands correspond on the same principle. These are almost the only colours which painters cannot manufacture; for there are colours which they create by mixing, but no mixing will give red, green, or purple. Those are the colours of the rainbow, though between the [10] red and the green an orange colour is often seen.

Mock suns and rods are always seen by the side of the sun, not above or below it nor in the opposite quarter of the sky. They are not seen at night but always in the neighbourhood of the sun, either as it is rising or setting but more commonly towards sunset. They have scarcely ever appeared when the sun was on the [15] meridian, though this once happened in Bosphorus where two mock suns rose with the sun and followed it all through the day till sunset.

These are the facts about each of these phenomena: the cause of them all is the same, for they are all reflections. But they differ in the manner of the reflection and [20] in the reflecting surfaces and according as the

reflection to the sun or some other bright object is.

The rainbow is seen by day, and it was formerly thought that it never appeared by night as a moon rainbow. This opinion was due to the rarity of the occurrence: it was not observed; for though it does happen it does so rarely. The reason is that the [25] colours are not so easy to see in the dark and that many other conditions must coincide, and all that in a single day in the month. For if there is to be one it must be at full moon, and then as the moon is either rising or setting. So we have only met with two instances of a moon rainbow in more than fifty years.

We must accept from the theory of optics the fact that sight is reflected from [30] air and any object with a smooth surface just as it is from water; also that in some mirrors the shapes of things are reflected, in others only their colours. Of the latter [372<sup>b</sup>1] kind are those mirrors which are so small as to be indivisible for sense. It is impossible that the shape of a thing should be reflected in them; for if it is the mirror will seem divisible—for every shape is at once a shape and divisible. But since [5] something must be reflected in them and shape cannot be, it remains that colour alone should be reflected. The colour of a bright object sometimes appears bright in the reflection, but it sometimes, either owing to the admixture of the colour of the mirror or to weakness of sight, gives rise to the appearance of another colour.

However, we must accept the account we have given of these things in the [10] investigation of sensation, and take some things for granted while we explain others.

**3** · Let us begin by explaining the shape of the halo; why it is a circle and why it appears round the sun or the moon or one of the other stars: the explanation being [15] in all these cases the same.

Sight is reflected in this way when air and vapour are condensed into a cloud and the condensed matter is uniform and consists of small parts. Hence it is a sign of rain, but if it fades away, of fine weather, if it is broken up, of wind. For if it does not [20] fade away and is not broken up but is allowed to attain its normal state, it is naturally a sign of rain since it shows that a process of condensation is proceeding which must, when it is carried to an end, result in rain. For the same reason these halos are the darkest in colour. It is a sign of wind when it is broken up because its [25] breaking up is due to a wind which exists there but has not reached us. This view finds support in the fact that the wind blows from the quarter in which the main division appears in the halo. Its fading away is

a sign of fine weather because if the air is not yet in a state to get the better of the heat it contains and proceed to [30] condense into water, this shows that the moist vapour has not yet separated from the dry and firelike exhalation: and this is a cause of fine weather.

So much for the atmospheric conditions under which the reflection takes place. Sight is reflected from the mist that forms round the sun or the moon, and that is [373<sup>a</sup>1] why the halo is not seen opposite the sun like the rainbow. Since the reflection takes place in the same way from every point the result is necessarily a circle or a segment of a circle; for if the lines start from the same point and end at the same point and are equal, the points where they form an angle will always lie on a circle. [5]

Let ACB and AFB and ADB be lines each of which goes from the point A to the point B and forms an angle. Let the lines AC, AF, AD be equal and those at B—viz. CB, FB, DB—equal too. Draw the line AEB. Then the triangles are equal; [10] for their base AEB is equal. Draw perpendiculars to AEB from the angles; CE from C, FE from F, DE from D. Then these perpendiculars are equal, being in equal triangles and all in one plane; for they are all at right angles to AEB and meet at a [15] single point E. So if you draw the line it will be a circle and E its centre. Now B is the sun, A the eye, and the circumference passing through the points CFD the cloud from which the sight is reflected to the sun.

The mirrors must be thought of as continuous: each of them is too small to be visible, but their contiguity makes the whole made up of them all to seem one. The [20] bright band is the sun, which is seen as a circle, appearing successively in each of the mirrors as a point indivisible to sense. The halo is formed rather near the earth because that is calmer; for where there is wind it is clear that no halo can maintain its position. Next to this is a dark ring, which seems to be darker because of the [25] brightness of the halo.

Haloes are commoner round the moon because the greater heat of the sun dissolves the condensations of the air more rapidly.

Haloes are formed round stars for the same reasons, but they are not prognostic in the same way because the condensation they imply is so insignificant [30] as to be barren.

4 · We have already stated that the rainbow is a reflection: we have now to explain what sort of reflection it is, to describe its various concomitants, and to assign their causes.

Sight is reflected from all smooth surfaces, such as are air and water

among others. Air must be condensed if it is to act as a mirror, though it often gives a [373<sup>b</sup>1] reflection even uncondensed when the sight is weak. Such was the case of a man [5] whose sight was faint and indistinct. He always saw an image in front of him and facing him as he walked. This was because his sight was reflected back to him. Its morbid condition made it so weak and delicate that the air close by acted as a mirror, just as distant and condensed air normally does, and his sight could not push [10] it back. That is why promontories in the sea loom when there is a south-east wind, and everything seems bigger, and in a mist, too, things seem bigger—as the sun and the stars seem bigger when rising and setting than on the meridian. But things are best reflected from water, and even in process of formation it is a better mirror than [15] air; for each of the particles, the union of which constitutes a raindrop, is necessarily a better mirror than mist. Now it is obvious and has already been stated that a mirror of this kind renders the colour of an object only, but not its shape. Hence it [20] follows that when it is on the point of raining and the air in the clouds is in process of forming into raindrops but the rain is not yet actually there, if the sun is opposite, or any other object bright enough to make the cloud a mirror and cause the sight to be reflected to the object, then the reflection must render the colour of the object [25] without its shape. Since each of the mirrors is so small as to be invisible and what we see is the continuous magnitude made up of them all, the reflection necessarily gives us a continuous magnitude made up of one colour, each of the mirrors contributing the same colour to the whole. Hence since these conditions are realizable there will be an appearance due to reflection whenever the sun and the cloud are related in the [30] way described and we are between them. But these are just the conditions under which the rainbow appears. So it is clear that the rainbow is a reflection of sight to the sun.

So the rainbow always appears opposite the sun whereas the halo is round it. They are both reflections, but the rainbow is distinguished by the variety of its [374<sup>a</sup>1] colours. The reflection in the one case is from water which is dark and from a distance; in the other from air which is nearer and lighter in nature. Bright light through a dark medium or on a dark surface (it makes no difference) looks red. We [5] can see how red the flame of green wood is: this is because so much smoke is mixed with the bright white firelight: so, too, the sun appears red through smoke and mist. That is why in the rainbow reflection the outer circumference is red (the reflection [10] being from small particles of water), but not in the case of the halo. The other colours shall be explained later. Again, a



condensation of this kind cannot persist in the neighbourhood of the sun itself: it must either turn to rain or be dissolved; but opposite to the sun there is an interval during which the water is formed. If there [15] were not this distinction haloes would be coloured like the rainbow. Actually no complete or circular halo presents this appearance, only small and fragmentary ones called 'rods'. But if a haze due to water or any other dark substance formed there we should have had, as we maintain, a complete rainbow like that which we do [20] find round lamps. A rainbow appears round these in winter, generally with southerly winds. Persons whose eyes are moist see it most clearly because their sight is weak and easily reflected. It is due to the moistness of the air and the soot which [25] the flame gives off and which mixes with the air; for a mirror is then formed actually because of the blackness—for soot is smoky. The light of the lamp appears as a circle which is not white but purple. It shows the colours of the rainbow; but because the sight that is reflected is too weak and the mirror too dark, red is absent. The rainbow that is seen when oars are raised out of the sea involves the same [30] relative positions as that in the sky, but its colour is more like that round the lamps, being purple rather than red. The reflection is from very small particles continuous with one another, and in this case the particles are fully formed water. We get a rainbow, too, if a man sprinkles fine drops in a room turned to the sun so that the [374<sup>b</sup>1] sun is shining in part of the room and throwing a shadow in the rest. Then if one man sprinkles in the room, another, standing outside, sees a rainbow where the sun's rays cease and make the shadow. Its nature and colour is like that from the oars and [5] its cause is the same, for the sprinkling hand corresponds to the oar.

That the colours of the rainbow are those we described and how the other colours come to appear in it will be clear from the following considerations. We must recognize, as we have said, and lay down first, that white colour on a black [10] surface or seen through a black medium gives red; second, that sight when strained to a distance becomes weaker and less; third, that black is in a sort the negation of sight: an object appears black because sight fails; so everything at a distance looks blacker, because sight does not reach it. The theory of these matters belongs to the [15] account of the senses, which are the proper subjects of such an inquiry; here we need only state about them what is necessary for us. At all events, that is the reason why distant objects and objects seen in a mirror look darker and smaller and smoother, and why the reflection of clouds in water is darker than the clouds themselves. This

[20] latter is clearly the case: the reflection diminishes the sight that reaches them. It makes no difference whether the change is in the object seen or in the sight, the result being in either case the same. The following fact further is worth noticing. When there is a cloud near the sun and we look at it it does not look coloured at all [25] but white, but when we look at the same cloud in water it shows a trace of rainbow colouring. Clearly, then, when sight is reflected it is weakened and, as it makes dark look darker, so it makes white look less white, changing it and bringing it nearer to [30] black. When the sight is relatively strong the change is to red; the next stage is green, and a further degree of weakness gives violet. No further change is visible, but three completes the series of colours (as we find three does in most other things), and the change into the rest is imperceptible. Hence also the rainbow appears with three colours; this is true of each of the two, but in a contrary way. The outer band [375<sup>a</sup>1] of the primary rainbow is red; for the largest band reflects most sight to the sun, and the outer band is largest. The middle band and the third go on the same principle. So if the principles we laid down about the appearance of colours are true the [5] rainbow necessarily has three colours, and these three and no others. The appearance of yellow is due to contrast; for the red is whitened by its juxtaposition with green. We can see this from the fact that the rainbow is purest when the cloud is blackest; and then the red shows more yellow. (Yellow in the rainbow comes [10] between red and green.) So the whole of the red shows white by contrast with the blackness of the cloud around; for it is white compared to them. Again, when the rainbow is fading away<sup>39</sup> and the red is dissolving, the white cloud is brought into [15] contact with the green and becomes yellow. But the moon rainbow affords the best instance of this: it looks quite white—this is because it appears on the dark cloud [20] and at night. So, just as fire is intensified by added fire, black beside black makes that which is in some degree white look quite white; and red is like that. Bright dyes too show the effect of contrast. In woven and embroidered stuffs the appearance of colours is profoundly affected by their juxtaposition with one another (purple, for [25] instance, appears different on white and on black wool), and also by differences of illumination. Thus embroiderers say that they often make mistakes in their colours when they work by lamplight, and use the wrong ones. We have now shown why the rainbow has three colours and that these are its only colours.

[30] The same cause explains the double rainbow and the faintness of the colours in the outer one and their inverted order. When sight is

strained to a greater distance the appearance of the distant object is affected in a certain way; and the same thing [375<sup>b</sup>1] holds good here. So the reflection from the outer rainbow is weaker because it takes place from a greater distance and less of it reaches the sun, and so the colours seen are fainter. Their order is reversed because more reflection reaches the sun from the [5] smaller, inner band. For that reflection is nearer to our sight which is reflected from the band which is nearest to the primary rainbow. Now the smallest band in the outer rainbow is that which is nearest, and so it will be red; and the second and the third will follow the same principle. Let B be the outer rainbow, A the inner and [10] primary one; let C stand for the red colour, D for green, E for violet; yellow appears at the point F. Three rainbows or more are not found because even the second is fainter, so that the third reflection can have no strength whatever and cannot reach [15] the sun.

5 · The rainbow can never be a circle nor a segment of a circle greater than a semicircle. The consideration of the diagram will show this and the other properties of the rainbow.

[20] Let A be a hemisphere resting on the circle of the horizon, let its centre be K and let G be another point appearing on the horizon. Then, if the lines that fall in a cone from K have GK as their axis, and, K and M being joined, the lines KM are [25] reflected from the hemisphere to G over the greater angle, the lines from K will fall on the circumference of a circle. If the reflection takes place when the luminous body is rising or setting the segment of the circle above the earth which is cut off by the horizon will be a semicircle; if the luminous body is above the horizon it will always be less than a semicircle, and it will be smallest when the luminous body reaches its meridian.

[30] First let the luminous body be rising at the point G, and let KM be reflected to G, and let the plane<sup>40</sup> determined by the triangle GKM be produced. Then the section of the sphere will be a great circle. Let it be A (for it makes no difference which of the planes passing through the line GK and determined by the triangle [376<sup>a</sup>1] KMG is produced). Now the lines drawn for G and K to any other point on the semicircle A will not stand in this ratio to one another. For since both the points G and K and the line KG are given, the line MG will be given too; consequently the ratio of the line MG to the line MK will be given too. So M will touch a given [5] circumference. Let this be NM. Then the intersection of the circumferences is given, and the same ratio cannot hold between lines in

the same plane drawn from the same points to any other circumference but MN.

Draw a line DB outside of the figure and divide it so that D is to B as MG is to [10] MK. But MG is greater than MK since the reflection of the cone is over the greater angle (for it subtends the greater angle of the triangle KMG). [Therefore D is greater than B.]<sup>41</sup> Then add to B a line F such that BF is to D as D is to B. Then [15] make another line KP having the same ratio as to B as KG has to F, and join MP.

Then P is the pole of the circle on which the lines from K fall. For the ratio of D to PM is the same as that of F to KG and of B to KP. If not, let D be in the same [20] ratio to a line lesser or greater than PM—it will not matter—and let this line be PR. Then GK and KP and PR will have the same ratios to one another as F, B, and D. But the ratios between F, B, and D were such that FB is to D as D is to B. Therefore [25] PG is to PR as PR is to PK. Now, if the points K, G be joined with the point R by the lines GR, KR these lines will be to one another as PG is to PR; for the sides of the triangles GPR, KPR about the angle P are homologous. Therefore, GR too will be [30] to KR as GP is to PR. But this is also the ratio of MG to MK; for the ratio of both is the same as that of D to B. Therefore, from the points G, K there will have been [376<sup>b</sup>1] drawn lines with the same ratio to one another, not only to the circumference MN but to another point as well, which is impossible. Since then D cannot bear that ratio to any line either lesser or greater than PM (the proof being in either case the same), it follows that it must stand in that ratio to MP itself. Therefore as MP is to [5] PK so PG will be to MP [and finally MG to MK].<sup>42</sup>

If, then, a circle be described with P as pole at the distance MP it will touch all the angles which the lines from H and K<sup>43</sup> make by their reflection. If not, it can be [10] shown, as before, that lines drawn to different points in the semicircle will have the same ratio to one another, which was impossible. If, then, the semicircle A be revolved about the diameter GKP, the lines reflected from the points G, K at the point M will have the same ratio, and will make the angle KMG equal, in every [15] plane. Further, the angle which GM<sup>44</sup> and MP make with GP will always be the same. So there are a number of triangles on GP and KP equal to the triangles GMP and KMP. Their perpendiculars will fall on GP at the same point and will be equal. Let O be the point on which they fall. Then O is the centre of the circle, half of [20] which, MN, is cut off by<sup>45</sup> the horizon.

For the sun does not master the parts above, but does master those

near the earth and dissolve the air. And that is why the rainbow does not make a complete circle. A rainbow at night from the moon occurs rarely: for the moon is not always [25] full and is too weak in its nature to master the air. Rainbows stand most firmly when the sun is most mastered; for then most moisture remains in them.<sup>46</sup>

Again, let the horizon be AKC, and let G have risen above it; and let the axis now be GP. The proof will be the same for the rest as before, but the pole P of the [377<sup>a</sup>1] circle will be below the horizon AC since the point G has risen above the horizon. But the pole, and the centre of the circle, and the centre of that circle (namely GP) which now determines the rising of the sun are on the same line. But since KG lies [5] above the diameter AC, the centre will be at O<sup>47</sup> on the line KP below the plane of the circle AC which determined the position of the sun before. So the segment XY which is above the horizon will be less than a semicircle. For XYZ<sup>48</sup> was a semicircle and it has now been cut off by<sup>49</sup> the horizon AC. So part of it, YZ,<sup>50</sup> will be invisible when the sun has risen above the horizon, and the segment visible will be [10] smallest when the sun is on the meridian; for the higher G is the lower the pole and the centre of the circle will be.

In the shorter days after the autumn equinox there may be a rainbow at any time of the day, but in the longer days from the spring to the autumn equinox there [15] cannot be a rainbow about midday. The reason for this is that the northerly segments are all greater than a semicircle, and go on increasing, while the invisible segment is small; but as to the segments south of the equator, the upper one is small and the one below the earth large—and the further away they get, the larger it [20] becomes. Consequently, in the days near the summer solstice, the size of the segment is such that before the point A reaches the middle of the segment—its meridian—the point P is well below the horizon; the reason for this being the great size of the segment, and the consequent distance of the meridian from the earth. But [25] in the days near the winter solstice the segments of the circles are small, and the contrary is necessarily the case: for the sun is on the meridian before the point G has risen far.

[30] **6** · Mock suns, and rods too, are due to the causes we have described. A mock sun is caused by the reflection of sight to the sun. Rods are seen when sight reaches the sun under circumstances like those which we described, when there are clouds near the sun and sight is reflected

from some liquid surface to the cloud. Here the [377<sup>b</sup>1] clouds themselves are colourless when you look at them directly, but in the water they are full of rods. The only difference is that in this latter case the colour of the cloud seems to reside in the water, but in the case of rods on the cloud itself. Rods [5] appear when the composition of the cloud is uneven, dense in part and in part rare, and more and less watery in different parts. For when the sight is reflected to the sun its shape is not seen but its colour is; and bright white light of the sun, to which [10] the sight is reflected, being seen on the uneven mirror, appears partly red, partly green or yellow. It makes no difference whether sight passes through or is reflected from a medium of that kind; the colour is the same in both cases; if it is red in the first case it must be red in the other.

Rods then are occasioned by the unevenness of the mirror—as regards colour, not shape. The mock sun, on the contrary, appears when the air is very uniform, and [15] of the same density throughout. This is why it appears white: the uniform character of the mirror gives the reflection in it a single colour, while the fact that the sight is reflected in a body and is thrown on the sun all together by the mist, which is dense and watery though not yet quite water, causes the sun's true colour to appear just as [20] it does when the reflection is from the dense, smooth surface of copper. So the sun's colour being white, the mock sun appears white too. This too, is the reason why the mock sun is a surer sign of rain than the rods; for the air is in a more favourable [25] condition for the production of water. Further a mock sun to the south is a surer sign of rain than one to the north; for the air in the south is readier to turn into water than that in the north.

Mock suns and rods are found, as we stated, about sunset and sunrise, not above the sun nor below it, but beside it. They are not found very close to the sun, [30] nor very far from it; for the sun dissolves the condensation if it is near, but if it is far off the reflection cannot take place, since sight weakens when it is reflected from a small mirror to a very distant object. (This is why a halo is never found opposite to the sun.) If the condensation is above the sun and close to it the sun will dissolve it; if [378<sup>a</sup>1] it is at a distance the sight is too weak for the reflection to take place, and so it will not reach the sun. But at the side of the sun, it is possible for the mirror to be at such an interval that the sun does not dissolve it, and yet sight reaches it in a body because it moves close to the earth<sup>51</sup> and is not as it were dissipated in its journey [5] through space. It cannot occur below the sun because close to the earth the sun's rays would dissolve it, but if it were high up in the heavens

sight would be dissipated. Indeed, even by the side of the sun, it is not found in the middle of the sky; for then the line of vision is not close to the earth,<sup>52</sup> and so but little sight reaches the mirror [10] and the reflection from it is altogether feeble.

Some account has now been given of the effects of the exhalation above the surface of the earth; we must go on to describe its operations below, when it is shut [15] up in the parts of the earth.

Its own twofold nature gives rise here to two varieties of bodies, just as it does in the upper region. We maintain that there are two exhalations, one vaporous the other smoky, and there correspond two kinds of bodies that originate in the earth, [20] things quarried and things mined. The heat of the dry exhalation is the cause of all things quarried. Such are the kinds of stones that cannot be melted, and realgar, and ochre, and ruddle, and sulphur, and the other things of that kind, most things quarried being either coloured lye or, like cinnabar, a stone compounded of it. The [25] vaporous exhalation is the cause of all things mined—things which are either fusible or malleable such as iron, copper, gold. All these originate from the imprisonment of the vaporous exhalation in the earth, and especially in stones. [30] Their dryness compresses it, and it congeals just as dew or hoar-frost does when it has been separated off, though in the present case the metals are generated before that separation occurs. Hence, they are water in a sense, and in a sense not. Their matter was that which might have become water, but it can no longer do so; nor are [378<sup>b</sup>1] they, like savours, due to a qualitative change in actual water. Copper and gold are not formed like that, but in every case the evaporation congealed before water was formed. Hence, they all (except gold) are affected by fire, and they possess an admixture of earth; for they still contain the dry exhalation.

[5] This is the general theory of all these bodies, but we must take up each kind of them and discuss it separately.

## BOOK IV

[10] 1 · We have explained that the causes of the elements are four, and that their combinations determine the number of the elements to be four.

Two of the causes, the hot and the cold, are active; two, the dry and the moist, passive. We can satisfy ourselves of this by looking at instances. In every case heat [15] and cold determine, conjoin, and change things of the same kind and things of different kinds, moistening, drying, hardening, and softening them. Things dry and moist, on the other hand, both in isolation and when present together in the same body are the subjects of that determination and of the other affections enumerated. [20] The account we give when we define their natures shows this too. Hot and cold we describe as active, for combining is a sort of activity; moist and dry are passive, for it is in virtue of its being acted upon in a certain way that a thing is said to be easy to [25] determine or difficult to determine. So it is clear that some are active and some passive.

Next we must describe the operations of the active qualities and the forms taken by the passive. First of all, unqualified becoming and natural change are the [30] work of these powers and so is the corresponding natural destruction; and these are found in plants and animals and their parts. Unqualified natural becoming is a change introduced by these powers into the matter underlying a given natural thing when they are in a certain ratio; and matter is the passive qualities we have [379<sup>a</sup>1] mentioned. When the hot and the cold are masters of the matter they generate a thing; if they are not, the object is imperfectly boiled or otherwise unconcocted. But the strictest general opposite of unqualified becoming is putrefaction. All natural destruction is on the way to it, as are, for instance, growing old or growing dry. [5] Putrescence is the end of all these things,<sup>53</sup> that is of all natural objects, except such as are destroyed by violence:<sup>54</sup> you can burn, for instance, flesh, bone, or anything else, but the natural course of their destruction ends in putrefaction. Hence things that putrefy begin by being moist and end by being dry. For the moist and the dry were their matter, and the operation of the active qualities caused the dry to be [10] determined by the moist.

Destruction supervenes when the determined gets the better of the



determining by the help of the environment (though in a special sense the word putrefaction is applied to partial destruction, when a thing's nature is perverted). Hence everything, except fire, is liable to putrefy; for earth, water, and air putrefy, [15] being all of them matter relatively to fire. Putrefaction is the destruction of the peculiar and natural heat in any moist subject by external heat, that is, by the heat of the environment. So since lack of heat is the ground of this affection and everything which lacks heat is cold, both heat and cold will be the causes of [20] putrefaction, which will be due indifferently to cold in the putrefying subject or to heat in the environment.

This explains why everything that putrefies grows drier and ends by becoming earth or dung. The subject's own heat departs and causes the natural moisture to evaporate with it, and then there is nothing left to draw in moisture; for it is a thing's [25] peculiar heat that attracts moisture and draws it in. Again, putrefaction takes place less in cold than in hot seasons; for in winter the surrounding air and water contain but little heat and it has no power, but in summer there is more. Again, what is frozen does not putrefy; for its cold is greater than the heat of the air and so is not [30] mastered, whereas what affects a thing does master it. Nor does that which is boiling or hot putrefy; for the heat in the air being less than that in the object does not master it or set up any change. So too anything that is flowing or in motion is less apt to putrefy than a thing at rest; for the motion set up by the heat in the air is weaker than that pre-existing in the object, and so it causes no change. For the same [379<sup>b</sup>1] reason a great quantity of a thing putrefies less readily than a little; for the greater quantity contains too much proper fire and cold for the corresponding qualities in the environment to get the better of. Hence, the sea putrefies quickly when broken [5] up into parts, but not as a whole; and all other waters likewise. Animals too are generated in putrefying bodies, because the heat that has been expelled, being natural, organizes the particles thrown out with it.

So much for the nature of becoming and of destruction.

2 · We must now describe the next kinds of processes which the qualities [10] already mentioned set up in actually existing natural objects as matter.

Of these concoction is due to heat; its species are ripening, boiling, broiling. Inconcoction is due to cold and its species are rawness, parboiling, scorching. (We must recognize that the things are not properly

denoted by these words: the various [15] classes of similar objects have no names universally applicable to them; consequently we must think of the species enumerated as being not what those words denote but something like it.) Let us say what each of them is. Concoction is a process in which the natural and proper heat of an object perfects the corresponding passive qualities, which are the proper matter of any given object. For when [20] concoction has taken place we say that a thing has been perfected and has come to be itself. It is the proper heat of a thing that sets up this perfecting, though external influences may contribute in some degree to its fulfilment. Baths, for instance, and other things of the kind contribute to the concoction of food, but the primary source [25] is the proper heat of the body. In some cases of concoction the end of the process is the nature of the thing—nature, that is, in the sense of the form and essence. In other cases it leads to some latent form which is attained when the moisture has acquired certain properties or a certain magnitude in the process of being broiled or boiled or of putrefying, or however else it is being heated; for then the thing has [30] some use and we say that concoction has taken place. Must is an instance of this, and the matter in boils when it becomes purulent, and tears when they become rheum, and so with the rest.

Concoction ensues whenever the matter, the moisture, is mastered. For the matter is what is determined by the natural heat in the object, and as long as the ratio between them exists in it a thing maintains its nature. Hence things like the [380<sup>a</sup>1] liquid and solid excreta and waste-stuffs in general are signs of health, and concoction is said to have taken place in them; for they show that the proper heat has mastered the indeterminate matter.

Things that undergo a process of concoction necessarily become thicker and [5] hotter; for the action of heat is to make things more compact, thicker, and drier.

This then is the nature of concoction: inconcoction is an imperfect state due to lack of proper heat, that is, to cold. That *of* which the imperfect state is, is the corresponding passive qualities which are the natural matter of anything.

[10] So much for a definition of concoction and inconcoction.

**3** · Ripening is a sort of concoction; for we call it ripening when there is a concoction of the nutriment in fruit. And since concoction is a sort of perfecting, the process of ripening is perfect when the seeds in fruit are

able to reproduce the fruit [15] in which they are found; for in all other cases as well this is what we mean by perfect. This is what ripening means when the word is applied to fruit. However, many other things that have undergone concoction are said to be ripe, the general character of the process being the same, though the word is applied by an extension of meaning. The reason for this extension is, as we explained before, that the various [20] modes in which natural heat and cold perfect the matter they determine have not special names appropriated to them. In the case of boils and phlegm, and the like, the process of ripening is the concoction of the moisture in them by their natural heat; for only that which gets the better of matter can determine it. So everything that ripens turns from an airy into a watery state, and from a watery into an earthy [25] state, and in general from being rare becomes dense. In this process nature incorporates some of the matter in itself,<sup>55</sup> and some it rejects. So much for the definition of ripening.

Rawness is its opposite and is therefore an inconcoction of the nutriment in the fruit, namely, of the undetermined moisture. Consequently a raw thing is either airy [30] or watery or contains both air and water. Ripening being a kind of perfecting, rawness will be an imperfect state, and this state is due to a lack of natural heat and its disproportion to the moisture that is undergoing the process of ripening. (Nothing moist ripens by itself without the admixture of some dry matter: water alone of liquids does not thicken.) This may be due either to defect of heat or to [380<sup>b</sup>1] excess of the matter to be determined; hence the juice of raw things is thin, cold rather than hot, and unfit for food or drink. Rawness, like ripening, is spoken of in a variety of ways. Thus the liquid and solid excreta and catarrhs are called raw for the [5] same reason; for in every case the word is applied to things because their heat has not got the mastery in them and compacted them. If we go further, brick is called raw and so is milk and many other things too when they are such as to admit of being changed and compacted by heat but have remained unaffected. Hence, while [10] we speak of boiled water, we cannot speak of raw water, since it does not thicken. We have now defined ripening and rawness and assigned their causes.

Boiling is, in general, a concoction by moist heat of the indeterminate matter contained in the moisture, and the word is strictly applicable only to things boiled in the way of cooking. The indeterminate matter, as we said, will be either airy or [15] watery. The cause of the concoction is the fire contained in the moisture; for what is cooked in a frying-pan is broiled: it is the heat outside that affects it and, as for the moisture in

which it is contained, it dries this up and draws it into itself. But a thing that is being boiled behaves in the opposite way: the moisture contained in it is [20] drawn out of it by the heat in the liquid outside. Hence boiled meats are drier than broiled; for, in boiling, things do not draw the moisture into themselves, since the external heat gets the better of the internal: if the internal heat had got the better it would have drawn the moisture to itself. Not every body admits of the process of boiling: if there is no moisture in it, it does not (for instance, stones), nor does it if [25] there is moisture in it but the density of the body is too great for it to be mastered, as in the case of wood. But only those bodies can be boiled that contain moisture which can be acted on by the heat contained in the liquid outside. It is true that gold and wood and many other things are said to be boiled; but this is not the same kind of process, and the word is used in an extended sense—the reason for the usage being [30] that the various cases have no names appropriated to them. Liquids too, like milk and must, are said to undergo a process of boiling when the external fire that surrounds and heats them changes the savour in the liquid into a given form, the process being thus in a way like what we have called boiling.

The end of the things that undergo boiling, or indeed any form of concoction, is [381<sup>a</sup>1] not always the same: some are meant to be eaten, some drunk, and some are intended for other uses; for instance drugs, too, are said to be boiled.

All those things then admit of boiling which can grow denser, smaller, or heavier; also those which do that with a part of themselves and with a part do the [5] opposite, dividing in such a way that one portion thickens while the other grows thinner, like milk when it divides into whey and curd. Oil by itself is affected in none of these ways, and therefore cannot be said to admit of boiling. Such then is the species of concoction known as boiling, and the process is the same in an artificial [10] and in a natural instrument, for the cause will be the same in every case.

Parboiling is the form of inconcoction opposed to boiling. Now the opposite of boiling, and the primary form of parboiling, is an inconcoction of the undetermined matter in a body due to lack of heat in the surrounding liquid. (Lack of heat implies, [15] as we have pointed out, the presence of cold.) The motion which causes parboiling is different from that which causes boiling, for the heat which operates the concoction is driven out. The lack of heat is due either to the amount of cold in the liquid or to the quantity of moisture in the object undergoing

the process of boiling. Where either of these conditions is realized the heat in the surrounding liquid is too great to have no effect at all, but too small to carry out the process of concoction uniformly [20] and thoroughly. Hence things are harder when they are parboiled than when they are boiled, and the moisture in them more distinct from the solid parts. So much for the definition and causes of boiling and parboiling.

Broiling is concoction by dry foreign heat. Hence if a man were to boil a thing [25] but the change and concoction in it were due, not to the heat of the liquid but to that of the fire, the thing will have been broiled and not boiled when the process has been carried to completion: if the process has gone too far we use the word 'charred' to describe it. If the process leaves the thing drier at the end the agent has been dry heat. Hence the outside is drier than the inside, the opposite being true of things [30] boiled. Where the process is artificial, broiling is more difficult than boiling, for it is difficult to heat the inside and the outside uniformly, since the parts nearer to the fire are the first to get dry and consequently get more intensely dry. In this way the [381<sup>b</sup>1] outer pores contract and the moisture in the thing cannot be expelled but is shut in by the closing of the pores. Now broiling and boiling are artificial processes, but the [5] same general kind of thing, as we said, is found in nature too. The affections produced are similar though they lack a name; for art imitates nature. For instance, the concoction of food in the body is like boiling, for it takes place in a hot and moist medium and the agent is the heat of the body. So, too certain forms of indigestion [10] are like parboiling. And it is not true that animals are generated in the concoction of food, as some say. Really they are generated in the excretion which putrefies in the lower belly, and they ascend afterwards. For concoction goes on in the upper belly but the excretion putrefies in the lower: the reason for this has been explained elsewhere.

We have seen that the opposite of boiling is parboiling: now there is something [15] correspondingly opposed to the species of concoction called broiling, but it is more difficult to find a name for it. It would be the kind of thing that would happen if there were scorching instead of broiling proper through lack of heat due to deficiency in the external fire or the quantity of water in the thing undergoing the process. For then we should get too much heat for no effect to be produced, but too little for concoction to take place.

[20] We have now explained concoction and inconcoction, ripening and rawness, boiling and broiling, and their opposites.

4 · We must now describe the forms taken by the passive qualities the moist and the dry. The elements of bodies, that is, the passive ones, are the moist and the [25] dry; the bodies themselves are compounded of them and whichever predominates determines the nature of the body; thus some bodies partake more of the dry, others of the moist. All the forms to be described will exist either actually, or potentially and in their opposite: for instance, there is actual melting and on the other hand that which admits of being melted.

Since the moist is easily determined and the dry determined with difficulty, their relation to one another is like that of a dish and its condiments. The moist is [30] what makes the dry determinable, and each serves as a sort of glue to the other—as Empedocles said in his poem on Nature, ‘glueing meal together by means of [382<sup>a</sup>1] water’.<sup>56</sup> Thus the determined body involves them both. Of the elements earth is especially representative of the dry, water of the moist, and therefore all determinate bodies in our world involve earth and water. Every body shows the quality of [5] that element which predominates in it. It is because earth and water are the material elements of all bodies that animals live in them alone and not in air or fire.

Of the qualities of bodies hardness and softness are those which must primarily belong to a determined thing, for anything made up of the dry and the moist is [10] necessarily either hard or soft. Hard is that the surface of which does not yield into itself; soft that which does yield but not by interchange of place: water, for instance, is not soft, for its surface does not yield to pressure or sink in but there is an interchange of place. Those things are absolutely hard and soft which satisfy the definition absolutely, and those things relatively so which do so compared with [15] another thing. Now relatively to one another hard and soft are indefinable, because it is a matter of degree, but since all the objects of sense are determined by reference to the faculty of sense it is clearly the relation to touch which determines that which is hard and soft absolutely, and touch is that which we use as a standard or mean. So we call that which exceeds it hard and that which falls short of it soft. [20]

5 · A body determined by its own boundary must be either hard or soft, for it either yields or does not.

It must also be concrete: or it could not be so determined. So since everything that is determined and solid is either hard or soft and these qualities are due to [25] concretion, all composite and determined bodies

must involve concretion. Concretion therefore must be discussed.

Now there are two causes besides matter, the agent and the quality brought about, the agent being the efficient cause, the quality the formal cause. Hence concretion and dispersal, drying and moistening, must have these two causes. [30]

As we have explained, the agent operates by means of two qualities and the patient is acted on in virtue of two qualities: action takes place by means of heat or cold, and the quality is produced either by the presence or by the absence of heat or cold since concretion is a form of drying, let us deal with drying first. Now that [382<sup>b</sup>1] which is acted upon is moist or dry or a compound of both. Water is the element characterized by the moist, earth that characterized by the dry, for these among the elements that admit the qualities moist and dry are passive. Therefore cold, too, [5] being found in water and earth (both of which we recognize to be cold), must be reckoned rather as a passive quality. It is active only as contributing to destruction or incidentally in the manner described before; for cold is sometimes actually said to burn and to warm, but not in the same way as heat does, but by collecting and concentrating heat.

[10] The subjects of drying are water and the various watery fluids and those bodies which contain water either foreign or connatural. By foreign I mean like the water in wool, by connatural, like that in milk. The watery fluids are wine, urine, whey, and in general those fluids which have no sediment or only a little, except where this absence of sediment is due to viscosity. For in some cases, in oil and pitch for [15] instance, it is the viscosity which prevents any sediment from appearing.

It is always a process of heating or cooling that dries things, but the agent in both cases is heat, either internal or external. For even when things are dried by [20] cooling, like a garment, where the moisture exists separately it is the internal heat that dries them. It carries off the moisture in the shape of vapour (if there is not too much of it), being itself driven out by the surrounding cold. So everything is dried, as we have said, by a process either of heating or cooling, but the agent is always heat, either internal or external, carrying off the moisture in vapour. By external [25] heat I mean as where things are boiled; by internal where the heat breathes out and takes away and uses up its moisture. So much for drying.

6 · Liquefaction is, first, condensation into water; second, the melting of a [30] solidified body. The first, condensation, is due to the cooling of

vapour: what melting is will appear from the account of solidification.

Whatever solidifies is either water or a mixture of earth and water, and the [383<sup>a</sup>1] agent is either dry heat or cold. Hence those of the bodies solidified by heat or cold which are soluble at all are dissolved by their opposites. Bodies solidified by dry heat are dissolved by water, which is moist cold, while bodies solidified by cold are dissolved by fire, which is hot. Some things seem to be solidified by water, e.g. [5] boiled honey, but really it is not the water but the cold in the water which effects the solidification. Aqueous bodies are not solidified by fire: for it is fire that dissolves them, and the same cause in the same relation cannot have opposite effects upon the same thing. Again, water solidifies owing to the departure of heat; so it will clearly [10] be dissolved by the entry into it of heat: cold, therefore, must be the agent in solidifying it.

Hence aqueous bodies do not thicken when they solidify; for thickening occurs when the moisture goes off and the dry matter comes together, but water is the only liquid that does not thicken. Those bodies that are made up of both earth and water are solidified both by fire and by cold and in either case are thickened. The [15] operation of the two is in a way the same and in a way different. Heat acts by drawing off the moisture, and as the moisture goes off in vapour the dry matter thickens and collects. Cold acts by driving out the heat, which is accompanied by the moisture as this goes off in vapour with it. Bodies that are soft but not liquid do not thicken but solidify when the moisture leaves them, e.g. potter's clay in process [20] of baking: but those mixed bodies that are liquid thicken besides solidifying, like milk. Those bodies which have first been thickened or hardened by cold often begin by becoming moist: thus potter's clay at first in the process of baking steams and grows softer, and is liable to distortion in the ovens for that reason. [25]

Now of the bodies solidified by cold which are made up both of earth and water but in which the earth preponderates, those which solidify by the departure of heat melt by heat when it enters into them again; this is the case with frozen mud. But those which solidify by refrigeration and the evaporation of all their heat, like iron [30] and horn, cannot be dissolved except by excessive heat, but they can be softened— though manufactured iron does melt, to the point of becoming fluid and then solidifying again. This is how steel is made. The dross sinks to the bottom and is purged away: when this has been done often and the metal is pure we have steel. The [383<sup>b</sup>1] process is not repeated often because the purification of the metal involves great waste and loss of weight. But the iron that has less dross is the better iron. The stone *pyrimachus*, too, melts



and forms into drops and becomes fluid; after having been in [5] a fluid state it solidifies and becomes hard again. Millstones, too, melt and become fluid: when the fluid mass begins to solidify it is black but its consistency comes to be like that of lime. Mud and earth, too, melt.

Of the bodies which are solidified by dry heat some are insoluble, others are [10] dissolved by liquid. Pottery and some kinds of stone that are formed out of earth burnt up by fire, such as millstones, cannot be dissolved. Natron and salt are soluble by liquid, but not all liquid but only such as is cold. Hence water and any of its varieties melt them but oil does not. For the opposite of dry heat is moist cold and [15] what the one solidified the other will dissolve, and so opposites will have opposite effects.

7 · If a body contains more water than earth fire only thickens it: if it contains more earth fire solidifies it. Hence natron and salt and stone and potter's [20] clay must contain more earth.

The nature of oil presents the greatest problem. If water preponderated in it, cold ought to solidify it; if earth preponderated, then fire ought to do so. Actually neither solidifies, but both thicken it. The reason is that it is full of air (hence it floats on the top of water, since air tends to rise). Cold thickens it by turning the air [25] in it into water, for any mixture of oil and water is thicker than either. Fire and the lapse of time thicken and whiten it. The whitening follows on the evaporation of any water that may have been in it; the thickening is due to the change of the air into [30] water as the heat in the oil is dissipated. The effect in both cases is the same and the cause is the same, but the manner of its operation is different. Both heat and cold thicken it, but neither dries it (neither the sun nor cold dries oil), not only because it is viscous but because it contains air. Its viscous nature prevents it from giving off [384<sup>a</sup>1] vapour and so fire does not dry the water or boil it off.

Those bodies which are made up of earth and water may be classified according to the preponderance of either. There is a kind of wine, for instance, [5] which both solidifies and thickens by boiling—I mean, must. All bodies of this kind lose their water as they dry. That it is their water may be seen from the fact that the vapour from them condenses into water when collected. So wherever some sediment is left this is of the nature of earth. Some of these bodies, as we have said, are also [10] thickened and dried by cold. For cold not only solidifies but also dries water, and thickens things by turning air into water. (Solidifying, as we

have said, is a form of drying.) Now those things that are not thickened by cold, but solidified, belong rather to water, e.g. wine, urine, vinegar, lye, whey. But those things that are [15] thickened (not by evaporation due to fire) are made up either of earth or of water and air: honey of earth, while oil contains air. Milk and blood, too, are made up of both water and earth, though earth generally predominates in them. So, too, are the liquids out of which natron and salt are formed; and stones are also formed from some mixtures of this kind. Hence, if the whey has not been separated, it burns [20] away if you boil it over a fire. But the earthy element in milk can also be coagulated by the help of fig-juice, if you boil it in a certain way as doctors do when they treat it with fig-juice, and this is how the whey and the cheese are commonly separated. Whey, once separated, does not thicken, but boils away like water. Sometimes, however, there is little or no cheese in milk, and such milk is not nutritive and is [25] more like water. The case of blood is similar: cold dries and so solidifies it. Those kinds of blood that do not solidify, like that of the stag, belong rather to water and are very cold. Hence they contain no fibres: for the fibres are of earth and solid, and blood from which they have been removed does not solidify. This is because it [30] cannot dry; for what remains is water, just as what remains of milk when cheese has been removed is water. The fact that diseased blood will not solidify is evidence of the same thing, for such blood is of the nature of serum and that is phlegm and water, nature having failed to get the better of it and digest it.

Some of these bodies are soluble, e.g. natron, some insoluble, e.g. pottery: of [384<sup>b</sup>1] the latter, some, like horn, can be softened by heat, others, like pottery and stone cannot. The reason is that opposite causes have opposite effects; consequently, if solidification is due to two causes, the cold and the dry, solution must be due to the [5] hot and the moist, that is, to fire and to water (these being opposites): water dissolving what was solidified by fire alone, fire what was solidified by cold alone. Consequently, if any things happen to be solidified by the action of both, these are least apt to be soluble. Such a case we find where things have been heated and are then solidified by cold. When the heat in leaving them has caused most of the [10] moisture<sup>57</sup> to evaporate, the cold so compacts these bodies together again as to leave no entrance even for moisture. Therefore heat does not dissolve them (for it only dissolves those bodies that are solidified by cold alone), nor does water (for it does not dissolve what cold solidifies, but only what is solidified by dry heat). But iron is [15] melted by heat and solidified by cold. Wood consists of

earth and air and is therefore combustible but cannot be melted or softened. (For the same reason it floats in water—all except ebony. This does not, for other kinds of wood contain a preponderance of air, but in black ebony the air has escaped and so earth preponderates in it.) Pottery consists of earth alone because it solidified gradually in [20] the process of drying. Water cannot get into it, for the pores were only large enough to admit of vapour escaping: and seeing that fire solidified it, that cannot dissolve it either.

So solidification and melting, their causes, and the kinds of subjects in which they occur have been described.

8 · All this makes it clear that bodies are formed by heat and cold and that these agents operate by thickening and solidifying. It is because these qualities [25] fashion bodies that we find heat in all of them, and in some cold in so far as heat is absent. These qualities, then, are present as active, and the moist and the dry as passive, and consequently all four are found in mixed bodies. So water and earth are [30] the constituents of homogeneous bodies both in plants and in animals and of metals such as gold, silver, and the rest—water and earth and their respective exhalations shut up in the compound bodies, as we have explained elsewhere.

All these mixed bodies are distinguished from one another, firstly by the [385<sup>a</sup>1] qualities special to the various senses, that is, by their capacities of action. (For a thing is white, fragrant, noisy, sweet, hot, cold in virtue of a power of acting on sense.) Secondly by other more characteristic affections which express their aptitude to be affected: I mean, for instance, the aptitude to melt or solidify or bend [5] and so forth, all these qualities, like moist and dry, being passive. These are the qualities that differentiate bone, flesh, sinew, wood, bark, stone and all other homogeneous natural bodies. Let us begin by enumerating these qualities expressing [10] the aptitude or inaptitude of a thing to be affected in a certain way. They are as follows: to be apt or inapt to solidify, melt, be softened by heat, be softened by [15] water, bend, break, be fragmented, impressed, moulded, squeezed; to be tractile or non-tractile, malleable or non-malleable, to be fissile or non-fissile, apt or inapt to be cut; to be viscous or friable, compressible or incompressible, combustible or incombustible; to be apt or inapt to give off fumes. These affections differentiate most bodies from one another. Let us go on to explain the nature of each of them. [20]

We have already given a general account of that which is apt or inapt to solidify or to melt, but let us return to them again now. Of all the bodies that admit of solidification and hardening, some are brought into this state by heat, others by cold. Heat does this by drying up their moisture, cold by driving out their heat. [25] Consequently some bodies are affected in this way by defect of moisture, some by defect of heat: watery bodies by defect of heat, earthy bodies of moisture. Now those bodies that are so affected by defect of moisture are dissolved by water, unless like pottery they have so contracted that their pores are too small for the particles of water to enter. All those bodies in which this is not the case are dissolved by water, [30] e.g. natron, salt, dry mud. Those bodies that solidified through defect of heat are melted by heat, e.g. ice, lead, copper. So much for the bodies that admit of solidification and of melting, and those that do not admit of melting.

The bodies which do not admit of solidification are those which contain no [385<sup>b</sup>1] aqueous moisture and are not watery, but in which heat and earth preponderate, like honey and must (for these are in a sort of state of effervescence), and those which do possess some water but have a preponderance of air, like oil and [5] quicksilver, and all viscous substances such as pitch and birdlime.

9 · Those bodies admit of softening which are not (like ice) made up of water, but in which earth predominates. All their moisture must not have left them (as in the case of natron and salt), nor must the relation of dry to moist in them be [10] incongruous (as in the case of pottery). They must be tractile (without admitting water) or malleable (without consisting of water), and the agent in softening them is fire. Such are iron and horn.<sup>58</sup>

Both of bodies that can melt and of bodies that cannot, some do and some do not admit of softening in water. Copper, for instance, which can be melted, cannot be softened in water, whereas wool and earth can be softened in water, for they can [15] be soaked. (It is true that though copper can be melted the agent in its case is not water, but some of the bodies that can be melted by water too such as natron and salt cannot be softened in water; for nothing is said to be so affected unless the water soaks into it and makes it softer.) Some things, on the other hand, such as wool and grain, can be softened by water though they cannot be melted. Any body that is to [20] be softened by water must be of earth and must have its pores larger than the particles of water, and the pores must be

harder<sup>59</sup> than the water, whereas bodies that can be melted by water must have pores throughout.

Why is it that earth is both melted and softened by moisture, while natron is melted but not softened? Because natron is pervaded throughout by pores so that [25] the parts are immediately divided by the water, but earth has also pores which do not connect and is therefore differently affected according as the water enters by one or the other set of pores.

Some bodies can be bent or straightened, like the reed or the withy, some cannot, like pottery and stone. Those bodies are apt to be bent and straightened [30] which can change from being curved to being straight and from being straight to being curved, and bending and straightening consist in the change or motion to the straight or to a curve, for a thing is said to be in process of being bent whether it is [386<sup>a</sup>1] being made to assume a convex or a concave shape. So bending is defined as motion to the convex or the concave without a change of length. For if we added 'or to the straight', we should have a thing bent and straight at once, and it is impossible for that which is straight to be bent. And if all bending is a bending up or a bending [5] down, the former being a change to the convex, the latter to the concave, a motion that leads to the straight cannot be called bending, but bending and straightening are two different things. These, then, are the things that can, and those that cannot be bent, and be straightened.

Some things can be both broken and fragmented, others admit only one or the [10] other. Wood, for instance, can be broken but not fragmented, ice and stone can be fragmented but not broken, while pottery may either be fragmented or broken. The distinction is this: breaking is a division and separation into large parts, fragmentation into parts of any size, but there must be more of them than two. Now those solids that have many pores not communicating with one another can be [15] fragmented (for the limit to their subdivision is set by the pores), but those whose pores stretch continuously for a long way are breakable, while those which have pores of both kinds can be either fragmented or broken.

Some things, e.g. copper and wax, are impressible, others, e.g. pottery and water, are not. The process of being impressed is the sinking of a part of the surface of a thing in response to pressure or a blow, in general to contact. Such bodies are [20] either soft,<sup>60</sup> like wax, where part of the surface is depressed while the rest remains, or hard, like copper. Non-impressible<sup>61</sup> bodies are either hard, like pottery (its surface does not give way and sink in), or liquid, like water (for though water does give way it

is not in a part of it, for there is a reciprocal change of place of all its [25] parts). Those impressibles that retain the shape impressed on them and are easily moulded by the hand are called plastic; those that are not easily moulded, such as stone or wood, or are easily moulded but do not retain the shape impressed, like wool or a sponge, are not plastic. The last group are said to be squeezable. Things are squeezable when they can contract into themselves under pressure, their surface [30] sinking in without being broken and without the parts interchanging position as happens in the case of water. (We speak of pressure when there is movement and the motor remains in contact with the thing moved, of impact when the movement is [386<sup>b</sup>1] due to the local movement of the motor.) Those bodies are subject to squeezing which have empty pores—empty, that is, of the stuff of which the body itself consists—and that can sink into the void spaces within them, or rather into their pores. For sometimes the pores into which a body sinks are not empty<sup>62</sup> (a wet sponge, for instance, has its pores full). But the pores, if full, must be full of [5] something softer than the body itself which is to contract into them. Examples of things squeezable are the sponge, wax, flesh. Those things are not squeezable which cannot be made to contract into their own pores by pressure, either because they have no pores or because their pores are full of something too hard. Thus iron, stone, water and all liquids are incapable of being squeezed. [10]

Things are tractile when their surface can be made to elongate, for being drawn out is a movement of the surface, remaining unbroken, in the direction of the mover. Some things are tractile, e.g. hair, thongs, sinew, dough, birdlime, and some are not, e.g. water, stone. Some things are both tractile and squeezable, e.g. wool; in [15] other cases the two qualities do not coincide; phlegm, for instance, is tractile but not squeezable, and a sponge squeezable but not tractile.

Some things are malleable, like copper. Some are not, like stone and wood. Things are malleable when their surface can be made to move (but only in part) both downwards and sideways with one and the same blow: when this is not possible [20] a body is not malleable. All malleable bodies are impressible, but not all impressible bodies are malleable, e.g. wood, though on the whole the two go together. Of [25] squeezable things some are malleable and some not: wax and mud are malleable, wool is not.

Some things are fissile, e.g. wood, some are not, e.g. potter's clay. A thing is fissile when it is apt to divide in advance of the instrument dividing it, for a body is said to split when it divides to a further point

than that to which the dividing instrument divides it and the act of division advances: which is not the case with [30] cutting. Those bodies which cannot behave like this are non-fissile. Nothing soft is fissile (by soft I mean absolutely soft and not relatively: for iron itself may be relatively soft); nor are all hard things fissile, but only such as are neither liquid nor [387<sup>a</sup>1] impressible nor capable of being fragmented. Such are the bodies that have the pores along which they cohere lengthwise and not crosswise.

Those hard or soft solids are apt to be cut which do not necessarily either split [5] in advance of the instrument or break into minute fragments when they are being divided; and everything that is not moist cannot be cut. Some things can be both split and cut, like wood, though generally it is lengthwise that a thing can be split and crosswise that it can be cut. For, a body being divided into many parts, in so far [10] as its unity is made up of many lengths it is apt to be split, in so far as its unity is made up of many lengths it is apt to be split, in so far as it is made up of many breadths it is apt to be cut.

A thing is viscous when, being moist or soft, it is tractile. Bodies owe this property to the interlocking of their parts when they are composed like chains, for them they can be drawn out to a great length and contracted again. Bodies that are not like this are friable.

[15] Bodies are compressible when they are squeezable and retain the shape they have been squeezed into; incompressible when they are either inapt to be squeezed at all or do not retain the shape they have been squeezed into.

Some bodies are combustible and some are not. Wood, wool, bone are combustible; stone, ice are not. Bodies are combustible when their pores are such as [20] to admit fire and their longitudinal pores contain moisture weaker than fire. If they have no moisture, or if, as in ice or very green wood, the moisture is stronger than fire, they are not combustible.

Those bodies give off fumes which contain moisture, but in such a form that it does not go off separately in vapour when they are exposed to fire. For vapour is a [25] moist exhalation into air and wind produced from a liquid by the agency of burning heat. Bodies that give off fumes give off secretions of the nature of air by the lapse of time: as they perish away they dry up or become earth. But the kind of secretion we are concerned with now differs from others in that it is not moist nor does it become wind (which is a continuous flow of air in a given direction). Fumes are a common [30] secretion of dry and moist together caused by

the agency of burning heat. Hence they do not moisten things but rather colour them.

[387<sup>b</sup>1] The fumes of a woody body are called smoke. (I mean to include bones and hair and everything of this kind in the same class. For there is no name common to all the objects that I mean, but, for all that, these things are all in the same class by analogy. Compare with Empedocles says: 'They are one and the same, hair and leaves and the thick wings of birds and scales that grow on stout limbs.'<sup>63</sup>) The [5] fumes of fat are a sooty smoke and those of oily substances a greasy steam. Oil does not boil away or thicken by evaporation because it does not give off vapour but fumes. Water on the other hand does not give off fumes, but vapour. Sweet wine does give off fumes, for it contains fat and behaves like oil. It does not solidify under [10] the influence of cold and it is apt to burn. Really it is not wine at all in spite of its name; for it does not taste like wine and consequently does not inebriate as ordinary wine does. It contains but little fumigable stuff and consequently is inflammable.

All bodies are combustible that dissolve into ashes, and all bodies do this that solidify under the influence either of heat or of both heat and cold; for we find that [15] all these bodies are mastered by fire. Of stones the precious stone called carbuncle is least amenable to fire.

Of combustible bodies some are inflammable and some are not, and some of the former are reduced to coals. Those are called inflammable which produce flame [20] and those which do not are called non-inflammable. Those fumigable bodies that are not liquid are inflammable, but pitch, oil, wax are inflammable in conjunction with other bodies rather than by themselves. Most inflammable are those bodies that give off smoke. Of bodies of this kind those that contain more earth than smoke are apt to be reduced to coals. Some bodies that can be melted are not inflammable, [25] e.g. copper; and some bodies that cannot be melted are inflammable, e.g. wood; and some bodies can be melted and are also inflammable, e.g. frankincense. The reason is that wood has its moisture all together and this is continuous throughout and so it burns up: whereas copper has it in each part but not continuous, and insufficient in quantity to give rise to flame. In frankincense it is disposed in both of these ways. [30] Fumigable bodies are inflammable when earth predominates in them and they are consequently such as to be unable to melt. These are inflammable because they are dry like fire. When this dry comes to be hot there is fire. This is why flame is [388<sup>a</sup>1] burning smoke or dry exhalation. The fumes of wood are smoke, those of wax and frankincense



and such-like, and pitch and whatever contains pitch or such-like, are sooty smoke, while the fumes of oil and oily substances are a greasy steam; so are [5] those of all substances which are not at all combustible by themselves because there is too little of the dry in them (the dry being the means by which the transition to fire is effected), but burn very readily in conjunction with something else. (For the fat is just the conjunction of the oily with the dry.) So those bodies<sup>64</sup> that give off fumes, like oil and pitch, belong rather to the moist, but those that burn to the dry.

**10** · Homogeneous bodies differ to touch by these affections and differences, [10] as we have said. They also differ in respect of their smell, taste, and colour.

By homogeneous bodies I mean, for instance, the stuffs that are mined—gold, copper, silver, tin, iron, stone, and everything else of this kind and the bodies that [15] are extracted from them; also the substances found in animals and plants, for instance, flesh, bones, sinew, skin, viscera, hair, fibres, veins (these are the elements of which the non-homogeneous bodies like the face, a hand, a foot, and everything of [20] that kind are made up), and in plants, wood, bark, leaves, roots, and the rest like them.

The homogeneous bodies, it is true, are constituted by a different cause, but the matter of which they are composed is the dry and the moist, that is, water and earth (for these bodies exhibit those qualities most clearly). The agents are the hot and the cold; for they constitute and make concrete the homogeneous bodies out of [25] earth and water. Let us consider, then, which of the homogeneous bodies are made of earth and which of water, and which of both.

Of organized bodies some are liquid, some soft, some hard. The soft and the hard are constituted by a process of solidification,<sup>65</sup> as we have already explained.

Those liquids that go off in vapour are made of water, those that do not are [30] either of the nature of earth, or a mixture either of earth and water, like milk, or of earth and air, like wood, or of water and air, like oil. Those liquids which are thickened by heat are a mixture. (Wine is a liquid which raises a difficulty; for it is [388<sup>b</sup>1] both liable to evaporation and it also thickens; for instance new wine does. The reason is that there is more than one kind of liquid called wine and different kinds behave in different ways. New wine is more earthy than old, and for this reason it is

more apt to be thickened by heat and less apt to be congealed by cold. For it [5] contains much heat and a great proportion of earth, as in Arcadia, where it is so dried up in its skins by the smoke that you scrape it to drink. If all wine has some sediment in it then it will belong to earth or to water according to the quantity of the sediment it possesses.) The liquids that are thickened by cold are of the nature of earth; those that are thickened either by heat or by cold consist of more than one [10] element, like oil and honey and sweet wine.

Of solid bodies those that have been solidified by cold are of water, e.g. ice, snow, hail, hoar-frost. Those solidified by heat are of earth, e.g., pottery, cheese, natron, salt. Some bodies are solidified by both heat and cold. Of this kind are those solidified by refrigeration, that is by the privation both of heat and of the moisture [15] which departs with the heat. For salt and the bodies that are purely of earth solidify by privation of moisture only, ice by that of heat only, these bodies by that of both. So both the active qualities and both kinds of matter were involved in the process. Of these bodies those from which all the moisture has gone are all of them of earth, like pottery or amber. (For amber, also, and the bodies called 'tears' are formed by [20] refrigeration, like myrrh, frankincense, gum. Amber, too, appears to belong to this class of things: the animals enclosed in it show that it is formed by solidification. The heat is driven out of it by the cold of the river and causes the moisture to evaporate with it, as in the case of honey when it has been heated and is immersed in [25] water.) Some of these bodies cannot be melted or softened; for instance, amber and certain stones, e.g. the stalactites in caves. (For these stalactites, too, are formed in the same way: the agent is not fire, but cold which drives out the heat, which, as it leaves the body, draws out the moisture with it: in the other class of bodies the agent is external fire.) In those from which the moisture has not wholly gone earth still [30] preponderates, but they admit of softening by heat, e.g. iron and horn. (Frankincense and things of that sort give off vapour in the same way as wood does.)

Now since we must include among meltables those bodies which are melted by fire, these contain some water; indeed some of them, like wax, are common to earth and water alike. But those that are melted by water are of earth. Those that are not [389<sup>a</sup>1] melted either by fire or water are of earth, or of earth and water.

Since, then, all bodies are either liquid or solid, and since the things that display the affections we have enumerated belong to these two classes and there is nothing intermediate, it follows that we have given a

complete account of the criteria for distinguishing whether a body consists of earth or of water or of more [5] elements than one, and whether fire was the agent in its formation, or cold, or both.

Gold, then, and silver and copper and tin and lead and glass and many nameless stones are of water; for they are all melted by heat. Of water, too, are some wines and urine and vinegar and lye and whey and serum; for they are all congealed [10] by cold. In iron, horn, nails, bones, sinews, wood, hair, leaves, bark, earth preponderates. So, too, in amber, myrrh, frankincense, and all the substances called 'tears', and stalactites, and fruits, such as leguminous plants, and corn. For things [15] of this kind are, to a greater or less degree, of earth. For of all these bodies some admit of softening by heat, the rest give off fumes and are formed by refrigeration. So again in natron, salt, and those kinds of stones that are not formed by refrigeration and cannot be melted. Blood, on the other hand, and semen are made up of earth and water and air. If the blood contains fibres, earth preponderates in it; [20] consequently it solidifies by refrigeration and is melted by liquids; if not, it is of water and therefore does not solidify. Semen solidifies by refrigeration, its moisture leaving it together with its heat.

**11** · We must investigate in the light of the results we have arrived at what [25] solid or liquid bodies are hot and what cold.

Bodies consisting of water are commonly cold, unless (like lye, urine, wine) they contain foreign heat. Bodies consisting of earth, on the other hand, are commonly hot because heat was active in forming them: for instance lime and ashes.

We must recognize that cold is in a sense the matter of bodies. For the dry and the moist are matter (being passive) and earth and water are the elements that [30] primarily embody them, and they are characterized by cold. Consequently cold must predominate in every body that consists of one or other of the elements simply, [389<sup>b</sup>1] unless such a body contains foreign heat as water does when it boils or when it has been strained through ashes. This latter, too, has acquired heat from the ashes; for everything that has been burnt contains more or less heat. This explains the generation of animals in putrefying bodies: the putrefying body contains the heat [5] which destroyed its proper heat.

Bodies made up of earth and water are hot; for most of them derive their existence from concoction and heat, though some, like the waste products of the [10] body, are the products of putrefaction. Thus blood,

semen, marrow, fig-juice, and all things of the kind are hot as long as they are in their natural state, but when they perish and fall away from that state they are so no longer. For what is left of them is their matter and what is earth or water. Hence both views are held about them, some people maintaining them to be cold and others to be warm; for they are observed to be hot when they are in their natural state, but to solidify when they [15] have fallen away from it. That, then, is the case of mixed bodies. However, the distinction we laid down holds good: if its matter is predominantly water a body is cold (water being the complete opposite of fire), but if earth or air it tends to be warm.

It sometimes happens that the coldest bodies can be raised to the highest [20] temperature by foreign heat; for the most solid and the hardest bodies are coldest when deprived of heat and most burning after exposure to fire: thus water is more burning than smoke and stone than water.

**12** · Having explained all this we must describe the nature of flesh, bone, and the other homogeneous bodies severally.

[25] Our account of the formation of the homogeneous bodies has given us the elements out of which they are compounded and the classes into which they fall, and has made it clear to which class each of those bodies belongs. The homogeneous bodies are made up of the elements, and all the works of nature in turn of the homogeneous bodies as matter. All the homogeneous bodies consist of the elements described, as matter, but their essence is determined by their definition. This fact is [30] always clearer in the case of the later products, of those, in fact, that are instruments, as it were, and have an end: it is clearer, for instance, that a dead man is a man only in name. And so the hand of a dead man, too, will in the same way be a [390<sup>a</sup>1] hand in name only, just as stone flutes might still be called flutes; for these too, seem to be instruments of a kind. But in the case of flesh and bone the fact is not so clear to see, and in that of fire and water even less. For the end is least obvious there [5] where matter predominates most. If you take the extremes, matter is pure matter and the essence is pure definition; but the bodies intermediate between the two are related to each in proportion as they are near to either. For each of these elements has an end and is not water or fire in any and every condition of itself, just as flesh is not flesh nor viscera viscera, and the same is true in a higher degree with face and [10] hand. What a thing is is always determined by its function: a thing really is itself when it can

perform its function; an eye, for instance, when it can see. When a thing cannot do so it is that thing only in name, like a dead eye or one made of stone, just as a wooden saw is no more a saw than one in a picture. The same, then, is true of [15] flesh, except that its function is less clear than that of the tongue. So, too, with fire; but its function is perhaps even harder to specify by physical inquiry than that of flesh. The parts of plants, and inanimate bodies like copper and silver, are in the same case. They all are what they are in virtue of a certain power of action or passion—just like flesh and sinew. But we cannot state their definitions accurately, and so it is not easy to tell when they are really there and when they are not unless [20] the body is thoroughly corrupted and its shape only remains. So ancient corpses suddenly become ashes in the grave and very old fruit preserves its shape only but [390<sup>b</sup>1] not its sensible qualities; so, too, with the solids that form from milk.

Now heat and cold and the motions they set up as the bodies are solidified by the hot and the cold are sufficient to form all such parts as are the homogeneous bodies, flesh, bone, hair, sinew, and the rest. For they are all of them differentiated [5] by the various qualities enumerated above, tension, ductility, fragmentability, hardness, softness, and the rest of them: all of which are derived from the hot and the cold and the mixture of their motions. But no one would go as far as to consider them sufficient in the case of the non-homogeneous parts (like the head, the hand, [10] or the foot) which these homogeneous parts go to make up. Cold and heat and their motion would be admitted to account for the formation of copper or silver, but not for that of a saw, a bowl, or a box. So here, save that in the examples given the cause is art, but in the non-homogeneous bodies nature or some other cause.

Since, then, we know to what class each of the homogeneous bodies belongs, we [15] must now find the definition of each of them, i.e. what is blood, flesh, semen, and the rest? For we know the cause of a thing and its definition when we know its matter and its definition—and best when we know both the material and the formed factors of its generation and destruction, and also the source of the origin of its motion.

After the homogeneous bodies have been explained we must consider the [20] non-homogeneous too, and lastly the bodies made up of these, such as man, plants, and the rest.

**\*\*TEXT:** F. H. Fobes, Cambridge, Mass., 1918

<sup>1</sup>Reading κάκείνους (Thurot) for κάκεϊνος.

<sup>2</sup>Αιθήρ being derived from αεί (always) and θεῖν (to run), with an allusion to θεῖος (divine).

<sup>3</sup>See *On the Heavens* 297<sup>b</sup>30ff.

<sup>4</sup>No such account is to be found in *On the Soul* or *Sense and Sensibilia*.

<sup>5</sup>Omitting τοῦ πυρὸς ἄνω φερομένου κατὰ φύσιν.

<sup>6</sup>Omitting μᾶλλον, and reading ἄνω for ἀνωτάτω.

<sup>7</sup>In 373/2 B.C.

<sup>8</sup>427/6 B.C.

<sup>9</sup>Reading ἄμμα for ἄλμα.

<sup>10</sup>341/0 B.C.

<sup>11</sup>Omitting ἀέρα τε ... ποιήση.

<sup>12</sup>Omitting πυρός.

<sup>13</sup>Reading πληθύουσι for πληθύουσα.

<sup>14</sup>Omitting γιγνόμενα.

<sup>15</sup>Reading ἔλαττον for ἐλάττω.

<sup>16</sup>Retaining ταμειυομένων.

<sup>17</sup>Retaining ἦν.

<sup>18</sup>Retaining ἀπαντᾷ.

<sup>19</sup>Omitting ἄτοπον.

<sup>20</sup>*Phaedo* 111 Cff.

<sup>21</sup>Omitting αἰτίας.

<sup>22</sup>Omitting τήν.

<sup>23</sup>Reading τινος for τό.

<sup>24</sup>Omitting δέ.

<sup>25</sup>Placing καί after μαραίνει instead of before διακρίνει.

<sup>26</sup>Webster thinks that this sentence is a learned—but irrelevant—interpolation.

<sup>27</sup>Omitting ἐστιν.

<sup>28</sup>Reading χίονας for νομάς.

<sup>29</sup>Reading τηξιν for πηξιν.

<sup>30</sup>Reading αὐτόν.

<sup>31</sup>Omitting καὶ εὖρος ὁ ἀπηλιώτην.

<sup>32</sup>Omitting ὁ γὰρ ἀπαρκτίας ζέφυρός ἐστιν.

<sup>33</sup>Transposing ἔξω and ἐκεῖ.

<sup>34</sup>Reading μεγέθους. τὴν δὲ ζέσιν ποιεῖ....

<sup>35</sup>Reading μεταβάλλουσι.

<sup>36</sup>Reading ἐκκρινομένη.

<sup>37</sup>Reading τυφῶν ἄνεμος, ὧν οἶον....

<sup>38</sup>Punctuating after διηθηθέν.

<sup>39</sup>Omitting ἐγγύτατα.

<sup>40</sup>Omitting ἐφ' ᾧ ἡ Α.

<sup>41</sup>Fobes excises this sentence.

<sup>42</sup>Fobes excises this clause.

<sup>43</sup>Reading αἱ ἀπὸ τοῦ Η καὶ Κ.

<sup>44</sup>Reading ΗΜ.

<sup>45</sup>Reading ὑπό.

<sup>46</sup>This paragraph is out of place and textually odd: most editors regard it as an interpolation.

<sup>47</sup>Reading ἐφ' οὗ τὸ Ο.

<sup>48</sup>Reading ψΥΩ.

<sup>49</sup>Reading ὑπό.

<sup>50</sup>Reading ΥΩ.

<sup>51</sup>Reading πρὸς τῇ γῇ.

<sup>52</sup>Reading πρὸς τῇ γῇ.

<sup>53</sup>Omitting τῶν ἄλλων.

<sup>54</sup>Comma after φθαρῇ.

<sup>55</sup>Reading αὐτήν.

<sup>56</sup>Frag. 34 Diels-Kranz.

<sup>57</sup>Punctuating after ὑγρόν, not after ἐξιόν.

<sup>58</sup>Omitting καὶ ξύλα.

<sup>59</sup>Reading ὄντας σκληροτέρους.

<sup>60</sup>Reading μαλακά.

<sup>61</sup>Reading χαλκός. καὶ τὰ ἄθλαστα.

<sup>62</sup>Fobes excises 'For sometimes . . . empty'.

<sup>63</sup>Frag. 82 Diels-Kranz.

<sup>64</sup>Omitting τῶν ὑγρῶν.

<sup>65</sup>Reading ὅτι πήξει.



# ON THE UNIVERSE\*\*

*E. S. Forster*

[391<sup>a</sup>1] 1 · Many a time, Alexander, has Philosophy seemed to me truly divine and supernatural, especially when in solitude she soars to the contemplation of things universal and strives to recognize the truth that is in them, and while all others [5] abstain from the pursuit of this truth owing to its sublimity and vastness, she has not shrunk from the task nor thought herself unworthy of the fairest pursuits, but has deemed the knowledge of such things at once most natural to herself and most [10] fitting. For seeing that it was not possible (as once the foolish Aloadae attempted) by means of the body to reach the heavenly region and leaving the earth behind to spy out that holy country, the soul by means of philosophy, taking the intellect as her guide, finding an easy path has traversed the intervening space and fared forth, and by intelligence comprehended things very far removed in space from one another, easily, I think, recognizing those things which have kinship with herself, [15] and by the divine eye of the soul apprehending things divine and interpreting them to mankind. This she felt, being desirous, as far as in her lay, freely to give to all men a share of her honours. And so men who have laboriously described to us either the nature of a single region or the plan of a single city or the dimensions of a river or [20] the scenery of a mountain, as some before now have done,—telling of Ossa or Nysa or the Corycian cave or giving us some other limited description,—such men one should pity for their small-mindedness in admiring ordinary things and making much of some quite insignificant spectacle. They are thus affected because they [25] have never contemplated what is nobler—the Universe and the greatest things of the Universe; for if they had properly attended to these things, they would never [391<sup>b</sup>1] marvel at anything else, but all else would appear insignificant and, compared to the surpassing excellence of these things, of no account. Let us therefore treat of all these matters and, as far as possible, inquire into their divine nature, and discuss the [5] nature and position and movement of each of them. And I think that it is but fitting that even you, who are the noblest

of rulers, should pursue the inquiry into the greatest of all subjects and that philosophy should entertain no trivial thoughts, but make the noblest among men welcome to these her gifts.

2 · The Universe then is a system made up of heaven and earth and the natural things which are contained in them. But the word is also used in another [10] sense of the ordering and arrangement of all things, preserved by and through God. Of this Universe the centre, which is immovable and fixed, is occupied by the life-bearing earth, the home and the mother of diverse creatures. The upper portion of the Universe, a whole with a fixed upper limit everywhere, the home of the gods, [15] is called Heaven. Heaven is full of divine bodies, which we usually call stars, and moves with an eternal motion, and in one circular orbit revolves in stately measure with all the heavenly bodies unceasingly for ever. The whole heaven and universe being spherical and moving, as I have said, continually, there must of necessity be [20] two points which do not move, exactly opposite to one another (as in a sphere being turned on a lathe), points which remain fixed and hold the sphere together and round which the whole mass revolves in a circle; and these points are called poles. If [25] we imagine a straight line drawn so as to join them (the axis, as it is sometimes called), it will form the diameter of the Universe, having the earth as its centre and [392<sup>a</sup>1] the two poles as its extremities. Of these fixed poles the one is always visible, being above our heads in the northern region of the sky, and is called the Arctic Pole; the other is always hidden beneath the earth to the south and is called the Antarctic Pole.

The substance of the heaven and stars we call ether, not because it blazes, [5] owing to its fiery nature (as some explain the word, mistaking its nature, which is very far removed from fire), but because it is in continual motion,<sup>1</sup> revolving in a circle, being an element other than the four pure and divine. Of the stars which are contained in it, some revolve fixedly with the whole heaven, always occupying the [10] same positions. A belt is formed through their midst by the so-called Circle of the Zodiac, which passes crosswise through the tropics, being divided up into the twelve regions of the Signs of the Zodiac. Others, which are the planets, do not naturally move with the same velocity as those stars of which I have already spoken, nor with the same velocity as one another, but each in a different course, so that one will be [15] nearer the earth, another higher in the heavens. Now the number of the fixed stars cannot be

ascertained by man, although they move in one surface, which is that of the whole heaven. But the planets fall into seven divisions in seven successive circles, [20] so situated that the higher is always greater than the lower, and the seven circles are successively encompassed by one another and are all surrounded by the sphere containing the fixed stars. The position nearest to this sphere is occupied by the so-called circle of the Shining star, or Saturn; next is that of the Beaming star, [25] which also bears the name of Jupiter; then follows the circle of the Fiery star, called by the names both of Heracles and of Mars; next comes the Glistening star, which some call sacred to Mercury, others sacred to Apollo; after that is the circle of the Light-bearing star, which some call the star of Venus, others the star of Hera; then comes the circle of the Sun, and lastly that of the Moon—and there is the limit of the ether which encompasses the heavenly bodies and the area over which they are [30] ordained to move.

After the ethereal and divine nature, which we declare to be orderly and to be, moreover, free from disturbance, change, and external influence, there follows immediately an element which is subject throughout to external influence and disturbance and is, in a word, corruptible and perishable. In the first portion of this occurs the substance which is made up of small particles and is fiery, being kindled [392<sup>b</sup>1] by the ethereal element owing to its superior size and the rapidity of its movement. In this so-called fiery and disordered element flashes shoot and fires dart, and so-called ‘beams’ and ‘pits’ and comets have their fixed position and often become extinguished.

[5] Next beneath this spreads the air, which is in its nature murky and cold as ice, but becomes illuminated and set on fire by the fiery element, and thus grows brighter and warm. And since the air too admits of influence and undergoes every [10] kind of change, clouds form in it, rain-storms beat down, and snow, hoar-frost, hail, blasts of winds and of hurricanes, and thunder too and lightning and falling bolts, and crashing together of countless storm-clouds.

3 · Next to the aerial element the earth and sea have their fixed position, [15] teeming with plant and animal life, and fountains and rivers, either being spent in the earth or discharging their waters into the sea. The earth is diversified by countless kinds of verdure and lofty mountains and densely wooded copses and cities, which that intelligent animal man has founded, and islands set in the sea and [20] continents.

Now the usual account divides the inhabited world into islands and continents, ignoring the fact that the whole of it forms a single island round which the sea that is called Atlantic flows. But it is probable that there are many other continents far away across the seas from ours, some larger and others smaller than [25] it, but all, save our own, invisible to us. For as our islands are in relation to our seas, so is the inhabited world in relation to the Atlantic, and so are many other continents in relation to the whole sea; for they are as it were immense islands [30] surrounded by immense seas. The general element of moisture, covering the earth's surface and allowing the so-called inhabited countries to show through where the earth projects, may be said to come immediately after the aerial element. Next to it the whole earth has been formed, firmly fixed in the lowest position at the midmost centre of the Universe, closely compacted, immovable and unshakable. This forms the whole of what we call the lower portion of the Universe.

[393<sup>a</sup>1] Thus then five elements, situated in spheres in five regions, the less being in each case surrounded by the greater—namely, earth surrounded by water, water by air, air by fire, and fire by ether—make up the whole Universe. All the upper [5] portion represents the dwelling of the gods, the lower the abode of mortal creatures. Of the latter, part is moist, to which we are accustomed to give the names of rivers, springs, and seas; while part is dry, which we call land and continents and islands.

[10] Of the islands, some are large, like the whole of what we call the inhabited world (and there are many other such surrounded by mighty seas); other islands are smaller, which are visible to us and in our own sea. Of these some are of considerable size, Sicily, Sardinia, Corsica, Crete, Euboea, Cyprus, and Lesbos; others are less extensive, such as the Sporades and Cyclades and others bearing [15] various names.

Again, the sea which lies outside the inhabited world is called the Atlantic or Ocean, flowing round us. Opening in a narrow passage towards the West, at the so-called Pillars of Heracles, the Ocean forms a current into the inner sea, as into a harbour; then gradually expanding it spread out, embracing great bays adjoining [20] one another, here contracting into narrow straits and there widening out again. First, then, on the right as one sails in through the Pillars of Heracles it is said to form two bays, the so-called Syrtes, the Greater and the Lesser as they are called; [25] on the other side it does not make such bays, but forms three seas, the Sardinian, the Gallic, and the Adriatic. Next to these comes the Sicilian sea, lying crosswise, and after it the Cretan. Continuing it come the Egyptian, Pamphylian, and Syrian seas [30] in one direction, and the

Aegean and Myrtoan seas in the other. Over against the seas already mentioned extends the Pontus, which is made up of several parts; the innermost portion is called Maeotis, while the outer portion in the direction of the Hellespont is connected by a straight with the so-called Propontis. Towards the East [393<sup>b</sup>1] the Ocean again flows in and opens up the Indian and Persian Gulfs, and displays the Erythraean sea continuous with these, embracing all three. With its other branch it passes through a long narrow strait and then expands again, marking off [5] the Hyrcanian and Caspian seas. Beyond this it occupies the deeps beyond the Lake of Maeotis; then beyond the Scythians and the land of the Celts it gradually confines the width of the habitable world, as it approaches the Gallic Gulf and the Pillars of Heracles already mentioned, outside which the Ocean flows round the [10] earth. In this sea are situated two very large islands, the so-called British Isles, Albion and Ierne, which are greater than any which we have yet mentioned and lie beyond the land of the Celts. (The island of Taprobane opposite India, situated at an angle to the inhabited world, is quite as large as the British Isles, as also is the [15] island called Phebol which lies over against the Arabian Gulf.) There is a large number of small islands round the British Isles and Iberia, forming a belt round the inhabited world, which as we have already said is itself an island. The width of the inhabited world at the greatest extent of its mainland is rather less than 40,000 [20] stades, so the best geographers say, and its length about 70,000 stades. It is divided in Europe, Asia, and Libya.

Europe is the tract bounded in a circle by the Pillars of Heracles, the inner recesses of the Pontus, and the Hyrcanian sea, where a very narrow isthmus stretches to the Pontus. Some have held that the river Tanais is the boundary rather [25] than the isthmus. Asia extends from the said isthmus and the Pontus and the Hyrcanian sea to the other isthmus which lies between the Arabian Gulf and the inner sea, being surrounded by the inner sea and the Ocean which flows round the [30] world. Some, however, define the bounds of Asia as from the Tanais to the mouths of the Nile. Libya extends from the Arabian isthmus to the Pillars of Heracles; though some describe it as stretching from the Nile to the Pillars; Egypt, which is [394<sup>a</sup>1] surrounded by the mouths of the Nile, is given by some to Asia, by others to Libya; some exclude the islands from both continents, others attach them to their nearest neighbour.

[5] Such is our account of the nature of land and sea and their position—the inhabited world as we call it.

4 · Let us now deal with the most remarkable conditions which are produced in and around the earth, summarizing them in the barest outline. There are two [10] kinds of exhalation which rise continually from the earth into the air above us, composed of small particles and entirely invisible, except that sometimes in the mornings they are seen rising from rivers and streams. Of these one kind being given off from the earth is dry and resembles smoke, while the other being exhaled [15] from the element of moisture is damp and vaporous. From the latter are produced mist and dew and the various forms of frost, clouds and rain and snow and hail; while from the dry exhalation come the winds and the different kinds of breezes, and thunder and lightning, and fiery bolts and thunderbolts, and all other cognate [20] phenomena. Mist is a vaporous exhalation which does not produce water, denser than air but less dense than cloud; it arises either from the first beginnings of a cloud or else from the remnant of a cloud. The contrary of this is what is called a clear sky, being simply air free from cloud and mist. Dew is moisture of fine [25] composition falling from a clear sky; ice is water congealed in a condensed form from a clear sky; hoar-frost is congealed dew, and 'dew-frost' is dew which is half congealed. Cloud is a vaporous mass, concentrated and producing water. Rain is produced from the compression of a closely condensed cloud, varying according to [30] the pressure exerted on the cloud; when the pressure is slight it scatters gentle drops; when it is great it produces a more violent fall, and we call this a downpour, being heavier than rain, and forming continuous masses of water falling over earth. Snow is produced by the breaking up of condensed clouds, the cleavage taking place before the change into water; it is the process of cleavage which causes its resemblance to foam and its intense whiteness, while the cause of its coldness is the [394<sup>b1</sup>] congelation of the moisture in it before it is dispersed or rarefied. When snow is violent and falls heavily we call it a blizzard. Hail is produced when snow becomes densified and acquires impetus for a swifter fall from its close mass; the hailstones [5] become greater and the fall more violent in proportion to the size of the broken fragments of cloud. Such then are the phenomena which occur as the result of moist exhalation.

From dry exhalation, impelled into motion by cold, is produced wind; for wind is merely a quantity of air set in motion in a mass. Wind is also called breath, a word [10] used in another sense of the vital and generative substance which is found in plants and living creatures, and permeates all things; but with this we need not deal here. The breath which breathes in the air we call wind, while to the expirations from

moisture we give the name of breezes. The winds which blow from moist land we [15] call land-winds, those which spring up from the gulfs we call gulf-winds; somewhat similar to these are those which blow from rivers and lakes. Winds which are produced by the bursting of a cloud causing an expansion of its density in their own direction, are called cloud-winds. Those which burst out all at once accompanied by a mass of water are called rain-winds.

The winds which blow continuously from the rising sun are called Euri; those from the north, Boreae; those from the setting sun, Zephyri; those from the south, [20] Noti. Of the east winds, that which blows from the region of the summer sunrise is called Caecias; that which blows from the region of the equinoctial sunrise is known as Apeliotes; while the name of Eurus is given to the wind which blows from the quarter of the winter sunrise. Of the west winds, which blow in the contrary [25] direction, that which blows from the summer setting is Argestes, though some call it Olympias, others Iapyz; that which blows from the equinoctial setting is Zephyrus, and that which blows from the winter setting is Lips. Of the north winds that which is next to Caecias is called Boreas in the specific sense of the word. Aparctias is next to it, and blows in a southerly direction from the pole. Thracias is the wind which [30] blows next to Argestes; by some it is called Circias. Of the south winds, that which comes from the invisible pole and immediately faces Aparctias is called Notus; that between Notus and Eurus is called Euronotus. The wind on the other side between Lips and Notus is called by some Liponotus, by others Libophoenix.

Some winds are direct, those, that is, which blow along a straight line; others follow a bending course, as for instance the wind called Caecias. Some winds hold [395<sup>a</sup>1] sway in the winter, the south winds for example; others in the summer, such as the Etesian winds, which are a mixture of northerly and westerly winds. The so-called Ornithian winds, which occur in the spring, are a northerly type of wind.

Of violent blasts of wind, a squall is one which suddenly strikes down from [5] above; a gust is a violent blast which springs up in a moment; a whirlwind, or tornado, is a wind which revolves in an upward direction from below. An eruption of wind from the earth is a blast caused by the emission of air from a deep hold or cleft; when it comes forth in a whirling mass it is called an earth-storm. A wind which is whirled along in a dense watery cloud and being driven forth through it violently [10] breaks up the continuous masses of the cloud, causes a roar and crash, which we call thunder, similar to the noise made by wind driven violently

through water. When the wind is breaking forth from a cloud catches fire and flashes it is called lightning. [15] The lightning reaches our perception sooner than the thunder, though it actually occurs after it, since it is the nature of that which is heard to travel less quickly than that which is seen; for the latter is visible at a distance, while the former is only heard when it reaches the ear, especially since the one, the fiery element, travels [20] faster than anything else, while the other, being of the nature of air, is less swift and only reaches the ear by actually striking upon it. If the flashing body is set on fire and rushes violently to the earth it is called a thunderbolt; if it be only half of fire, but violent also and massive, it is called a fiery bolt; if it is entirely free from fire, it is called a smoking bolt. They are all called swooping bolts, because they swoop [25] down upon the earth. Lightning is sometimes smoky, and is then called smouldering lightning; sometimes it darts quickly along, and is then said to be vivid; at other times it travels in crooked lines, and is called forked lightning; when it swoops down upon the earth it is called swooping lightning.

To sum up, some of the phenomena which occur in the air are merely appearances, while others have actual substance. Rainbows and rods and the like [30] are only appearances, while flashes and shooting-stars and comets and the like have real substance. A rainbow is the reflection of a segment of the sun or of the moon, seen, as in a mirror, in a cloud which is moist, hollow, and continuous in appearance, and taking a circular form. A rod is a rainbow appearing in the form of a straight [395<sup>b</sup>1] line. A halo is an appearance of brightness shining round a star; it differs from a rainbow, because the latter appears opposite the sun and moon, while the halo is formed all round a star. A light in the sky is caused by the kindling of a mass of fire [5] in the air; some lights shoot along, other are fixed. The shooting is the generation of fire by friction, when the fire moves quickly through the air and by its quickness produces an impression of length; the fixture is a prolonged extension without movement, an elongated star as it were. A light which broadens out towards one end [10] is called a comet. Some lights often last a considerable time, others are extinguished immediately. There are numerous other kinds of appearances seen in the sky, the so-called torches, beams, barrels, and pits, which derive their names from their similarity to these objects. Some of them appear in the west, others in the east, [15] others in both these quarters, but rarely in the north or south. None of them are stable; for none of them have been discovered to be always visible in a fixed position. Such are the phenomena of the air.



As the earth contains many sources of water, so also it contains many sources [20] of wind and fire. Of these some are subterranean and invisible, but many have vents and blow-holes, as Lipara, Etna, and those in the Aeolian islands—and they frequently flow like rivers and cast up red-hot lumps. Some, which are under the [25] earth near springs of water, warm them and cause some streams to flow tepid, others very hot, others tempered to a pleasant heat. Similarly, many vent-holes for wind open in every part of the earth; some of them cause those who draw near to them to become frenzied, others cause them to waste away, others inspire them to utter oracles, as at Delphi and Lebadia, others utterly destroy them, as the one in [30] Phrygia. Often, too, a moderate wind engendered in the earth, being driven aside into deep crannies of the earth and displaced from its proper locality, causes shocks in many parts. Often, too, a strong current from without becomes caught in the hollows of the earth, and, being cut off, it shakes the earth violently, seeking an exit, and sets up the condition which we commonly call an earthquake. Earthquakes of [396<sup>a</sup>1] which the shock is oblique, at a sharp angle, are known as horizontal earthquakes; those which lift the earth up and down at right angles are known as heaving earthquakes; those which cause the earth to settle down into hollows are called sinking earthquakes; those which open up chasms and break up the earth's surface [5] are called rending earthquakes. Some of them also emit winds, others stones or mud, while others cause springs to appear which did not exist before. Some earthquakes cause a disturbance by means of a single shock and are known as thrusting earthquakes. Others which swing to and fro and by inclinations and waves [10] in each direction remedy the effect of their shock, are called vibrating earthquakes, setting up a condition which resembles trembling. There are also bellowing earthquakes, which shake the earth with a roar. Underground bellowing, however, is often heard unaccompanied by earthquakes, when the wind, though insufficient to cause a shock, is compressed together in the earth and beats with the force of its impetus. Blasts which penetrate into the earth are materialized also from moisture [15] concealed underground.

We find analogous phenomena occurring in the sea. Chasms form in it and its waters often retire or the waves rush in; this is sometimes followed by a recoil and sometimes there is merely a forward surge of water, as is said to have occurred at [20] Helice and Bura. Often, too, there are exhalations of fire from the sea, and springs gush out and river-mouths are formed and trees suddenly grow up, and currents and eddies appear, like those caused in the air by blasts of wind, sometimes in the

middle of the sea, sometimes in straits and channels. Many tides and tidal waves are said [25] always to accompany the periods of the moon at fixed intervals. In short, owing to the mingling of the elements together, it is reasonable that similar conditions are produced in the air and in the earth and in the sea, causing decay and generation in [30] parts, but preserving the whole free from destruction and generation.

5 · Yet some have wondered how it is that the Universe, if it be composed of contrary principles—namely, dry and moist, hot and cold—has not long ago perished and been destroyed. It is just as though one should wonder how a city [396<sup>b</sup>1] continues to exist, being, as it is, composed of the most opposite classes—rich and poor, young and old, weak and strong, good and bad. They fail to notice that this has always been the most striking characteristic of civic concord, that it evolves unity [5] out of plurality, and similarity out of dissimilarity, admitting every kind of nature and chance. It may perhaps be that nature has a liking for contraries and evolves harmony out of them and not out of similarities (just as she joins the male and female together and not members of the same sex), and has devised the original [10] harmony by means of contraries and not similarities. The arts, too, apparently imitate nature in this respect. The art of painting, by mingling in the picture the elements of white and black, yellow and red, achieves representations which correspond to the original object. Music, too, mingling together notes, high and low, [15] short and prolonged, attains to a single harmony amid different voices; while writing, mingling vowels and consonants, composes of them all its art. The saying of Heracleitus the obscure was to the same effect: ‘Graspings: wholes and not wholes, [20] that which agrees and that which differs, that which produces harmony and that which produces discord; from all one and from one all.’<sup>2</sup>

Thus then a single harmony orders the composition of the whole—heaven and [25] earth and the whole Universe—by the mingling of the most contrary principles. The dry mingling with the moist, the hot with the cold, the light with the heavy, the straight with the curved, all the earth, the sea, the ether, the sun, the moon, and the whole heaven are ordered by a single power extending through all, which has created the whole universe out of separate and different elements—air, earth, fire, [30] and water—embracing them all in one spherical surface and forcing the most contrary natures in it to live in agreement with one another and thus contriving the permanence of the whole. The cause of this

permanence is the agreement of the [397<sup>a</sup>1] elements, and the reason of this agreement is their equal proportion and the fact that no one of them is more powerful than any other; for the heavy is equally balanced with the light and the hot with the cold. Thus nature teaches us in the greater principles of the world that equality somehow tends to preserve harmony, whilst harmony preserves the universe which is the parent of all things and itself the [5] fairest thing of all. For what natural thing is more excellent? Any that one can name is but a part of the Universe. All that is beautiful bears its name, and all that which is arranged well; for it is said to be well ordered, being thus called after the ordered Universe.<sup>3</sup> And what particular phenomenon could be likened to the ordered system of the heavens and the march of the stars and the sun and the moon, [10] which move on in most accurate measure through age after age? Where else could be found such regularity as is observed by the goodly seasons, which produce all things and bring in due order summer and winter, day and night, to the accomplishment of the month and the year? Moreover, in greatness the universe is [15] pre-eminent, in motion swiftest, in radiance most bright, and in might it knows not old age or corruption. It has divided the various creatures that live in the sea, on the earth, and in the air, and regulated their lives by its movements. Of it all living [20] things breathe and have their life. Even all the unexpected changes which occur in it are really accomplished in an ordered sequence—diverse winds conflicting together, thunderbolts falling from heaven, and violent storms bursting forth. The expulsion of moisture and the exhalation of fire by these means restores the whole to harmony and stability. The earth, too, clothed with diverse vegetation, gushing [25] forth with streams and trodden by the feet of living creatures, in due season bringing forth, nurturing, and receiving back all things, producing countless varieties and changes, none the less always preserves its nature untouched by age, though shaken by earthquakes, washed by floods, and in parts burnt up by fires. All [30] these things seem to work its welfare and to ensure its eternal permanence. For when it is shaken by earthquakes and winds which have been diverted into it escape forth, finding vents through the clefts, as we have already said; when it is washed by rain, it is cleansed of all that is unhealthy; and when the breezes blow about it, it is [397<sup>b</sup>1] purified above and beneath. Again, the fires soften that which is frost-bound, while the frosts abate the fires. Of particular things some are coming into being, others are at their prime, others are decaying; and birth checks decay and decay lightens [5] birth. Thus an unbroken permanence, which all things conspire to secure,

counteracting one another—at one time dominating, at another being dominated—preserves the whole unimpaired through all eternity.

[10] **6** · There still remains for us to treat briefly, as we have discussed the other subjects, of the cause which holds all things together. For in dealing with the universe, not perhaps in exact detail, yet at any rate so as to give a general idea of the subject, it would be wrong to omit that which is the most important thing in the universe. The old explanation which we have all inherited from our fathers, is that all things are from God and were framed by God, and that no natural thing is of [15] itself sufficient for itself, deprived of the permanence which it derives from him. Therefore some of the ancients went so far as to say that all those things are full of gods which are presented to us through the eyes and the hearing and all the other senses, thus propounding a theory which, though it accords with the divine power, does not accord with the divine nature. For God is in very truth the preserver and [20] creator of all that is in any way being brought to perfection in this universe; yet he endures not all the weariness of a being that administers and labours, but exerts a power which never wearies; whereby he prevails even over other things which seem far distant from him. He has himself obtained the first and highest place and is [25] therefore called Supreme, dwelling, in the words of the poet,<sup>4</sup> ‘on the topmost crest’ of the whole heaven; and the body which is nearest to him most enjoys his power, and afterwards the next nearest, and so on successively until the regions wherein we dwell are reached. That is why the earth and the things upon the earth, being [30] farthest removed from the benefit which proceeds from God, seem feeble and incoherent and full of much confusion; nevertheless, inasmuch as it is the nature of the divine to penetrate to all things, the things also of our earth receive their share of it in the same way as the things above us, according to their nearness to or distance from God receiving more or less of divine benefit. It is therefore better, even as it is [398<sup>a</sup>1] more seemly and befitting God, to suppose that the power which is established in the heavens is the cause of permanence even in those things which are furthest removed from it, as we might say, and indeed in everything, rather than to hold that [5] it passes forth and travels to and fro to places which becomes and befit it not, and personally administers the affairs of this earth. For indeed, to superintend any and every operation does not become even the rulers among mankind—the chief, for example, of an army or a city, or the head of a household, if it were necessary to bind up a sack of bedding or perform any other somewhat menial task, such as

could be performed by any ordinary slave—but rather they should act as it is recorded was [10] done in the time of the Great King. For the pomp of Cambyses and Xerxes and Darius was magnificently ordered with the utmost state and splendour. The king himself, so the story goes established himself at Susa or Ecbatana, invisible to all, dwelling in a wondrous palace within a fence gleaming with gold and amber and [15] ivory. And it had many gateways one after another, and porches many furlongs apart from one another, secured by bronze doors and mighty walls. Outside these the chief and most distinguished men had their appointed place, some being the [20] king's bodyguard and attendants, others the guardians of each of the enclosing walls, the so-called janitors and 'listeners', that the king himself, who was called their master and deity, might thus see and hear all things. Besides these, others were appointed as stewards of his revenues and leaders in war and hunting, and receivers [25] of gifts, and others charged with all the other necessary functions. All the Empire of Asia, bounded on the west by the Hellespont and on the east by the Indus, was apportioned according to races among generals and satraps and Kings, slaves of the [30] Great King; and there were couriers and watchmen and messengers and superintendents of signal-fires. So effective was the organization, in particular the system of signal-fires, which formed a chain of beacons from the furthest bounds of the empire to Susa and Ecbatana, that the king received the same day the news of all [398<sup>b</sup>1] that was happening in Asia. Now we must suppose that the majesty of the Great King falls as far short of that of the God who possesses the universe, as that of the feeblest and weakest creature is inferior to that of the king of Persia. Thus, if it was [5] beneath the dignity of Xerxes to appear himself to administer all things and to carry out his own wishes and superintend the government of his kingdom, such functions would be still less becoming for a god. It is more worthy of his dignity and more befitting that he should be enthroned in the highest region, and that his power, extending through the whole universe, should move the sun and moon and make the [10] whole heaven revolve and be the cause of permanence to all that is on this earth. For he needs no contrivance or the service of others, as our earthly rulers, owing to their feebleness, need many hands to do their work; but it is most characteristic of the divine to be able to accomplish diverse kinds of work with ease and by simple [15] movement, even as machine-operators by one turn on a machine accomplish many different operations. And just as puppet-showmen by pulling a single string make the neck and hand and shoulder and eye and sometimes all the parts of

the figure [20] move with a certain harmony; so too the divine nature, by simple movement of that which is nearest to it, imparts its power to that which next succeeds, and thence further and further until it extends over all things. For one thing, moved by another, itself in due order moves something else, each acting according to its own [25] constitution, and not all following the same course but different and various and sometimes even contrary courses; although the first prelude, as it were, to the movement is single. It is just as though one should cast from one vessel at the same time a sphere, a cube, a cone, and a cylinder; each of them will move according to its [30] particular shape. Or if one should hold in the folds of a garment a water-animal, a land-animal, and a bird, and let them go; clearly the animal that swims will leap into its own element and swim away, the land-animal will creep away to its own haunts and pastures, the bird of the air will raise itself aloft from the earth and fly away, though one original cause gave each its aptitude for movement. So is it with [399a1] the universe; by a single revolution of the whole within the bounds of day and night, the different orbits of all the heavenly bodies are produced, though all are enclosed in a single sphere, some moving more quickly, others more slowly, according to the [5] distances between them and the individual composition of each. For the moon accomplishes her circuit in a month, waxing and waning and disappearing; the sun and the heavenly bodies whose course is of equal length, namely those called the 'Lightbearer' and Mercury, perform their revolution in a year; the Fiery star in [10] double that period; the star of Jupiter in six years; and lastly the so-called star of Saturn in a period two and a half times as long as the heavenly body next below it. The single harmony produced by all the heavenly bodies singing and dancing together springs from one source and ends by achieving one purpose, and has rightly bestowed the name not of 'disordered' but of 'ordered universe' upon the whole. And [15] just as in a chorus, when the leader gives the signal to begin, the whole chorus of men, or it may be of women, joins in the song, mingling a single studied harmony among different voices, some high and some low; so too is it with the God that rules the whole world. For at the signal given from on high by him who may well be called their chorus-leader, the stars and the whole heaven always move, and the sun that [20] illumines all things travels forth on its double course, whereby it both divides day and night by its rising and setting, and also brings the four seasons of the year, as it moves forwards towards the north and backwards towards the south. And in their own due season the rain, the winds, and the dews, and all the other

phenomena [25] which occur in the region which surrounds the Earth, are produced by the first, *primaeval* cause. These are followed by the flowing of rivers, the swelling of the sea, the growth of trees, the ripening of fruits, the birth of animals, the nurturing and the prime and decay of all things, to which, as I have said, their individual composition also contributes. When, therefore, the ruler and parent of all, invisible save to the [30] power of reason, gives the word to all nature that moves between heaven and earth, the whole revolves unceasingly in its own circuits and within its own bounds, sometimes unseen and sometimes appearing, revealing and again hiding diverse manners of things, from one and the same cause. Very like is it to that which [399<sup>b</sup>1] happens in times of war, when the trumpet sounds to the army; then each soldier hears its note, and one takes up his shield, another dons his breast-plate; another puts on his greaves or his helmet or his swordbelt; one puts the bit in his horse's [5] mouth, another mounts his chariot, another passes along the watchword; the captain betakes himself straightway to his company, the commander to his division, the horseman to his squadron, the light-armed warrior hastens to his appointed place, all is hurry and movement in obedience to one word of command, to carry out the orders of the leader who is supreme over all. Even so must we suppose [10] concerning the universe; by one impelling force, unseen and hidden from our eyes, all things are stirred and perform their individual functions. That this force is unseen stands in the way neither of its action nor of our belief in it. For the soul whereby we live and dwell in houses and communities, though invisible, is yet seen [15] in its operations; for by it the whole ordering of life has been discovered and organized and is held together—the ploughing and planting of the earth, the discovery of the arts, the use of law, the ordering of constitutions, the administration of home affairs and war outside our borders and peace. Thus, too, must we think of God, who in might is most powerful, in beauty most fair, in life immortal, in virtue [20] supreme; for, though he is invisible to all mortal nature, yet is he seen in his very works. For all that happens in the air, on the earth, and in the water, may truly be said to be the work of God, who possesses the universe; from whom, in the words of Empedocles, the natural philosopher, [25]

Whatsoever hath been and is now and shall be hereafter,  
All alike hath its birth—men, women, trees of the forest,  
Beasts of the field and fowls of the air and fish in the water.<sup>5</sup>

To use a somewhat humble illustration, we might with truth compare

it to the so-called 'key-stones' in arches, which, placed at the junction of the two sides, [30] ensure the balance and arrangement of the whole structure of the arch and give it stability. Moreover, they say that the sculptor Pheidias, when he was setting up the Athena on the Acropolis, represented his own features in the centre of her shield, [400<sup>a</sup>1] and so attached it to the statue by a hidden contrivance, that any one who tried to cut it out, thereby necessarily shattered and overthrew the whole statue. The position of God in the universe is analogous to this, for he preserves the harmony and permanence of all things; save only that he has his seat not in the midst, where [5] the earth and this our troubled world is situated, but himself pure he has gone up into a pure region, to which we rightly give the name of heaven, for it is the furthest boundary<sup>6</sup> of the upper world, and the name of Olympus, because it is all-bright<sup>7</sup> and free from all gloom and disordered motion, such as is caused on our earth [10] by storms and the violence of the wind. Even thus speaks the poet Homer—

Unto Olympus' height, where men say that the gods have their dwelling,  
Always safe and secure; no wind ever shaketh its stillness,  
Nor is it wet with the rain; no snow draweth nigh; but unclouded,  
Even the air is outspread, and a white sheen floateth about it.<sup>8</sup>

[15] This, too, is borne out by the general habit of mankind, which assigns the regions above to God; for we all stretch up our hands to heaven when we offer prayers. Hence too these words of the poet are not spoken amiss,

Heaven belongeth to Zeus, wide spread mid the clouds and the ether.<sup>9</sup>

[20] Therefore also the objects of sense which are held in the highest esteem occupy the same region, to wit the stars and the sun and the moon. For this cause the heavenly bodies alone are so arranged that they ever preserve the same order, and never alter or move from their course, while the things of earth, being mutable, admit of many [25] changes and conditions. For before now mighty earthquakes have rent the earth in diverse places, and violent rains have burst forth and flooded it, and the inroads and withdrawals of waves have often turned the dry land into sea and sea into dry land, and the might of winds and hurricanes has sometimes overthrown whole cities, and [30] fires and flames have



consumed the earth, either coming forth from heaven in former times, even as men say that in the days of Phaethon they burnt up the eastern regions of the earth, or else gushing forth and erupting from the earth in the west, as when the craters of Etna burst and flowed like a torrent over the earth. [400<sup>b</sup>1] (There also the favour of heaven bestowed especial honour upon the generation of the pious; for when they were overtaken by the fiery stream, because they were carrying their aged parents upon their shoulders and seeking to save them, when the river of fire drew near to them, it was parted asunder and turned part of its flame [5] this way and part that way, and preserved the young men and their parents unscathed.)

To sum up the matter, as is the steersman in the ship, the charioteer in the chariot, the leader in the chorus, the lawgiver in the city, the general in the army, even so is God in the Universe; save that to them their rule is full of weariness and disturbance and care, while to him it is without toil or labour and free from all [10] bodily weakness. For, enthroned amid the immutable, he moves and revolves all things where and how he will, in different forms and natures; just as the law of a city, immutable in the souls of those who are under it, orders all the life of the state. [15] For in obedience to it, it is plain, the magistrates go forth to their duties, the judges to their several courts of justice, the councillors and members of the assembly to their appointed places of meeting, and one man proceeds to his meals in the prytaneum, another to make his defence before the jury, and another to die in [20] prison. So too the customary public feasts and yearly festivals take place, and sacrifices to the gods and worship of heroes and libations in honour of the dead. The various activities of the citizens in obedience to one ordinance or lawful authority are well expressed in the words of the poet,

And all the town is full of incense smoke, [25]

And full of cries for aid and loud laments.<sup>10</sup>

So must we suppose to be the case with that greater city, the universe. For God is to us a law, impartial, admitting not of correction or change, and better, I think, and surer than those which are engraved upon tablets. Under his motionless and [30] harmonious rule the whole ordering of heaven and earth is administered, extending over all natural things through the seeds of life in each both to plants and to animals, according to genera and species. For vines and date-palms and peach-trees [401<sup>a</sup>1] and ‘sweet fig-trees and olives’,<sup>11</sup> as the poet says, and trees which, though they bear no fruits, have other uses, plane-trees and pines and

box-trees,

Alder and poplar-tree and cypress breathing sweet odours,<sup>12</sup>

and trees which produce autumn crops pleasant but also difficult to store,  
[5]

Pear-trees and pomegranate-trees and apple-trees glorious-fruited,<sup>13</sup>

and animals, both wild and tame, feeding in the air or on the earth or in the water, all are born and come to their prime and decay in obedience to the ordinances of God; for, in the words of Heraclitus, 'every creeping thing grazes at the blow of [10] God's goad'.<sup>14</sup>

7 · God being one yet has many names, being called after all the various conditions which he himself inaugurates. We call him Zen and Zeus, using the two names in the same sense, as though we should say him through whom we live.<sup>15</sup> He [15] is called the son of Kronos and of Time, for he endures from eternal age to age. He is God of Lightning and Thunder, God of the Clear Sky and of Ether, God of the Thunderbolt and of Rain, so called after the rain and the thunderbolts and other physical phenomena. Moreover, after the fruits he is called the Fruitful God, after [20] cities the City-God; he is God of the Family, God of the Household, God of Kindred and God of our Fathers from his participation in such things. He is God of Comradeship and Friendship and Hospitality, God of Armies and of Trophies, God of Purification and of Vengeance and of Supplication and of Propitiation, as the poets name him, and in very truth the Saviour and God of Freedom, and to complete [25] the tale of his titles, God of Heaven and of the World Below, deriving his names from all natural phenomena and conditions, inasmuch as he is himself the cause of all things. Thus it is well said in the Orphic Hymns,

Zeus of the flashing bolt was the first to be born and the latest,  
Zeus is the head and the middle; of Zeus were all things created;  
[401<sup>b</sup>1] Zeus is the stay of the earth and the stay of the star-spangled heaven;

Zeus is male and female of sex, the bride everlasting;

Zeus is the breath of all and the rush of unwearying fire;

Zeus is the root of the sea, and the sun and the moon in the heavens;

[5] Zeus of the flashing bolt is the king and the ruler of all men,

Hiding them all away, and again to the glad light of heaven

Bringing them back at his will, performing terrible marvels.

I think also that God and nothing else is meant when we speak of Necessity, since he is as it were an invincible cause; and Fate, because his action is continuous and he cannot be stayed in his course; and Destiny, because all things [10] have their bounds, and nothing which exists is infinite; and Lot, from the fact that all things are allotted; and Nemesis, from the apportionment which is made to every individual; andAdrasteia, which is a cause ordained by nature which cannot be escaped; and Dispensation, so called because it exists for ever. What is said of the [15] Fates and their spindle tends to the same conclusion; for they are three, appointed over different periods of time, and the thread on the spindle is part of it already spent, part reserved for the future, and part in the course of being spun. One of the Fates is appointed to deal with the past, namely, Atropos, for nothing that is gone by [20] can be changed; Lachesis is concerned with the future, for cessation in the course of nature awaits all things; Clotho presides over the present, accomplishing and spinning for each his own particular destiny.<sup>16</sup> This fable is well and duly composed. All these things are nought else but God, even as worthy Plato tells us:

[25] ‘God, then, as the old story has it, holding the beginning and the end and the middle of all things that exist, proceeding by a straight path in the course of nature brings them to accomplishment; and with him ever follows Justice, the avenger of all that falls short of the Divine Law—let every man who is to become blessed and happy partake in this from the very first’.<sup>17</sup>

<sup>\*\*</sup>TEXT: W. L. Lorimer, Paris, 1933

<sup>1</sup>‘Ether’, αἰθήρ, is derived from ἀεὶ θεῖν not from αἰθεσθαί.

<sup>2</sup>Frag. 10 Diels-Kranz.

<sup>3</sup>Things are said κεκοσμησθαι after the κόσμος.

<sup>4</sup>Homer, *Iliad* I 499.

<sup>5</sup>Frag. 21 Diels-Kranz.

<sup>6</sup>οὐρανός being derived from ὄρος ἄνω.

<sup>7</sup>Ὀλύμπτος being derived from ὀλολαμπής.

<sup>8</sup>*Odyssey* VI 42–5.

<sup>9</sup>*Iliad* XV 192.

<sup>10</sup>Sophocles, *Oedipus Tyrannus* 4–5.

<sup>11</sup>*Odyssey* XV 116.

<sup>12</sup>*ib* V 64.

<sup>13</sup>*ib* XI 589.

<sup>14</sup>Frag. 11 Diels-Kranz.

<sup>15</sup>Ζῆνα from ζῆν, Δία from δι’ ὄν.

<sup>16</sup>The identifications in this paragraph are supported by etymologizing.

<sup>17</sup>*Laws* 715E and 730C.

# ON THE SOUL\*\*

*J. A. Smith*

## BOOK I

1 · Holding as we do that, while knowledge of any kind is a thing to be [402<sup>a</sup>1] honoured and prized, one kind of it may, either by reason of its greater exactness or of a higher dignity and greater wonderfulness in its objects, be more honourable and precious than another, on both accounts we should naturally be led to place in the front rank the study of the soul. The knowledge of the soul admittedly contributes [5] greatly to the advance of truth in general, and, above all, to our understanding of Nature, for the soul is in some sense the principle of animal life. Our aim is to grasp and understand, first its essential nature, and secondly its properties; of these some are thought to be affections proper to the soul itself, while others are considered to attach to the animal owing to the presence of soul.

To attain any knowledge about the soul is one of the most difficult things in the [10] world. As the form of question which here presents itself, viz. the question ‘What is it?’, recurs in other fields, it might be supposed that there was some single method of inquiry applicable to all objects whose essential nature we are endeavouring to ascertain (as there is for incidental properties the single method of demonstration); [15] in that case what we should have to seek for would be this unique method. But if there is no such single and general method for solving the question of essence, our task becomes still more difficult; in the case of each different subject we shall have to determine the appropriate process of investigation. If to this there be a clear answer, e.g. that the process is demonstration or division, or some other known [20] method, many difficulties and hesitations still beset us—with what facts shall we begin the inquiry? For the facts which form the starting-points in different subjects must be different, as e.g. in the case of numbers and surfaces.

First, no doubt, it is necessary to determine in which of the *summa genera* soul lies, what it is; is it 'a this-somewhat', a substance, or is it a quale or a quantum, or some other of the remaining kinds of predicates which we have distinguished? [25] Further, does soul belong to the class of potential existents, or is it not rather an actuality? Our answer to this question is of the greatest importance.

We must consider also whether soul is divisible or is without parts, and [402<sup>b</sup>1] whether it is everywhere homogeneous or not; and if not homogeneous, whether its various forms are different specifically or generically: up to the present time those who have discussed and investigated soul seem to have confined themselves to the [5] human soul. We must be careful not to ignore the question whether soul can be defined in a single account, as is the case with animal, or whether we must not give a separate account for each sort of it, as we do for horse, dog, man, god (in the latter case the universal, animal—and so too every other common predicate—is either nothing or posterior). Further, if what exists is not a plurality of souls, but a [10] plurality of parts of one soul, which ought we to investigate first, the whole soul or its parts? It is also a difficult problem to decide which of these parts are in nature distinct from one another. Again, which ought we to investigate first, these parts or their functions, mind or thinking, the faculty or the act of sensation, and so on? If [15] the investigation of the functions precedes that of the parts, the further question suggests itself: ought we not before either to consider the correlative objects, e.g. of sense or thought? It seems not only useful for the discovery of the causes of the incidental properties of substances to be acquainted with the essential nature of those substances (as in mathematics it is useful for the understanding of the property of the equality of the interior angles of a triangle to two right angles to [20] know the essential nature of the straight and the curved or of the line and the plane) but also conversely, for the knowledge of the essential nature of a substance is largely promoted by an acquaintance with its properties: for, when we are able to give an account conformable to experience of all or most of the properties of a substance, we shall be in the most favourable position to say something worth [25] saying about the essential nature of that subject; in all demonstration a definition of the essence is required as a starting-point, so that definitions which do not enable us [403<sup>a</sup>1] to discover the incidental properties, or which fail to facilitate even a conjecture about them, must obviously, one and all, be dialectical and futile.

A further problem presented by the affections of soul is this: are they

all affections of the complex of body and soul, or is there any one among them peculiar [5] to the soul by itself? To determine this is indispensable but difficult. If we consider the majority of them, there seems to be no case in which the soul can act or be acted upon without involving the body; e.g. anger, courage, appetite, and sensation generally. Thinking seems the most probable exception; but if this too proves to be a form of imagination or to be impossible without imagination, it too requires a body [10] as a condition of its existence. If there is any way of acting or being acted upon proper to soul, soul will be capable of separate existence; if there is none, its separate existence is impossible. In the latter case, it will be like what is straight, which has many properties arising from the straightness in it, e.g. that of touching a bronze sphere at a point, though straightness divorced from the other constituents of the [15] straight thing cannot touch it in this way; it cannot be so divorced at all, since it is always found in a body. It seems that all the affections of soul involve a body—passion, gentleness, fear, pity, courage, joy, loving, and hating; in all these there is a concurrent affection of the body. In support of this we may point to the [20] fact that, while sometimes on the occasion of violent and striking occurrences there is no excitement or fear felt, on others faint and feeble stimulations produce these emotions, viz. when the body is already in a state of tension resembling its condition when we are angry. Here is a still clearer case: in the absence of any external cause of terror we find ourselves experiencing the feelings of a man in terror. From all this it is obvious that the affections of soul are enmattered accounts. [25]

Consequently their definitions ought to correspond, e.g. anger should be defined as a certain mode of movement of such and such a body (or part or faculty of a body) by this or that cause and for this or that end. That is precisely why the study of the soul—either every soul or souls of this sort—must fall within the science of nature. Hence a physicist would define an affection of soul differently from a dialectician; the latter would define e.g. anger as the appetite for returning [30] pain for pain, or something like that, while the former would define it as a boiling of the blood or warm substance surrounding the heart. The one assigns the material [403<sup>b</sup>1] conditions, the other the form or account; for what he states is the account of the fact, though for its actual existence there must be embodiment of it in a material such as is described by the other. Thus the essence of a house is assigned in such an account as ‘a shelter against destruction by wind, rain, and heat’; the physicist [5] would describe it as ‘stones, bricks, and timbers’; but there is a third possible description

which would say that it was that form in that material with that purpose or end. Which, then, among these is entitled to be regarded as the genuine physicist? The one who confines himself to the material, or the one who restricts himself to the account alone? Is it not rather the one who combines both? If this is so, how are we to characterize the other two? Must we not say that there is no type of thinker who concerns himself with those qualities or attributes of the material [10] which are in fact inseparable from the material, and without attempting even in thought to separate them? The physicist is he who concerns himself with all the properties active and passive of bodies or materials thus or thus defined; attributes not considered as being of this character he leaves to others, in certain cases it may be to a specialist, e.g. a carpenter or a physician, in others (a) where they are inseparable in fact, but are separable from any particular kind of body by an effort of abstraction, to the mathematician, (b) where they are separate, to the First [15] Philosopher. But we must return from this digression, and repeat that the affections of soul, insofar as they are such as passion and fear, are inseparable from the natural matter of animals in this way and not in the same way as a line or surface.

2 · For our study of soul it is necessary, while formulating the problems of [20] which in our further advance we are to find the solutions, to call into council the views of those of our predecessors who have declared any opinion on this subject, in order that we may profit by whatever is sound in their suggestions and avoid their errors.

The starting-point of our inquiry is an exposition of those characteristics which have chiefly been held to belong to soul in its very nature. Two characteristic marks have above all others been recognized as distinguishing that which has soul in it [25] from that which has not—movement and sensation. It may be said that these two are what our predecessors have fixed upon as characteristic of soul.

Some say that what originates movement is both pre-eminently and primarily [30] soul; believing that what is not itself moved cannot originate movement in another, they arrived at the view that soul belongs to the class of things in movement. This is what led Democritus to say that soul is a sort of fire or hot substance; his ‘forms’ or [404<sup>a</sup>1] atoms are infinite in number; those which are spherical he calls fire and soul, and compares them to the motes in the air which we see in shafts of light coming through windows; the mixture of seeds of all sorts he calls the



elements of the whole [5] of nature (Leucippus gives a similar account); the spherical atoms are identified with soul because atoms of that shape are most adapted to permeate everywhere, and to set all the others moving by being themselves in movement. This implies the view that soul is identical with what produces movement in animals. That is why, further, they regard respiration as the characteristic mark of life; as the environment [10] compresses the bodies of animals, and tends to extrude those atoms which impart movement to them, because they themselves are never at rest, there must be a reinforcement of these by similar atoms coming in from without in the act of respiration; for they prevent the extrusion of those which are already within by [15] counteracting the compressing and consolidating force of the environment; and animals continue to live only so long as they are able to maintain this resistance.

The doctrine of the Pythagoreans seems to rest upon the same ideas; some of them declared the motes in air, others what moved them, to be soul. These motes [20] were referred to because they are seen always in movement, even in a complete calm.

The same tendency is shown by those who define soul as that which moves itself; all these seem to hold the view that movement is what is closest to the nature of soul, and that while all else is moved by soul, it alone moves itself. This belief arises from their never seeing anything originating movement which is not first itself moved.

[25] Similarly also Anaxagoras (and whoever agrees with him in saying that thought set the whole in movement) declares the moving cause of things to be soul. His position must, however, be distinguished from that of Democritus. Democritus roundly identifies soul and mind, for he identifies what appears with what is true—that is why he commends Homer for the phrase ‘Hector lay with thought distraught’;<sup>1</sup> he does not employ mind as a special faculty dealing with truth, but [404<sup>b1</sup>] identifies soul and thought. What Anaxagoras says about them is less clear; in many places he tells us that the cause of beauty and order is thought, elsewhere that it is soul; it is found, he says, in all animals, great and small, high and low, but [5] thought (in the sense of intelligence) appears not to belong alike to all animals, and indeed not even to all human beings.

All those, then, who had special regard to the fact that what has soul in it is moved, adopted the view that soul is to be identified with what is eminently originative of movement. All, on the other hand, who looked to the fact that what has soul in it knows or perceives what is, identify soul with the principle or principles [10] of Nature, according as they admit

several such principles or one only. Thus Empedocles declares that it is formed out of all his elements, each of them also being soul; his words are:

For 'tis by Earth we see Earth, by Water Water,  
By Ether Ether divine, by Fire destructive Fire,  
By Love Love, and Hate by cruel Hate.<sup>2</sup> [15]

In the same way Plato in the *Timaeus*<sup>3</sup> fashions the soul out of his elements; for like, he holds, is known by like, and things are formed out of the principles or elements. Similarly also in the lectures 'On Philosophy' it was set forth that the Animal-itself is compounded of the Idea itself of the One together with the primary length, [20] breadth, and depth, everything else being similarly constituted. Again he puts his view in yet other terms: Mind is the monad, science or knowledge the dyad (because it goes undeviatingly from one point to another), opinion the number of the plane, sensation the number of the solid; the numbers are by him expressly identified with the Forms themselves or principles, and are formed out of the elements; now things [25] are apprehended either by mind or science or opinion or sensation, and these same numbers are the Forms of things.

Some thinkers, accepting both premisses, viz. that the soul is both originative of movement and cognitive, have compounded it of both and declared the soul to be a self-moving number.

As to the nature and number of the first principles opinions differ. The [30] difference is greatest between those who regard them as corporeal and those who regard them as incorporeal, and from both dissent those who make a blend and [405a1] draw their principles from both sources. The number of principles is also in dispute; some admit one only, others assert several. There is a consequent diversity in their several accounts of soul; they assume, naturally enough, that what is in its own nature originative of movement must be among what is primordial. That has led some to regard it as fire, for fire is the subtlest of the elements and nearest [5] to incorporeality; further, in the primary sense, fire both is moved and originates movement in all the others.

Democritus has expressed himself more ingeniously than the rest on the grounds for ascribing each of these two characters to soul; soul and thought are, he says, one and the same thing, and this thing must be one of the primary and [10] indivisible bodies, and its power of originating movement must be due to its fineness of grain and the shape of its atoms; he says that of all the shapes the spherical is the most mobile, and that

this is the shape of the particles of both fire and thought.

Anaxagoras, as we said above, seems to distinguish between soul and thought, but in practice he treats them as a single substance, except that it is thought that he [15] specially posits as the principle of all things; at any rate what he says is that thought alone of all that is is simple, unmixed, and pure. He assigns both characteristics, knowing and origination of movement, to the same principle when he says that it was thought that set the whole in movement.

Thales, too, to judge from what is recorded about him seems to have held soul [20] to be a motive force, since he said that the magnet has a soul in it because it moves the iron.

Diogenes (and others) held the soul to be air because he believed air to be finest in grain and a first principle; therein lay the grounds of the soul's powers of knowing and originating movement. As the primordial principle from which all other things are derived, it is cognitive; as finest in grain, it has the power to originate movement.

[25] Heraclitus too says that the first principle—the 'warm exhalation' of which, according to him, everything else is composed—is soul; further, that this exhalation is most incorporeal and in ceaseless flux; that what is in movement requires that what knows it should be in movement; and that all that is depends on movement (herein agreeing with the majority).

Alcmaeon also seems to have held a similar view about soul; he says that it is [30] immortal because it resembles the immortals, and that this immortality belongs to it in virtue of its ceaseless movement; for all the divine things, moon, sun, the [405<sup>b</sup>1] planets, and the whole heavens, are in perpetual movement.

Of more superficial writers, some, e.g. Hippo, have pronounced it to be water; they seem to have argued from the fact that the seed of all animals is fluid, for Hippo tries to refute those who say that the soul is blood, on the ground that the seed, which is the primordial soul, is not blood.

[5] Another group (Critias, for example) did hold it to be blood; they take perception to be the most characteristic attribute of soul, and hold that perceptiveness is due to the nature of blood.

Each of the elements has thus found its partisan, except earth—earth has found no supporter unless we count as such those who have declared soul to be, or to [10] be compounded of, *all* the elements. All, then, it may be said, characterize the soul by three marks, Movement, Sensation,

Incorporeality, and each of these is traced back to the first principles. That is why (with one exception) all those who define the soul by its power of knowing make it either an element or constructed out of the [15] elements. The language they all use is similar; like, they say, is known by like; as the soul knows everything, they construct it out of all the principles. Hence all those who admit but one cause or element, make the soul also one (e.g. fire or air), while those who admit a multiplicity of principles make the soul also multiple. The [20] exception is Anaxagoras; he alone says that thought is impassible and has nothing in common with anything else. But, if this is so, how or in virtue of what cause can it know? That Anaxagoras has not explained, nor can any answer be inferred from his words. All who acknowledge pairs of opposites among their principles, construct the soul also out of these contraries, while those who admit as principles only one [25] contrary of each pair, e.g. either hot or cold, likewise make the soul some one of these. That is why they allow themselves to be guided by the names; those who identify soul with the hot argue that ζῆν (to live) is derived from ζεῖν (to boil), while those who identify it with the cold say that soul (ψυχή) is so called from the process [30] of respiration and refrigeration (κατάψυξις).

Such are the traditional opinions concerning soul, together with the grounds on which they are maintained.

**3** · We must begin our examination with movement; for, doubtless, not only is it false that the essence of soul is correctly described by those who say that it is what moves (or is capable of moving) itself, but it is an impossibility that movement [406<sup>a</sup>1] should be even an attribute of it.

We have already<sup>4</sup> pointed out that there is no necessity that what originates movement should itself be moved. There are two senses in which anything may be moved—either indirectly, owing to something other than itself, or directly, owing to [5] itself. Things are indirectly moved which are moved as being contained in something which is moved, e.g. sailors, for they are moved in a different sense from that in which the ship is moved; the ship is directly moved, they are indirectly moved, because they are in a moving vessel. This is clear if we consider their limbs; the movement proper to the legs (and so to man) is walking, and in this case the sailors are not walking. Recognizing the double sense of ‘being moved’, what we [10] have to consider now is whether the soul is directly moved and participates in such direct movement.

There are four species of movement—locomotion, alteration,

diminution, growth; consequently if the soul is moved, it must be moved with one or several or all of these species of movement. Now if its movement is not incidental, there must be a movement natural to it, and, if so, as all the species enumerated involve place, place [15] too must be natural to it. But if the essence of soul be to move itself, its being moved cannot be incidental to it, as it is to what is white or three cubits long; they too can be moved, but only incidentally—what is moved is that of which white and three cubits long are the attributes, the body in which they inhere; hence *they* have no [20] place: but if the soul naturally partakes in movement, it follows that it must have a place.

Further, if there be a movement natural to the soul, there must be a counter-movement unnatural to it, and conversely. The same applies to rest as well as to movement; for the *terminus ad quem* of a thing's natural movement is the place of its natural rest, and similarly the *terminus ad quem* of its enforced [25] movement is the place of its enforced rest. But what meaning can be attached to enforced movements or rests of the soul, it is difficult even to imagine.

Further, if the natural movement of the soul be upward, the soul must be fire; if downward, it must be earth; for upward and downward movements are the characteristics of these bodies. The same reasoning applies to the intermediate movements, *termini*, and bodies. Further, since the soul is observed to originate [30] movement in the body, it is reasonable to suppose that it transmits to the body the movements by which it itself is moved, and so, reversing the order, we may infer from the movements of the body back to similar movements of the soul. Now the [406<sup>b</sup>1] body is moved by locomotion. Hence it would follow that the soul too must change either its place as a whole or the relative places of its parts. This carries with it the possibility that the soul might even quit its body and re-enter it, and with this would be involved the possibility of a resurrection of animals from the dead. But, it may be contended, the soul can be moved indirectly by something else; for an animal can be [5] pushed out of its course. Yes, but that to whose *essence* belongs the power of being moved by itself, cannot be moved by something else except incidentally, just as what is good by or in itself cannot owe its goodness to something external to it or to some end to which it is a means.

[10] If the soul is moved, the most probable view is that what moves it is sensible things.

We must note also that, if the soul moves itself, it must be the mover itself that is moved, so that it follows that if movement is in every case a displacement of that which is in movement, in that respect in which it is

said to be moved, the movement of the soul must be a departure from its essential nature, at least if its self-movement [15] is essential to it, not incidental.

Some go so far as to hold that the movements which the soul imparts to the body in which it is are the same in kind as those with which it itself is moved. An example of this is Democritus, who uses language like that of the comic dramatist Philippus, who accounts for the movements that Daedalus imparted to his wooden [20] Aphrodite by saying that he poured quicksilver into it; similarly Democritus says that the spherical atoms owing to their own ceaseless movements draw the whole body after them and so produce its movements. We must urge the question whether it is these very same atoms which produce rest also—how they could do so, it is difficult and even impossible to say. And, in general, we may object that it is not in this way that the soul appears to originate movement in animals—it is through [25] intention or process of thinking.

It is in the same fashion that the *Timaeus* tries to give a physical account of how the soul moves its body; the soul, it is there said, is in movement, and so owing to their mutual implication moves the body also. After compounding the soul-substance out of the elements and dividing it in accordance with the harmonic [30] numbers, in order that it may possess a connate sensibility for ‘harmony’ and that the whole may move in movements well attuned, the Demiurge bent the straight line into a circle; this single circle he divided into two circles united at two common [407<sup>a</sup>1] points; one of these he subdivided into seven circles. All this implies that the movements of the soul are identified with the local movements of the heavens.

Now, in the first place, it is a mistake to say that the soul is a magnitude. It is evident that Plato means the soul of the whole to be like the sort of soul which is [5] called thought—not like the sensitive or the desiderative soul, for the movements of neither of these are circular. Now thought is one and continuous in the sense in which the process of thinking is so, and thinking is identical with thoughts—these have a serial unity like that of number, not a unity like that of a magnitude. Hence thought cannot have that kind of continuity either; thought is either without parts or is continuous in some other way than that which characterizes a magnitude. [10] How, indeed, if it were a magnitude, could thought possibly think? Will it think with any one indifferently of its parts? In this case, the ‘part’ must be understood either in the sense of a magnitude or in the sense of a point (if a point *can* be called a part of a magnitude). If we accept the latter alternative, the points being infinite in

number, obviously thought can never exhaustively traverse them; if the former, thought must think the same thing over and over again, indeed an infinite number of times (whereas it is manifestly possible to think a thing once only). If contact of [15] any part whatsoever of itself with the object is all that is required, why need thought move in a circle, or indeed possess magnitude at all? On the other hand, if contact with the whole circle is necessary, what meaning can be given to the contact of the parts? Further, how could what has no parts think of what has parts, or what has parts think of what has none? We must identify the circle referred to with thought; for it is thought whose movement is thinking, and it is the circle whose movement is [20] revolution, so that if thinking is a movement of revolution, the circle which has this characteristic movement must be thought.<sup>5</sup>

If the circular movement is eternal, there must be something which thought is always thinking—what can this be? For all practical processes of thinking have limits—they all go on for the sake of something else, and all theoretical processes come to a close in the same way as accounts do. For every account is a definition or a [25] demonstration: demonstration has both a starting-point and may be said to end in a conclusion or inferred result (even if the process never reaches completion, at any rate it never returns upon itself again to its starting-point, it goes on assuming a fresh middle term or extreme, and moves straight forward, but circular movement returns to its starting-point); and definitions are all limited. [30]

Further, if the same revolution is repeated, mind must repeatedly think of the same object.

Further, thinking has more resemblance to a coming to rest or arrest than to a movement; the same may be said of inferring.

It might also be urged that what is difficult and enforced is incompatible with blessedness; if the movement of the soul is not<sup>6</sup> of its essence, movement of the soul [407<sup>b</sup>1] must be contrary to its nature. It must also be painful for the soul to be inextricably bound up with the body; furthermore, if, as is frequently said and widely accepted, [5] it is better for thought not to be embodied, the union must be for it undesirable.

Further, the cause of the revolution of the heavens is left obscure. It is not the essence of soul which is the cause of this circular movement—that movement is only incidental to soul—nor is the body its cause. Again, it is not even asserted that it is better that soul should be so moved; and yet the reason for which God caused the [10] soul to move in a circle can

only have been that movement was better for it than rest, and movement of this kind better than any other. But since this sort of consideration is more appropriate to another field of speculation, let us dismiss it for the present.

The view we have just been examining, in company with most theories about the soul, involves the following absurdity: they all join the soul to a body, or place it [15] in a body, without adding any specification of the reason of their union, or of the bodily conditions required for it. Yet such explanation can scarcely be omitted; for some community of nature is presupposed by the fact that the one acts and the other is acted upon, the one moves and the other is moved; but it is not the case that *any* two things are related to one another in these ways. All, however, that these thinkers do is to describe the specific characteristics of the soul; they do not try to determine [20] anything about the body which is to contain it, as if it were possible, as in the Pythagorean myths, that any soul could be clothed in any body—an absurd view, for each body seems to have a form and shape of its own. It is as absurd as to say [25] that the art of carpentry could embody itself in flutes; each art must use its tools, each soul its body.

4 · There is yet another opinion about soul, which has commended itself to many as no less probable than any of those we have hitherto mentioned, and has rendered public account of itself in the court of popular discussion. Its supporters [30] say that the soul is a kind of harmony; for harmony is a blend or composition of contraries, and the body is compounded out of contraries. Harmony, however, is a certain proportion or composition of the constituents blended, and soul can be neither the one nor the other of these. Further, the power of originating movement cannot belong to a harmony, while all concur in regarding this pretty well as a [408<sup>a</sup>1] principal attribute of soul. It is more appropriate to call health (or generally one of the good states of the body) a harmony than to predicate it of the soul. The absurdity becomes most apparent when we try to attribute the active and passive [5] affections of the soul to a harmony—it is difficult to harmonize them. Further, in using the word ‘harmony’ we have one or other of two cases in mind: the most proper sense is in relation to magnitudes which have motion and position, where harmony means their being compounded and harmonized in such a manner as to prevent the introduction of anything homogeneous; and the derived sense is that in which it means the ratio between the



constituents so blended; in neither of these senses is it plausible to predicate it of soul. That soul is a harmony in the sense of the [10] composition of the parts of the body is a view easily refutable; for there are many and various compoundings of the parts; of what is thought or the sensitive or the appetitive faculty the composition? And what is the composition which constitutes each of them? It is equally absurd to identify the soul with the ratio of the mixture; [15] for the mixture of the elements which makes flesh has a different ratio from that which makes bone. The consequence of this view will therefore be that distributed throughout the whole body there will be many souls, since every one of the bodily parts is a mixture of the elements, and the ratio of mixture is in each case a harmony, i.e. a soul.

From Empedocles at any rate we might demand an answer to the following question—for he says that each of the parts of the body is what it is in virtue of a [20] ratio between the elements: is the soul identical with this ratio, or is it not rather something over and above this which is formed in the parts? Is love the cause of any and every mixture, or only of those that are in the right ratio? Is love this ratio itself, or is love something over and above this? Such are the problems raised by this [25] account. But, on the other hand, if the soul is different from the mixture, why does it disappear at one and the same moment with that relation between the elements which constitutes flesh or the other parts of the animal body? Further, if the soul is not identical with the ratio of mixture, and it is consequently not the case that each of the parts has a soul, what is that which perishes when the soul quits the body?

[30] That the soul cannot either be a harmony, or be moved in a circle, is clear from what we have said. Yet that it can be moved incidentally is, as we said above, possible, and even that it can move itself, i.e. in the sense that *the vehicle* in which it is can be moved, and moved by it; in no other sense can the soul be moved in space.

More legitimate doubts might remain as to its movement in view of the following facts. We speak of the soul as being pained or pleased, being bold or [408<sup>b</sup>1] fearful, being angry, perceiving, thinking. All these are regarded as modes of movement, and hence it might be inferred that the soul is moved. This, however, does not necessarily follow. We may admit to the full that being pained or pleased, [5] or thinking, are movements (each of them a being moved), and that the movement is originated by the soul. For example we may regard anger or fear as such and such movements of the heart, and thinking as such and such another movement of that organ, or of some other; these modifications may arise

either from changes of place [10] in certain parts or from qualitative alterations (the special nature of the parts and the special modes of their changes being for our present purpose irrelevant). Yet<sup>7</sup> to say that it is the soul which is angry is as if we were to say that it is the soul that weaves or builds houses. It is doubtless better to avoid saying that the soul pities or learns or thinks, and rather to say that it is the man who does this with his soul. What we mean is not that the movement is in the soul, but that sometimes it [15] terminates in the soul and sometimes starts from it, sensation e.g. coming from without, and reminiscence starting from the soul and terminating with the movements or states of rest in the sense organs.

But thought seems to be an independent substance implanted within us and to be incapable of being destroyed. If it could be destroyed at all, it would be under the blunting influence of old age. What really happens is, however, exactly parallel to [20] what happens in the case of the sense organs; if the old man could recover the proper kind of eye, he would see just as well as the young man. The incapacity of old age is due to an affection not of the soul but of its vehicle, as occurs in drunkenness or disease. Thus it is that thinking and reflecting decline through the decay of some other inward part and are themselves impassible. Thinking, loving, and hating are [25] affections not of thought, but of that which has thought, so far as it has it. That is why, when this vehicle decays, memory and love cease; they were activities not of thought, but of the composite which has perished; thought is, no doubt, something more divine and impassible. That the soul cannot be moved is therefore clear from [30] what we have said, and if it cannot be moved at all, manifestly it cannot be moved by itself.

Of all the opinions we have enumerated, by far the most unreasonable is that which declares the soul to be a self-moving number; it involves in the first place all the impossibilities which follow from regarding the soul as moved, and in the second special absurdities which follow from calling it a number. How are we to imagine a [409<sup>a</sup>1] unit being moved? By what agency? What sort of movement can be attributed to what is without parts or internal differences? If the unit is both originative of movement and itself capable of being moved, it must contain difference.

Further, since they say a moving line generates a surface and a moving point a [5] line, the movements of the units must be lines (for a point is a unit having position, and the number of the soul is, of course, somewhere and has position).

Again, if from a number a number or a unit is subtracted, the remainder is another number; but plants and many animals when divided continue to live, and [10] each segment is thought to retain the same kind of soul.

It must be all the same whether we speak of units or corpuscles; for if the spherical atoms of Democritus became points, nothing being retained but their being a quantum, there must remain in each a moving and a moved part, just as there is in what is continuous; what happens has nothing to do with the size of the [15] atoms, it depends solely upon their being a quantum. That is why there must be something to originate movement in the units. If in the animal what originates movement is the soul, so also must it be in the case of the number, so that not the mover and the moved, but the mover only, will be the soul. But how is it possible for one of the units to fulfil this function? There must be *some* difference between such [20] a unit and all the other units, and what difference can there be between one unit-point and another except a difference of position? Thus if, on the one hand, these units within the body are different from the points, the units will be in the same place; for each unit will occupy a point. And yet, if there can be two in the same place, why cannot there be an infinite number? For if things can occupy an indivisible place, they must themselves be indivisible. If, on the other hand, the [25] points of the body are the number which is the soul, or if the number of the points in the body is the soul, why have not all bodies souls? For all bodies contain an *infinity* of points.

Further, how is it possible for these points to be isolated or separated from their [30] bodies, seeing that lines cannot be resolved into points?

5 · The result is, as we have said, that this view, while on the one side identical with that of those who maintain that soul is a subtle kind of body, is on the [409<sup>b</sup>1] other entangled in the absurdity peculiar to Democritus' way of describing the manner in which movement is originated by soul. For if the soul is present throughout the whole percipient body, there must, if the soul be a kind of body, be two bodies in the same place; and for those who call it a number, there must be [5] many points at one point, or every body must have a soul, unless the soul be a different sort of number—other, that is, than the points existing in a body. Another consequence that follows is that the animal must be moved by its number precisely in the way that Democritus explained its being moved. For what difference does it make whether we speak of small

spheres or of large units, or, quite simply, of units [10] in movement? One way or another, the movements of the animal must be due to their movements. Hence those who combine movement and number in the same subject lay themselves open to these and many other similar absurdities. It is impossible not only that these characters should give the definition of soul—it is impossible that they should even be incidental to it. The point is clear if the attempt [15] be made to start from this account and explain from it the affections and actions of the soul, e.g. reasoning, sensation, pleasure, pain, &c. For, to repeat what we have said earlier, it is not easy even to make a guess on that basis.

Such are the three ways in which soul has traditionally been defined: one group of thinkers declared it to be that which is most originaive of movement because it [20] moves itself, another group to be the subtlest and most incorporeal of all kinds of body. We have now sufficiently set forth the difficulties and inconsistencies to which these theories are exposed. It remains now to examine the doctrine that soul is composed of the elements.

The reason assigned for this doctrine is that thus the soul may perceive and [25] come to know everything that is; but the theory necessarily involves itself in many impossibilities. Its upholders assume that like is known by like, as though they were assuming that the soul is identical with the objects. But the elements are not the only things; there are many others, or, more exactly, an infinite number of others, formed out of the elements. Let us admit that the soul knows and perceives the [30] elements out of which each of these composites is made up; but by what means will it know or perceive the composite whole, e.g. what god, man, flesh, bone (or any other compound) is? For each *is*, not merely the elements of which it is composed, [410<sup>a</sup>1] but those elements combined in a determinate mode or ratio, as Empedocles himself says of bone,

The kindly Earth in its broad-bosomed moulds  
Won of clear Water two parts out of eight [5]  
And four of Fire; and so white bones were formed.<sup>8</sup>

Nothing, therefore, will be gained by the presence of the elements in the soul, unless there be also present there the ratios and the composition. Each element will indeed know its like, but there will be no knowledge of bone or man, unless they too are present in it. The impossibility of this needs no pointing out; for who would suggest [10] that a stone or a man is in the soul? The same applies to the good and the not-good, and so on.

Further, things are said to be in many ways: 'be' signifies of a 'this' or

substance, or a quantum, or a quale, or any other of the kinds of predicates we have distinguished. Does the soul consist of all of these or not? It does not appear that all [15] have common elements. Is the soul formed out of those elements alone which enter into substances? If so, how will it be able to know each of the other kinds of thing? Will it be said that each kind of thing has elements or principles of its own, and that the soul is formed out of these? In that case, the soul must be a quantum *and* a quale [20] *and* a substance. But all that can be made out of the elements of a quantum is a quantum, not a substance. These (and others like them) are the consequences of the view that the soul is composed of all the elements.

It is absurd, also, to say both that like is not capable of being affected by like, and that like is perceived and known by like; for perceiving, and also both thinking [25] and knowing, are, on their own assumption, ways of being affected or moved.

That there are many puzzles and difficulties raised by saying, as Empedocles does, that each set of things is known by means of its corporeal elements and by reference to something is shown by what we have just said which is like them; for all the parts of the animal body which consist wholly of earth such as bones, sinews, [410<sup>b</sup>1] and hair seem to be wholly insensitive and consequently not perceptive even of objects like themselves, as they ought to have been.

Further, each of the principles will have far more ignorance than knowledge; for though each of them will know one thing, there will be many of which it will be [5] ignorant—viz. all the others. Empedocles at any rate must conclude that his god is the least intelligent of all beings; for of him alone is it true that there is one element, Strife, which he does not know, while there is nothing which mortal beings do not know; for there is nothing which does not enter into their composition.

In general, why has not everything a soul, since everything either is an element, [10] or is formed out of one or several or all of the elements? Each must certainly know one or several or all.

The problem might also be raised, What is that which unifies the elements? The elements correspond, it would appear, to the matter; what unites them, whatever it is, is the supremely important factor. But it is impossible that there should be something superior to, and dominant over, the soul (and *a fortiori* over thought); it is reasonable to hold that thought is by nature most primordial and [15] dominant, while their statement is that it is the elements which are first of all that is.

All, both those who assert that the soul, because of its knowledge and perception of what is, is compounded out of the elements, and those who assert that it is of all things the most originate of movement, fail to take into consideration all kinds of soul. In fact not all beings that perceive can originate movement; there [20] appear to be certain animals which are stationary, and yet local movement is the only one, so it seems, which the soul originates in animals. And the same objection holds against all those who construct thought and the perceptive faculty out of the elements; for it appears that plants live, and yet are not endowed with locomotion or<sup>9</sup> perception, while a large number of animals are without discourse of reason. [25] Even if these points were waived and thought admitted to be a part of the soul (and so too the perceptive faculty), still, even so, there would be kinds and parts of soul of which they had failed to give any account.

The same objection lies against the view expressed in the 'Orphic' poems: there it is said that the soul comes in from the whole when breathing takes place, being borne in upon the winds. Now this cannot take place in the case of plants, nor indeed [411<sup>a</sup>1] in the case of certain animals, for not all breathe. This fact has escaped the notice of the holders of this view.

If we must construct the soul out of the elements, there is no necessity to suppose that all the elements enter into its construction; one element in each pair of contraries will suffice to enable it to discern both that element itself and its [5] contrary. By means of the straight line we know both itself and the curved—the carpenter's rule enables us to test both—but what is curved does not enable us to distinguish either itself or the straight.

Certain thinkers say that soul is intermingled in the whole universe, and it is perhaps for that reason that Thales came to the opinion that all things are full of gods. This presents some difficulties: why does the soul when it resides in air or fire [10] not form an animal, while it does so when it resides in mixtures of the elements, and that although it is held to be of higher quality when contained in the former? (One might add the question, why the soul in air is maintained to be higher and more immortal than that in animals.) Both possible ways of replying to the former question lead to absurdity or paradox; for it is beyond paradox to say that fire or air [15] is an animal, and it is absurd to refuse the name of animal to what has soul in it. The opinion that the elements have soul in them seems to have arisen from the doctrine that a whole must be homogeneous with its parts. If it is true that animals become animate by

drawing into themselves a portion of what surrounds them, the partisans of this view are bound to say that the soul too is homogeneous with its parts. If the [20] air sucked in is homogeneous, but soul heterogeneous, clearly while some part of soul will exist in the inbreathed air, some other part will not. The soul must either be homogeneous, or such that there are some parts of the whole in which it is not to be found.

From what has been said it is now clear that knowing as an attribute of soul cannot be explained by soul's being composed of the elements, and that it is neither [25] sound nor true to speak of soul as moved. But since knowing, perceiving, opining, and further desiring, wishing, and generally all other modes of appetition, belong to soul, and the local movements of animals, and growth, maturity, and decay are produced by the soul, we must ask whether each of these is an attribute of the soul as a whole, i.e. whether it is with the whole soul we think, perceive, move ourselves, [411<sup>b</sup>1] act or are acted upon, or whether each of them requires a different part of the soul? So too with regard to life. Does it depend on one of the parts of soul? Or is it dependent on more than one? Or on all? Or has it some quite other cause?

Some hold that the soul is divisible, and that we think with one part and desire [5] with another. If, then, its nature admits of its being divided, what can it be that holds the parts together? Surely not the body; on the contrary it seems rather to be the soul that holds the body together; at any rate when the soul departs the body disintegrates and decays. If, then, there is something else which makes the soul one, this would have the best right to the name of soul, and we shall have to repeat for it [10] the question: Is *it* one or multipartite? If it is one, why not at once admit that *the soul* is one? If it has parts, once more the question must be put: What holds *its* parts together, and so *ad infinitum*?

The question might also be raised about the parts of the soul: What is the separate rôle of each in relation to the body? For, if the whole soul holds together [15] the whole body, we should expect each part of the soul to hold together a part of the body. But this seems an impossibility; it is difficult even to imagine what sort of bodily part thought will hold together, or how it will do this.

It is a fact of observation that plants and certain insects go on living when [20] divided into segments; this means that each of the segments has a soul in it identical in species, though not numerically; for both of the segments for a time possess the power of sensation and local movement. That this does not last is not surprising, for they no longer possess the organs necessary for self-maintenance. But, all the same, [25]

in each of the parts there are present all the parts of soul, and the souls so present are homogeneous with one another and with the whole—the several parts of the soul being inseparable from one another, although the whole soul is<sup>10</sup> divisible. It seems that the principle found in plants is also a kind of soul; for this is the only principle which is common to both animals and plants; and this exists in isolation from the [30] principle of sensation, though there is nothing which has the latter without the former.



## BOOK II

[412<sup>a</sup>1] 1 · Let the foregoing suffice as our account of the views concerning the soul which have been handed on by our predecessors; let us now make as it were a completely fresh start, endeavouring to answer the question, What is soul? i.e. to [5] formulate the most general possible account of it.

We say that substance is one kind of what is, and that in several senses: in the sense of matter or that which in itself is not a this, and in the sense of form or essence, which is that precisely in virtue of which a thing is called a this, and thirdly in the sense of that which is compounded of both. Now matter is potentiality, form [10] actuality; and actuality is of two kinds, one as e.g. knowledge, the other as e.g. reflecting.

Among substances are by general consent reckoned bodies and especially natural bodies; for they are the principles of all other bodies. Of natural bodies some have life in them, others not; by life we mean self-nutrition and growth and decay. It [15] follows that every natural body which has life in it is a substance in the sense of a composite.

Now given that there are bodies of such and such a kind, viz. having life, the soul cannot be a body; for the body is the subject or matter, not what is attributed to [20] it. Hence the soul must be a substance in the sense of the form of a natural body having life potentially within it. But substance is actuality, and thus soul is the actuality of a body as above characterized. Now there are two kinds of actuality corresponding to knowledge and to reflecting. It is obvious that the soul is an actuality like knowledge; for both sleeping and waking presuppose the existence of [25] soul, and of these waking corresponds to reflecting, sleeping to knowledge possessed but not employed, and knowledge of something is temporally prior.

That is why the soul is an actuality of the first kind of a natural body having life potentially in it. The body so described is a body which is organized. The parts of plants in spite of their extreme simplicity are organs; e.g. the leaf serves to shelter [412<sup>b</sup>1] the pericarp, the pericarp to shelter the fruit, while the roots of plants are analogous to the mouth of animals, both serving for the absorption of food. If, then, we have to give a general formula applicable to all kinds of soul, we must describe it as an

actuality of the first kind of a natural organized body. That is why we can dismiss as [5] unnecessary the question whether the soul and the body are one: it is as though we were to ask whether the wax and its shape are one, or generally the matter of a thing and that of which it is the matter. Unity has many senses (as many as 'is' has), but the proper one is that of actuality.

We have now given a general answer to the question, What is soul? It is [10] substance in the sense which corresponds to the account of a thing. That means that it is what it is to be for a body of the character just assigned. Suppose that a tool, e.g. an axe, were a *natural* body, then being an axe would have been its essence, and so its soul; if this disappeared from it, it would have ceased to be an axe, except in name. As it is, it is an axe; for it is not of a body of that sort that what it is to be, i.e. [15] its account, is a soul, but of a natural body of a particular kind, viz. one having in itself the power of setting itself in movement and arresting itself. Next, apply this doctrine in the case of the parts of the living body. Suppose that the eye were an animal—sight would have been its soul, for sight is the substance of the eye which corresponds to the account, the eye being merely the matter of seeing; when seeing [20] is removed the eye is no longer an eye, except in name—no more than the eye of a statue or of a painted figure. We must now extend our consideration from the parts to the whole living body; for what the part is to the part, that the whole faculty of sense is to the whole sensitive body as such.

We must not understand by that which is potentially capable of living what has [25] lost the soul it had, but only what still retains it; but seeds and fruits are bodies which are potentially of that sort. Consequently, while waking is actuality in a sense corresponding to the cutting and the seeing, the soul is actuality in the sense corresponding to sight and the power in the tool; the body corresponds to what is in [413<sup>a</sup>1] potentiality; as the pupil *plus* the power of sight constitutes the eye, so the soul *plus* the body constitutes the animal.

From this it is clear that the soul is inseparable from its body, or at any rate that certain parts of it are (if it has parts)—for the [5] actuality of some of them is the actuality of the parts themselves. Yet some may be separable because they are not the actualities of any body at all. Further, we have no light on the problem whether the soul may not be the actuality of its body in the sense in which the sailor is the actuality of the ship.<sup>11</sup>

This must suffice as our sketch or outline of the nature of soul. [10]

2 · Since what is clear and more familiar in account emerges from what in itself is confused but more observable by us, we must reconsider our results from this point of view. For it is not enough for a definitional account to express as most [15] now do the mere fact; it must include and exhibit the cause also. At present definitions are given in a form analogous to the conclusion of an argument; e.g. What is squaring? The construction of an equilateral rectangle equal to a given oblong rectangle. Such a definition is in form equivalent to a conclusion. One that tells us that squaring is the discovery of a mean proportional discloses the cause of [20] what is defined.

We resume our inquiry from a fresh starting-point by calling attention to the fact that what has soul in it differs from what has not in that the former displays life. Now this word has more than one sense, and provided any one alone of these is found in a thing we say that thing is living—viz. thinking or perception or local [25] movement and rest, or movement in the sense of nutrition, decay and growth. Hence we think of plants also as living, for they are observed to possess in themselves an origivative power through which they increase or decrease in all spatial directions; they do not grow up but not down—they grow alike in both, indeed in all, directions; [30] and that holds for everything which is constantly nourished and continues to live, so long as it can absorb nutriment.

This power of self-nutrition can be separated from the other powers mentioned, but not they from it—in mortal beings at least. The fact is obvious in plants; for it is the only psychic power they possess.

[413<sup>b</sup>1] This is the origivative power the possession of which leads us to speak of things as *living* at all, but it is the possession of sensation that leads us for the first time to speak of living things as *animals*; for even those beings which possess no power of local movement but do possess the power of sensation we call animals and not merely living things.

The primary form of sense is touch, which belongs to all animals. Just as the [5] power of self-nutrition can be separated from touch and sensation generally, so touch can be separated from all other forms of sense. (By the power of self-nutrition we mean that part of the soul which is common to plants and animals: all animals whatsoever are observed to have the sense of touch.) What the explanation of these [10] two facts is, we must discuss later. At present we must confine ourselves to saying that soul is the source of these phenomena and is characterized by them, viz. by the powers of self-nutrition, sensation, thinking, and movement.

Is each of these a soul or a part of a soul? And if a part, a part merely [15] distinguishable by definition or a part distinct in local situation as well? In the case of certain of these powers, the answers to these questions are easy, in the case of others we are puzzled what to say. Just as in the case of plants which when divided are observed to continue to live though separated from one another (thus showing that in *their* case the soul of each individual plant was actually one, potentially [20] many), so we notice a similar result in other varieties of soul, i.e. in insects which have been cut in two; each of the segments possesses both sensation and local movement; and if sensation, necessarily also imagination and appetition; for, where there is sensation, there is also pleasure and pain, and, where these, necessarily also desire.

[25] We have no evidence as yet about thought or the power of reflexion; it seems to be a different kind of soul, differing as what is eternal from what is perishable; it alone is capable of being separated. All the other parts of soul, it is evident from what we have said, are, in spite of certain statements to the contrary, incapable of separate existence though, of course, distinguishable by definition. If opining is distinct from perceiving, to be capable of opining and to be capable of perceiving [30] must be distinct, and so with all the other forms of living above enumerated. Further, some animals possess all these parts of soul, some certain of them only, others one only (this is what enables us to classify animals); the cause must be [414<sup>a</sup>1] considered later. A similar arrangement is found also within the field of the senses; some classes of animals have all the senses, some only certain of them, others only one, the most indispensable, touch.

Since the expression ‘that whereby we live and perceive’ has two meanings, just like the expression ‘that whereby we know’—that may mean either knowledge [5] or the soul, for we can speak of knowing *by* either, and similarly that whereby we are in health may be either health or the body or some part of the body; and since of these knowledge or health is a form, essence, or account, or if we so express it an activity of a recipient matter—knowledge of what is capable of knowing, health of [10] what is capable of being made healthy (for the activity of that which is capable of originating change seems to take place in what is changed or altered); further, since it is the soul by which primarily we live, perceive, and think—it follows that the soul must be an account and essence, not matter or a subject. For, as we said, the word substance has three meanings—form, matter, and the complex of both—and [15] of these matter is potentiality, form actuality. Since then the complex here is the

living thing, the body cannot be the actuality of the soul; it is the soul which is the actuality of a certain kind of body. Hence the rightness of the view that the soul cannot be without a body, while it cannot *be* a body; it is not a body but something [20] relative to a body. That is why it is *in* a body, and a body of a definite kind. It was a mistake, therefore, to do as former thinkers did, merely to fit it into a body without adding a definite specification of the kind or character of that body, although evidently one chance thing will not receive another. It comes about as reason [25] requires: the actuality of any given thing can only be realized in what is already potentially that thing, i.e. in a matter of its own appropriate to it. From all this it is plain that soul is an actuality or account of something that possesses a potentiality of being such.

3 · Of the psychic powers above enumerated some kinds of living things, as we have said, possess all, some less than all, others one only. Those we have [30] mentioned are the nutritive, the appetitive, the sensory, the locomotive, and the power of thinking. Plants have none but the first, the nutritive, while another order of living things has this *plus* the sensory. If any order of living things has the [414<sup>b</sup>1] sensory, it must also have the appetitive; for appetite is the genus of which desire, passion, and wish are the species; now all animals have one sense at least, viz. touch, and whatever has a sense has the capacity for pleasure and pain and therefore has pleasant and painful objects present to it, and wherever these are present, there is [5] desire, for desire is appetition of what is pleasant. Further, all animals have the sense for food (for touch is the sense for food; the food of all living things consists of what is dry, moist, hot, cold, and these are the qualities apprehended by touch) all other sensible qualities are apprehended by touch only indirectly. Sounds, colours, [10] and odours contribute nothing to nutriment; flavours fall within the field of tangible qualities. Hunger and thirst are forms of desire, hunger a desire for what is dry and hot, thirst a desire for what is cold and moist; flavour is a sort of seasoning added to both. We must later clear up these points, but at present it may be enough to say [15] that all animals that possess the sense of touch have also appetition. The case of imagination is obscure; we must examine it later. Certain kinds of animals possess in addition the power of locomotion, and still others, i.e. man and possibly another order like man or superior to him, the power of thinking and thought. It is now [20] evident that a single definition can be given of soul only in the same sense as one can be given of figure. For, as in that case there is no figure apart from triangle and those that follow

in order, so here there is no soul apart from the forms of soul just enumerated. It is true that a common definition can be given for figure which will fit all figures without expressing the peculiar nature of any figure. So here in the [25] case of soul and its specific forms. Hence it is absurd in this and similar cases to look for a common definition which will not express the peculiar nature of anything that is and will not apply to the appropriate indivisible species, while at the same time omitting to look for an account which will. The cases of figure and soul are exactly parallel; for the particulars subsumed under the common name in both cases—[30] figures and living beings—constitute a series, each successive term of which potentially contains its predecessor, e.g. the square the triangle, the sensory power the self-nutritive. Hence we must ask in the case of each order of living things, What is its soul, i.e. What is the soul of plant, man, beast? Why the terms are [415<sup>a</sup>1] related in this serial way must form the subject of examination. For the power of perception is never found apart from the power of self-nutrition, while—in plants—the latter is found isolated from the former. Again, no sense is found apart [5] from that of touch, while touch is found by itself; many animals have neither sight, hearing, nor smell. Again, among living things that possess sense some have the power of locomotion, some not. Lastly, certain living beings—a small minority— possess calculation and thought, for (among mortal beings) those which possess [10] calculation have all the other powers above mentioned, while the converse does not hold—indeed some live by imagination alone, while others have not even imagination. Reflective thought presents a different problem.

It is evident that the way to give the most adequate definition of soul is to seek in the case of *each* of its forms for the most appropriate definition.

4 · It is necessary for the student of these forms of soul first to find a [15] definition of each, expressive of what it is, and then to investigate its derivative properties, &c. But if we are to express what each is, viz. what the thinking power is, or the perceptive, or the nutritive, we must go farther back and first give an account of thinking or perceiving; for activities and actions are prior in definition to [20] potentialities. If so, and if, still prior to them, we should have reflected on their correlative objects, then for the same reason we must first determine about them, i.e. about food and the objects of perception and thought.

It follows that first of all we must treat of nutrition and reproduction,

for the nutritive soul is found along with all the others and is the most primitive and widely distributed power of soul, being indeed that one in virtue of which all are said to [25] have life. The acts in which it manifests itself are reproduction and the use of food, because for any living thing that has reached its normal development and which is un mutilated, and whose mode of generation is not spontaneous, the most natural act is the production of another like itself, an animal producing an animal, a plant a plant, in order that, as far as its nature allows, it may partake in the eternal and divine. That is the goal towards which all things strive, that for the sake of which they do whatsoever their nature renders possible. The phrase 'for the sake of which' [415<sup>b</sup>1] is ambiguous; it may mean either the end to achieve which, or the being in whose interest, the act is done. Since then no living thing is able to partake in what is eternal and divine by uninterrupted continuance (for nothing perishable can for ever remain one and the same), it tries to achieve that end in the only way possible [5] to it, and success is possible in varying degrees; so it remains not indeed as the self-same individual but continues its existence in something like itself—not numerically but specifically one.

The soul is the cause or source of the living body. The terms cause and source have many senses. But the soul is the cause of its body alike in all three senses which [10] we explicitly recognize. It is the source of movement, it is the end, it is the essence of the whole living body.

That it is the last, is clear; for in everything the essence is identical with the cause of its being, and here, in the case of living things, their being is to live, and of their being and their living the soul in them is the cause or source. Further, the actuality of whatever is potential is identical with its account.

It is manifest that the soul is also the final cause. For nature, like thought, [15] always does whatever it does for the sake of something, which something is its end. To that something corresponds in the case of animals the soul and in this it follows the order of nature; all natural bodies are organs of the soul. This is true of those that enter into the constitution of plants as well as of those which enter into that of animals. This shows that that for the sake of which they are is soul. That for the [20] sake of which has two senses, viz. the end to achieve which, and the being in whose interest, anything is or is done.

The soul is also the cause of the living body as the original source of local movement. The power of locomotion is not found, however, in all living things. But change of quality and change of quantity are also due to

the soul. Sensation is held to be a qualitative alteration, and nothing except what has soul in it is capable of [25] sensation. The same holds of growth and decay; nothing grows or decays naturally except what feeds itself, and nothing feeds itself except what has a share of life in it.

Empedocles is wrong in adding that growth in plants is to be explained, the downward rooting by the natural tendency of earth to travel downwards, and the [416<sup>a</sup>1] upward branching by the similar natural tendency of fire to travel upwards. For he misinterprets up and down; up and down are not for all things what they are for the [5] whole world: if we are to distinguish and identify organs according to their functions, the roots of plants are analogous to the head in animals. Further, we must ask what is the force that holds together the earth and the fire which tend to travel in contrary directions; if there is no counteracting force, they will be torn asunder; if [10] there is, this must be the soul and the cause of nutrition and growth. By some the element of fire is held to be the cause of nutrition and growth, for it alone of the bodies or<sup>12</sup> elements is observed to feed and increase itself. Hence the suggestion that in both plants and animals it is it which is the operative force. A concurrent cause in a sense it certainly is, but not the principal cause; that is rather the soul; for [15] while the growth of fire goes on without limit so long as there is a supply of fuel, in the case of all complex wholes formed in the course of nature there is a limit or ratio which determines their size and increase, and limit and ratio are marks of soul but not of fire, and belong to the side of account rather than that of matter.

Nutrition and reproduction are due to one and the same psychic power. It is [20] necessary first to give precision to our treatment of food, for it is by this function of absorbing food that this psychic power is distinguished from all the others. The current view is that what serves as food to a living thing is what is contrary to it—not that in every pair of contraries each is food to the other: to be food a contrary must not only be transformable into the other and vice versa, it must also in so doing increase the bulk of the other. Many a contrary is transformed into its [25] other and vice versa, where neither is even a quantum e.g. an invalid into a healthy subject. It is clear that not even those contraries are food to one another in precisely the same sense; water may be said to feed fire, but not fire water. Where the members of the pair are elementary bodies only one of the contraries, it would appear, can be said to feed the other. But there is a difficulty here. One set of [30] thinkers assert that like is fed, as well as increased in amount, by like. Another set,



as we have said, maintain the very reverse, viz. that what feeds and what is fed are contrary to one another; like, they argue, is incapable of being affected by like; but food is changed in the process of digestion, and change is always to what is opposite or to what is intermediate. Further, food is acted upon by what is nourished by it, [416<sup>b</sup>1] not the other way around, as timber is worked by a carpenter and not conversely; there is a change in the carpenter but it is merely a change from not-working to working. In answering this problem it makes all the difference whether we mean by 'the food' the 'finished' or the 'raw' product. If we use the word food of both, viz. of [5] the undigested and the digested matter, we can justify both the rival accounts of it; taking food in the sense of undigested matter, it is the contrary of what is fed by it, taking it as digested it is like what is fed by it. Consequently it is clear that in a certain sense we may say that both parties are right, both wrong.

[10] Since nothing except what is alive can be fed, what is fed is the besouled body and just because it has soul in it. Hence food is essentially related to what has soul in it. Food has a power which is other than the power to increase the bulk of what is fed by it; so far forth as what has soul in it is a quantum, food may increase its quantity, but it is only so far as what has soul in it is a 'this-somewhat' or substance that food acts as food; in that case it maintains the being of what is fed, and that continues to be what it is so long as the process of nutrition continues. Further, it is the agent in generation, i.e. not the generation of the individual fed but the reproduction of [15] another like it; the substance of the individual fed is already in existence; nothing generates itself, but only maintains itself.

Hence the psychic power which we are now studying may be described as that which tends to maintain whatever has this power in it of continuing such as it was, and food helps it to do its work. That is why, if deprived of food, it must cease to be.

The process of nutrition involves three factors, what is fed, that wherewith it is [20] fed, and what does the feeding; of these what feeds is the first soul, what is fed is the body which has that soul in it, and that with which it is fed is the food. But since it is right to call things after the ends they realize, and the end of this soul is to generate another being like that in which it is, the first soul ought to be named the [25] reproductive soul. The expression 'wherewith it is fed' is ambiguous just as is the expression 'wherewith the ship is steered'; that may mean either the hand or the rudder, i.e. either what is moved and sets in movement, or what is merely moved. All food must be capable of being digested, and

what produces digestion is warmth; that is why everything that has soul in it possesses warmth.

We have now given an outline account of the nature of food; further details [30] must be given in the appropriate place.

5 · Having made these distinctions let us now speak of sensation in the widest sense. Sensation depends, as we have said, on a process of movement or affection from without, for it is held to be some sort of change of quality. Now some thinkers assert that like is affected only by like; in what sense this is possible and in [417<sup>a</sup>1] what sense impossible, we have explained in our general discussion of acting and being acted upon.<sup>13</sup>

Here arises a problem: why do we not perceive the senses themselves, or why without the stimulation of external objects do they not produce sensation, seeing that they contain in themselves fire, earth, and all the other elements, of which—either in themselves or in respect of their incidental attributes—there is [5] perception? It is clear that what is sensitive is so only potentially, not actually. The power of sense is parallel to what is combustible, for that never ignites itself spontaneously, but requires an agent which has the power of starting ignition; otherwise it could have set itself on fire, and would not have needed actual fire to set it ablaze.

We use the word ‘perceive’ in two ways, for we say that what has the power to [10] hear or see, ‘sees’ or ‘hears’, even though it is at the moment asleep, and also that what is actually seeing or hearing, ‘sees’ or ‘hears’. Hence ‘sense’ too must have two meanings, sense potential, and sense actual. Similarly ‘to be a sentient’ means either to have a certain power or to manifest a certain activity. To begin with let us speak [15] as if there were no difference between being moved or affected, and being active, for movement is a kind of activity—an imperfect kind, as has elsewhere been explained. Everything that is acted upon or moved is acted upon by an agent which is actually at work. Hence it is that in one sense, as has already been stated, what acts and what [20] is acted upon are like, in another unlike; for the unlike is affected, and when it has been affected it is like.

But we must now distinguish different senses in which things can be said to be potential or actual; at the moment we are speaking<sup>14</sup> as if each of these phrases had only one sense. We can speak of something as a knower either as when we say that man is a knower, meaning that man

falls within the class of beings that know or [25] have knowledge, or as when we are speaking of a man who possesses a knowledge of grammar; each of these has a potentiality, but not in the same way: the one because his kind or matter is such and such, the other because he can reflect when he wants to, if nothing external prevents him. And there is the man who is already reflecting—he is a knower in actuality and in the most proper sense is knowing, e.g. [30] this A. Both the former are potential knowers, who realize their respective potentialities, the one by change of quality, i.e. repeated transitions from one state to its opposite under instruction, the other in another way by the transition from the [417<sup>b</sup>1] inactive possession of sense<sup>15</sup> or grammar to their active exercise.

Also the expression ‘to be acted upon’ has more than one meaning; it may mean either the extinction of one of two contraries by the other, or the maintenance of what is potential by the agency of what is actual and already like what is acted [5] upon, as actual to potential. For what possesses knowledge becomes an actual knower by a transition which is either not an alteration of it at all (being in reality a development into its true self or actuality) or at least an alteration in a quite different sense.

Hence it is wrong to speak of a wise man as being ‘altered’ when he uses his wisdom, just as it would be absurd to speak of a builder as being altered when he is using his skill in building a house.

[10] What in the case of thinking or understanding leads from potentiality to actuality ought not to be called teaching but something else. That which starting with the power to know learns or acquires knowledge through the agency of one who actually knows and has the power of teaching either ought not to be said ‘to be acted [15] upon’ at all—or else we must recognize two senses of alteration, viz. the change to conditions of privation, and the change to a thing’s dispositions and to its nature.

In the case of what is to possess sense, the first transition is due to the action of the male parent and takes place before birth so that at birth the living thing is, in respect of sensation, at the stage which corresponds to the possession of knowledge. Actual sensation corresponds to the stage of the exercise of knowledge. But between [20] the two cases compared there is a difference; the objects that excite the sensory powers to activity, the seen, the heard, &c, are outside. The ground of this difference is that what actual sensation apprehends is individuals, while what knowledge apprehends is universals, and these are in a sense within the soul itself. That is why a man can think when he wants to but his sensation does not depend upon himself—a sensible object must be there. A similar

statement must be made [25] about our knowledge of what is sensible—on the same ground, viz. that the sensible objects are individual and external.

A later more appropriate occasion may be found thoroughly to clear up all this. At present it must be enough to recognize the distinctions already drawn; a thing [30] may be said to be potential in either of two senses, either in the sense in which we might say of a boy that he may become a general or in the sense in which we might say the same of an adult, and there are two corresponding senses of the term ‘a potential sentient’. There are no separate names for the two stages of potentiality; [418<sup>a</sup>1] we have pointed out that they are different and how they are different. We cannot help using the incorrect terms ‘being acted upon or altered’ of the two transitions involved. As we have said, what has the power of sensation is potentially like what the perceived object is actually; that is, while at the beginning of the process of its being acted upon the two interacting factors are dissimilar, at the end the one acted [5] upon is assimilated to the other and is identical in quality with it.

6 · In dealing with each of the senses we shall have first to speak of the objects which are perceptible by each. The term ‘object of sense’ covers three kinds of objects, two kinds of which we call perceptible in themselves, while the remaining one is only incidentally perceptible. Of the first two kinds one consists of what is [10] special to a single sense, the other of what is common to any and all of the senses. I call by the name of special object of this or that sense that which cannot be perceived by any other sense than that one and in respect of which no error is possible; in this sense colour is the special object of sight, sound of hearing, flavour of taste. Touch, indeed, discriminates more than one set of different qualities. Each sense has one kind of object which it discerns, and never errs in reporting that what [15] is before it is colour or sound (though it may err as to what it is that is coloured or where that is, or what it is that is sounding or where that is). Such objects are what we call the special objects of this or that sense.

Common sensibles are movement, rest, number, figure, magnitude; these are not special to any one sense, but are common to all. There are at any rate certain kinds of movement which are perceptible both by touch and by sight.

We speak of an incidental object of sense where e.g. the white object which we [20] see is the son of Diares; here because being the son of

Diaphanous is incidental to the white which is perceived, we speak of the whiteness of Diaphanous as being incidentally perceived. That is why it in no way as such affects the senses. Of the things perceptible in themselves, the special objects are properly called perceptible and it is to them that in the nature of things the structure of each several sense is adapted. [25]

7 · The object of sight is the visible, and what is visible is colour and a certain kind of object which can be described in words but which has no single name; what we mean by the second will be abundantly clear as we proceed. Whatever is visible is colour and colour is what lies upon what is in itself visible; ‘in itself here means [30] not that visibility is involved in the definition of what thus underlies colour, but that that substratum contains in itself the cause of visibility. Every colour has in it the [418<sup>b</sup>1] power to set in movement what is actually transparent; that power constitutes its very nature. That is why it is not visible except with the help of light; it is only in light that the colour of a thing is seen. Hence our first task is to explain what light is.

Now there clearly is something which is transparent, and by ‘transparent’ I [5] mean what is visible, and yet not visible in itself, but rather owing its visibility to the colour of *something else*; of this character are air, water, and many solid bodies. Neither air nor water is transparent because it is air or water; they are transparent because each of them has contained in it a certain substance which is the same in both and is also found in the eternal upper body. Of this substance light is the [10] activity—the activity of what is transparent *qua* transparent; where this power is present, there is also the potentiality of the contrary, viz. darkness. Light is as it were the proper colour of what is transparent, and exists whenever the potentially transparent is excited to actuality by the influence of fire or something resembling ‘the uppermost body’; for fire too contains something which is one and the same with the substance in question.

We have now explained what the transparent is and what light is; light is [15] neither fire nor any kind whatsoever of body nor an efflux from any kind of body (if it were, it would again itself be a kind of body)—it is the presence of fire or something resembling fire in what is transparent. It is certainly not a body, for two bodies cannot be present in the same place. The opposite of light is darkness; darkness is the absence from what is transparent of the corresponding positive state [20] above characterized; clearly therefore, light is just the presence of that.

Empedocles (and with him all others who used the same forms of expression) was wrong in speaking of light as 'travelling' or being at a given moment between the earth and its envelope, its movement being unobservable by us; that view is contrary both to the clear evidence of argument and to the observed facts; if the [25] distance traversed were short, the movement might have been unobservable, but where the distance is from extreme East to extreme West, the strain upon our powers of belief is too great.

What is capable of taking on colour is what in itself is colourless, as what can take on sound is what is soundless; what is colourless includes what is transparent and what is invisible or scarcely visible, i.e. what is dark. The latter is the same as [30] what is transparent, when it is potentially, not of course when it is actually transparent; it is the same substance which is now darkness, now light.

[419<sup>a</sup>1] Not everything that is visible depends upon light for its visibility. This is only true of the 'proper' colour of things. Some objects of sight which in light are invisible, in darkness stimulate the sense; that is, things that appear fiery or shining. This class of objects has no simple common name, but instances of it are fungi, [5] horns, heads, scales, and eyes of fish. In none of these is what is seen their own proper colour. Why we see these at all is another question. At present what is obvious is that what is seen in light is always colour. That is why without the help of light colour remains invisible. Its being colour at all means precisely its having in it the power to set in movement what is actually transparent, and the actuality of what [10] is transparent is just light.

The following makes the necessity of a medium clear. If what has colour is placed in immediate contact with the eye, it cannot be seen. Colour sets in movement what is transparent, e.g. the air, and that, extending continuously from the object of the organ, sets the latter in movement. Democritus misrepresents the [15] facts when he expresses the opinion that if the interspace were empty one could distinctly see an ant on the vault of the sky; that is an impossibility. Seeing is due to an affection or change of what has the perceptive faculty, and it cannot be affected by the seen colour itself; it remains that it must be affected by what comes between. Hence it is indispensable that there be *something* in between—if there were [20] nothing, so far from seeing with greater distinctness, we should see nothing at all.

We have now explained the cause why colour cannot be seen otherwise than in light. Fire on the other hand is seen both in darkness and in light; this double possibility follows necessarily from our theory,

for it is just fire that makes what is potentially transparent actually transparent.

The same account holds also of sound and smell; if the object of either of these [25] senses is in immediate contact with the organ no sensation is produced. In both cases the object sets in movement only what lies between, and this in turn sets the organ in movement: if what sounds or smells is brought into immediate contact with the organ, no sensation will be produced. The same, in spite of all appearances, applies also to touch and taste; why there is this apparent difference will be clear [30] later. What comes between in the case of sounds is air; the corresponding medium in the case of smell has no name. But, corresponding to what is transparent in the case of colour, there is a quality found both in air and water, which serves as a medium for what has smell; for animals that live in water seem to possess the sense of smell. Men and all other land animals that breathe, perceive smells only when they [419<sup>b</sup>1] breathe air in. The explanation of this too will be given later.

8 · Now let us, to begin with, make certain distinctions about sound and hearing.

Sound may mean either of two things—actual and potential sound. There are [5] certain things which, as we say, have no sound, e.g. sponges or wool, others which have, e.g. bronze and in general all things which are smooth and solid—the latter are said to have a sound because they can make a sound, i.e. can generate actual sound between themselves and the organ of hearing.

Actual sound is always of something in relation to something and in something; for it is generated by an impact. Hence it is impossible for one body only [10] to generate a sound—there must be a body impinging and a body impinged upon; what sounds does so by striking against something else, and this is impossible without a movement from place to place.

As we have said, not all bodies can by impact on one another produce sound; impact on wool makes no sound, while the impact on bronze or any body which is smooth and hollow does. Bronze gives out a sound when struck because it is smooth; [15] bodies which are hollow owing to reflection repeat the original impact over and over again, the body originally set in movement being unable to escape from the concavity.

Further, sound is heard both in air and in water, though less

distinctly in the latter. Yet neither air nor water is the principal cause of sound. What is required for [20] the production of sound is an impact of two solids against one another and against the air. The latter condition is satisfied when the air impinged upon does not retreat before the blow, i.e. is not dissipated by it.

That is why it must be struck with a sudden sharp blow, if it is to sound—the movement of the whip must outrun the dispersion of the air, just as one<sup>16</sup> might get in a stroke at a heap or whirl of sand as it was travelling rapidly past.

[25] An echo occurs, when, a mass of air having been unified, bounded, and prevented from dissipation by the containing walls of a vessel, the air rebounds from this mass of air like a ball from a wall. It is probable that in all generation of sound echo takes place, though it is frequently only indistinctly heard. What happens here must be analogous to what happens in the case of light; light is always reflected—[30] otherwise it would not be diffused and outside what was directly illuminated by the sun there would be blank darkness; but this reflected light is not always strong enough, as it is when it is reflected from water, bronze, and other smooth bodies, to cast a shadow, which is the distinguishing mark by which we recognize light.

It is rightly said that an empty space plays the chief part in the production of hearing, for people think that the air is empty, and the air is what causes hearing, [420<sup>a</sup>1] when it is set in movement as one continuous mass; but owing to its friability it emits no sound, unless what is impinged upon is smooth. But then it becomes a single mass at the same time because of the surface; for the surface of the smooth object is single.

What has the power of producing sound is what has the power of setting in movement a single mass of air which is continuous up to the organ of hearing. The organ of hearing is physically united with air, and because it is in air, the air inside [5] is moved concurrently with the air outside. Hence animals do not hear with all parts of their bodies, nor do all parts admit of the entrance of air; for even the part which can be moved and can sound has not air everywhere in it. Air in itself is, owing to its friability, quite soundless; only when its dissipation is prevented is its movement sound. The air in the ear is built into a chamber just to prevent this dissipating [10] movement, in order that the animal may accurately apprehend all varieties of the movements of the air outside. That is why we hear also in water, viz. because the water cannot get into the air chamber or even, owing to the spirals, into the outer ear. If this



does happen, hearing ceases, as it also does if the tympanic membrane is damaged, just as sight ceases if the membrane covering the pupil is damaged. It is [15] also a sign of whether we hear or not that the ear does or does not reverberate like a horn; the air inside the ear has always a movement of its own, but the sound we hear is always the sounding of something else, not of the organ itself. That is why we say that we hear with what is empty and echoes, viz. because what we hear with is a chamber which contains a bounded mass of air.

Which is it that sounds, the striking body or the struck? Is not the answer that [20] it is both, but each in a different way? Sound is a movement of what can rebound from a smooth surface when struck against it. As we have explained not everything sounds when it strikes or is struck, e.g. if one needle is struck against another, neither emits any sound. In order, therefore, that sound may be generated, what is struck must be smooth, to enable the air to rebound and be shaken off from it in one [25] piece.

The distinctions between different sounding bodies show themselves only in actual sound; as without the help of light colours remain invisible, so without the help of actual sound the distinctions between sharp and flat sounds remain inaudible. Sharp and flat are here metaphors, transferred from their proper sphere, viz. that of touch, where they mean respectively what moves the sense much in a [30] short time, and what moves the sense little in a long time. Not that what is sharp really moves fast, and what is flat, slowly, but that the difference in the qualities of the one and the other movement is due to their respective speeds. There seems to be a sort of parallelism between what is sharp or flat to hearing and what is sharp or [420<sup>b</sup>1] blunt to touch; what is sharp as it were stabs, while what is blunt pushes, the one producing its effect in a short, the other in a long time, so that the one is quick, the other slow.

Let the foregoing suffice as an analysis of sound. Voice is a kind of sound [5] characteristic of what has soul in it; nothing that is without soul utters voice, it being only by a metaphor that we speak of the voice of the flute or the lyre or generally of what (being without soul) possesses the power of producing a succession of notes which differ in length and pitch and timbre. The metaphor is based on the fact that all these differences are found also in voice. Many animals are voiceless, e.g. all non-sanguineous animals and among sanguineous animals fish. [10] This is just what we should expect, since voice is a certain movement of air. The fish, like those in the Achelous, which are said to have voice, really make the sounds with their gills or some similar organ. Voice is the sound

made by an animal, and that with a special organ. As we saw, everything that makes a sound does so by the impact of something against something else, across a space filled with air; hence it is [15] only to be expected that no animals utter voice except those which take in air. Once air is inbreathed, Nature uses it for two different purposes, as the tongue is used both for tasting and for articulating; in that case of the two functions tasting is necessary for the animal's existence (hence it is found more widely distributed), while articulate speech serves its possessor's well-being; similarly in the former case Nature employs the breath both as an indispensable means to the regulation of the [20] inner temperature of the living body and also as the matter of articulate voice, in the interests of its possessor's well-being. Why its former use is indispensable must be discussed elsewhere.

The organ of respiration is the windpipe, and the organ to which this is related as means to end is the lungs. The latter is the part of the body by which the [25] temperature of land animals is raised above that of all others. But what primarily requires the air drawn in by respiration is not only this but the region surrounding the heart. That is why when animals breathe the air must penetrate inwards.

Voice then is the impact of the inbreathed air against the windpipe, and the agent that produces the impact is the soul resident in these parts of the body. Not [30] every sound, as we said, made by an animal is voice (even with the tongue we may merely make a sound which is not voice, or without the tongue as in coughing); what produces the impact must have soul in it<sup>17</sup> and must be accompanied by an act of imagination, for voice is a sound with a meaning, and is not the result of any impact [421<sup>a</sup>1] of the breath as in coughing; in voice the breath in the windpipe is used as an instrument to knock with against the walls of the windpipe. This is confirmed by our inability to speak when we are breathing either out or in—we can only do so by holding our breath; we make the movements with the breath so checked. It is clear [5] also why fish are voiceless; they have no windpipe. And they have no windpipe because they do not breathe or take in air. Why they do not is a question belonging to another inquiry.

9 · Smell and its object are much less easy to determine than what we have hitherto discussed; the distinguishing characteristic of smell is less obvious than those of sound or colour. The ground of this is that our power of smell is less [10] discriminating and in general inferior to that

of many species of animals; men have a poor sense of smell and our apprehension of its objects is bound up with pleasure and pain, which shows that in us the organ is inaccurate. It is probable that there is a parallel failure in the perception of colour by animals that have hard eyes: [15] probably they discriminate differences of colour only by the presence or absence of what excites fear, and that it is thus that human beings distinguish smells. It seems that there is an analogy between smell and taste, and that the species of tastes run parallel to those of smells—the only difference being that our sense of taste is more discriminating because it is a sort of touch, which reaches in man the maximum of [20] discriminative accuracy. While in respect of all the other senses we fall below many species of animals, in respect of touch we far excel all other species in exactness of discrimination. That is why man is the most intelligent of all animals. This is confirmed by the fact that it is to differences in the organ of touch and to nothing else that the differences between man and man in respect of natural endowment are [25] due; men whose flesh is hard are ill-endowed with intellect, men whose flesh is soft, well-endowed.

As flavours may be divided into sweet and bitter, so with smells. In some things the flavour and the smell have the same quality, e.g. both are sweet, in others they [30] diverge. Similarly a smell may be pungent, astringent, acid, or succulent. But, as we said, because smells are much less easy to discriminate than flavours, the names of [421<sup>b</sup>1] these varieties are applied to smells in virtue of similarity; for example sweet belongs to saffron or honey, pungent to thyme, and so on.

In the same sense in which hearing has for its object both the audible and the inaudible, sight both the visible and the invisible, smell has for its object both the [5] odorous and the inodorous. Inodorous may be either what has no smell at all, or what has a small or feeble smell. The same holds of the tasteless.

Smelling too takes place through a medium, i.e. through air or water—for water-animals too (both sanguineous and non-sanguineous) seem to smell just as [10] much as land-animals; at any rate some of them make directly for their food from a distance if it has any scent. That is why the following facts constitute a problem for us. All animals smell in the same way, but man smells only when he inhales; if he exhales or holds his breath, he ceases to smell, no difference being made whether the [15] odorous object is distant or near, or even placed inside the nostril; it is common to all not to perceive what is in immediate contact with the organ of sense, but our failure to apprehend what is odorous without the

help of inhalation is peculiar to man (the fact is obvious on making the experiment). Now since bloodless animals do not breathe, they should have some other sense apart from those mentioned. But this is [20] impossible, since it is scent that is perceived; a sense that apprehends what is odorous and what has a good or bad odour cannot be anything but smell. Further, they are observed to be deleteriously effected by the same strong odours as man is, e.g. bitumen, sulphur, and the like. These animals must be able to smell without [25] breathing. The probable explanation is that in man the organ of smell has a certain superiority over that in all other animals just as his eyes have over those of hard-eyed animals. Man's eyes have in the eyelids a kind of shelter or envelope, which must be shifted or drawn back in order that we may see, while hard-eyed [30] animals have nothing of the kind, but at once see whatever presents itself in the transparent medium. Similarly in certain species of animals the organ of smell is like the eye of hard-eyed animals, uncurtained, while in others which take in air it [422<sup>a</sup>1] probably has a curtain over it, which is drawn back in inhalation, owing to the dilating of the veins or pores. That explains also why animals that breathe cannot smell under water; to smell they must first inhale, and that they cannot do under [5] water.

Smells are of what is dry as flavours of what is moist. Consequently the organ of smell is potentially dry.

10 · What can be tasted is always something that can be touched, and just for that reason it cannot be perceived through an interposed foreign body, for no more is it so with touch. Further, the flavoured and tasteable body is suspended in a [10] liquid matter, and this is tangible. Hence, if we lived in water, we should perceive a sweet object introduced into the water, but the water would not be the medium through which we perceived; our perception would be due to the solution of the sweet substance in the water, just as if it were mixed with some drink. There is no parallel here to the perception of colour, which is due neither to any blending nor to [15] any efflux. In the case of taste, there is no medium; but as the object of sight is colour, so the object of taste is flavour. But nothing excites a perception of flavour without the help of liquid; what acts upon the sense of taste must be either actually or potentially liquid like what is saline; it must be both itself easily dissolved, and [20] capable of dissolving along with itself the tongue. Just as sight apprehends both what is visible and what is invisible (for darkness is

invisible and yet is discriminated by sight; so is, in a different way, what is over-brilliant), and as hearing apprehends both sound and silence, of which the one is audible and the other [25] inaudible, and also over loud sound as sight does what is bright (for as a faint sound is inaudible, so in a sense is a loud or violent sound; and as one thing is called invisible absolutely (as in other cases of impossibility), another if it is adapted by nature to have the property but has not it or has it only in a very low degree, as when we say that something is footless or stoneless—so too taste has as its object both [30] what can be tasted and the tasteless—the latter in the sense of what has little flavour or a bad flavour or one destructive of taste. The primary difference seems to be that between what is drinkable and what is undrinkable—both are tasteable, but the latter is bad and tends to destroy taste, while the former is natural. What is drinkable is a common object of both touch and taste.

[422<sup>b</sup>1] Since what can be tasted is liquid, the organ for its perception cannot be either actually liquid or incapable of becoming liquid. Tasting is being affected by what can be tasted as such; hence the organ of taste must be liquefied, and so to start with must be non-liquid but capable of liquefaction without loss of its distinctive nature. [5] This is confirmed by the fact that the tongue cannot taste either when it is too dry or when it is too moist; in the latter case there is contact with the pre-existent moisture, as when after a foretaste of some strong flavour we try to taste another flavour; it is in this way that sick persons find everything they taste bitter, viz. because, when they taste, their tongues are overflowing with bitter moisture.

[10] The species of flavour are, as in the case of colour, simple, i.e. the two contraries, the sweet and the bitter, secondary, viz. the succulent and the saline; between these come the pungent, the harsh, the astringent, and the acid; these pretty well exhaust the varieties of flavour. It follows that what has the power of [15] tasting is what is potentially of that kind, and that what is tasteable is what has the power of making it actually what it itself already is.

11 · Whatever can be said of what is tangible, can be said of touch, and vice versa; if touch is not a single sense but a group of senses, there must be several kinds of what is tangible. It is a problem whether touch is a single sense or a group of [20] senses. It is also a problem, what is the organ of touch; is it or is it not the flesh (including what in certain animals is analogous to flesh)? On the second view, flesh is the medium

of touch, the real organ being situated farther inward. Every sense seems to be concerned with a single pair of contraries, white and black for sight, [25] sharp and flat for hearing, bitter and sweet for taste; but in the field of what is tangible we find several such pairs, hot cold, dry moist, hard soft, &c. This problem finds a solution, when it is recalled that in the case of the other senses more than one pair of contraries are to be met with, e.g. in sound not only sharp and flat but loud [30] and soft, smooth and rough, &c; there are similar contrasts in the field of colour. Nevertheless we are unable clearly to detect in the case of touch what the single subject is which corresponds to sound in the case of hearing.

To the question whether the organ of touch lies inward or not (i.e. whether we need look any farther than the flesh), no indication can be drawn from the fact that [423<sup>a</sup>1] if the object comes into contact with the flesh it is at once perceived. For even under present conditions if the experiment is made of making a sort of membrane and stretching it tight over the flesh, as soon as this web is touched the sensation is reported in the same manner as before, yet it is clear that the organ is not in this membrane. If the membrane could be *grown* on to the flesh, the report would travel [5] still quicker. That is why the flesh plays in touch very much the same part as would be played by an air-envelope growing round our body; had we such an envelope we should have supposed that it was by a single organ that we perceived sounds, colours, and smells, and we should have taken sight, hearing, and smell to be a single sense. But as it is, because that through which the different movements are [10] transmitted is not naturally attached to our bodies, the difference of the various sense-organs is evident. But in the case of touch the obscurity remains.

For no living body could be constructed of air or water; it must be something solid. Consequently it must be composed of earth along with these, which is just what flesh and its analogue tend to be. Hence the body must be the medium for the [15] faculty of touch, naturally attached to us, through which the several perceptions are transmitted. That they are several is clear when we consider touching with the tongue; we apprehend at the tongue all tangible qualities as well as flavour. Suppose all the rest of our flesh was sensitive to flavour, we should have identified the sense of taste and the sense of touch; but in fact they are two, for they do not [20] correspond.

The following problem might be raised. Let us assume that every body has depth, i.e. has three dimensions, and that if two bodies have a third body between them they cannot be in contact with one another; let

us remember that what is liquid is not independent of body and must be or contain water, and that if two [25] bodies touch one another under water, their touching surfaces cannot be dry, but must have water between, viz. the water which wets their bounding surfaces; from all this it follows that in water two bodies cannot be in contact with one another. The same holds of two bodies in air—air being to bodies in air precisely what water is to [30] bodies in water—but the facts are not so evident to our observation, because we live in air, just as animals that live in water would not notice that the things which touch one another in water have wet surfaces. The problem, then, is: does the perception of [423<sup>b</sup>1] all objects of sense take place in the same way, or does it not, e.g. taste and touch requiring contact (as they are commonly thought to do), while all other senses perceive over a distance? The distinction is unsound; we perceive what is hard or soft, as well as the objects of hearing, sight, and smell, through a medium, only that [5] the latter are perceived over a greater distance than the former; that is why the facts escape our notice. For we do perceive everything through a medium; but in these cases the fact escapes us. Yet, to repeat what we said before, if the medium for touch were a membrane separating us from the object without our observing its existence, we should be relatively to it in the same condition as we are now to air or [10] water in which we are immersed; in their case we fancy we can touch objects, nothing coming in between us and them. But there remains this difference between what can be touched and what can be seen or can sound; in the latter two cases we perceive because the medium produces a certain effect upon us, whereas in the perception of objects of touch we are affected not *by* but *along with* the medium; it [15] is as if a man were struck through his shield, where the shock is not first given to the shield and passed on to the man, but the concussion of both is simultaneous.

In general, flesh and the tongue are related to the organs of touch and taste, as air and water are to those of sight, hearing, and smell. Hence in neither the one case [20] nor the other can there be any perception of an object if it is placed immediately upon the organ, e.g. if a white object is placed on the surface of the eye. This again shows that what has the power of perceiving the tangible is seated inside. Only so would there be a complete analogy with all the other senses. In their case if you [25] place the object on the organ it is not perceived, here if you place it on the flesh it is perceived; therefore flesh is the medium of touch.

What can be touched are distinctive qualities of body *as* body; by such differences I mean those which characterize the elements, viz. hot

cold, dry moist, of which we have spoken earlier in our treatise on the elements.<sup>18</sup> The organ for the [30] perception of these is that of touch—that part of the body in which primarily the sense of touch resides. This is that part which is potentially such as its object is [424<sup>a</sup>1] actually: for all sense-perception is a process of being so affected; so that that which makes something such as it itself actually is makes the other such because the other is already potentially such. That is why we do not perceive what is equally hot and cold or hard and soft, but only excesses, the sense itself being a sort of mean between [5] the opposites that characterize the objects of perception. It is to this that it owes its power of discerning the objects in that field. What is in the middle is fitted to discern; relatively to either extreme it can put itself in the place of the other. As what is to perceive white and black must, to begin with, be actually neither but potentially either (and so with all the other sense-organs), so the organ of touch [10] must be neither hot nor cold.

Further, as in a sense sight had for its object both what was visible and what was invisible (and there was a parallel truth about all the other senses discussed), so touch has for its object both what is tangible and what is intangible. Here by intangible is meant what like air possesses some quality of tangible things in a very slight degree and also what possesses it in an excessive degree, as destructive things do.

[15] We have now given an outline account of each of the several senses.

12 · Generally, about all perception, we can say that a sense is what has the power of receiving into itself the sensible forms of things without the matter, in the [20] way in which a piece of wax takes on the impress of a signet-ring without the iron or gold; what produces the impression is a signet of bronze or gold, but not *qua* bronze or gold: in a similar way the sense is affected by what is coloured or flavoured or sounding not insofar as each is what it is, but insofar as it is of such and such a sort and according to its form.

A primary sense-organ is that in which such a power is seated. The sense and its organ are the same in fact, but their essence is not the same. What perceives is, of [25] course, a spatial magnitude, but we must not admit that either the having the power to perceive or the sense itself is a magnitude; what they are is a certain form or power in a magnitude. This enables us to explain why excesses in objects of sense destroy the organs of sense; if the movement set up by an object is too strong for the [30]



organ, the form which is its sensory power is disturbed; it is precisely as concord and tone are destroyed by too violently twanging the strings of a lyre. This explains also why plants cannot perceive, in spite of their having a portion of soul in them and being affected by tangible objects themselves; for their temperature can be lowered or raised. The explanation is that they have no mean, and so no principle in them [424<sup>b</sup>1] capable of taking on the forms of sensible objects but are affected together with their matter. The problem might be raised: Can what cannot smell be said to be affected by smells or what cannot see by colours, and so on? Now a smell is just [5] what can be smelt, and if it produces any effect it can only be so as to make something smell it, and it might be argued that what cannot smell cannot be affected by smells and further that what can smell can be affected by it only in so far as it has in it the power to smell (similarly with the proper objects of all the other senses). Indeed that this is so seems clear as follows. Light or darkness, sounds and [10] smells leave bodies quite unaffected; what does affect bodies is not these but the bodies which are their vehicles, e.g. what splits the trunk of a tree is the air which accompanies thunder. But bodies are affected by what is tangible and by flavours. If not, by what are things that are without soul affected, i.e. altered in quality? Must we not, then, admit that the objects of the other senses also may affect them? Is not the true account this, that all bodies are capable of being affected by smells and sounds, but that some on being acted upon, having no boundaries of their own, [15] disintegrate, as in the instance of air, which does become odorous, showing that some effect is produced on it by what is odorous? What is smelling more than such an affection by what is odorous? Is it that air, when affected quickly, becomes perceptible, but that smelling is actually perceiving?

## BOOK III

1 · That there is no sense in addition to the five—sight, hearing, smell, taste, touch—may be established by the following considerations:

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We in fact have sensation of everything of which touch can give us sensation (for all the qualities of the tangible *qua* tangible are perceived by us through touch); [25] and absence of a sense necessarily involves absence of a sense-organ; and all objects that we perceive by immediate contact with them are perceptible by touch, which sense we actually possess, while all objects that we perceive through media, i.e. without immediate contact, are perceptible by or through the simple elements, e.g. air and water. Now this is so arranged that if more than one kind of sensible object [30] is perceivable through a single medium, the possessor of a sense-organ homogeneous with that medium has the power of perceiving both kinds of objects (for example, if the sense-organ is made of air, and air is a medium both for sound and for colour); and if more than one medium can transmit the same kind of sensible [425<sup>a</sup>1] objects, as e.g. water as well as air can transmit colour, both being transparent, then the possessor of either alone will be able to perceive the kind of objects transmissible through both. And of the simple elements two only, air and water, go to form sense-organs (for the pupil is made of water, the organ of hearing is made of air, and [5] the organ of smell of one or other of these two, while fire is found either in none or in all—warmth being an essential condition of all sensibility—and earth either in none or, if anywhere, specially mingled with the components of the organ of touch; hence it would remain that there can be no sense-organ formed of anything except water and air); and these sense-organs are actually found in certain animals. Thus all the [10] possible senses are possessed by those animals that are not imperfect or mutilated (for even the mole is observed to have eyes beneath its skin); so that, if there is no fifth element and no property other than those which belong to the four elements of our world, no sense can be wanting to such animals.

Further, there cannot be a special sense-organ for the common sensibles either, [15] i.e. the objects which we perceive incidentally through this or that special sense, e.g. movement, rest, figure, magnitude, number, unity; for all these we perceive by movement, e.g. magnitude by movement, and therefore also figure (for figure is a species of magnitude), what is at rest by the absence of movement: number is

perceived by the negation of continuity, and by the special sensibles; for each sense [20] perceives one class of sensible objects. So that it is clearly impossible that there should be a special sense for any one of the common sensibles, e.g. movement; for, if that were so, our perception of it would be exactly parallel to our present perception of what is sweet by vision. That is so because we have a sense for each of the two qualities, in virtue of which when they happen to meet in one sensible object we are aware of both contemporaneously. If it were not like this our perception of the [25] common qualities would always be incidental, i.e. as is the perception of Cleon's son, where we perceive him not as Cleon's son but as white, and the white thing happens to be Cleon's son.

But in the case of the common sensibles there is already in us a common sensibility which enables us to perceive them non-incidentally; there is therefore no special sense required for their perception: if there were, our perception of them would have been exactly like what has been above described.

[30] The senses perceive each other's special objects incidentally; not because the percipient sense is this or that special sense, but because all form a unity: this [425<sup>b</sup>1] incidental perception takes place whenever sense is directed at one and the same moment to two disparate qualities in one and the same object, e.g. to the bitterness and the yellowness of bile; the assertion of the identity of both cannot be the act of either of the senses; hence the illusion of sense, e.g. the belief that if a thing is yellow it is bile.

[5] It might be asked why we have more senses than one. Is it to prevent a failure to apprehend the common sensibles, e.g. movement, magnitude, and number, which go along with the special sensibles? Had we no sense but sight, and that sense no object but white, they would have tended to escape our notice and everything would have merged for us into an indistinguishable identity because of the concomitance of colour and magnitude. As it is, the fact that the common sensibles are given in the objects of more than one sense reveals their distinction from each and all of the [10] special sensibles.

2 · Since it is through sense that we are aware that we are seeing or hearing, it must be either by sight that we are aware of seeing, or by some sense other than sight. But the sense that gives us this new sensation must perceive both sight and its object, viz. colour: so that either there will be two senses both percipient of the same sensible

object, or the sense must be percipient of itself. Further, even if the sense [15] which perceives sight were different from sight, we must either fall into an infinite regress, or we must somewhere assume a sense which is aware of itself. If so, we ought to do this in the first case.

This presents a difficulty: if to perceive by sight is just to see, and what is seen is colour (or the coloured), then if we are to see that which sees,<sup>19</sup> that which sees<sup>20</sup> originally must be coloured. It is clear therefore that 'to perceive by sight' has more [20] than one meaning; for even when we are not seeing, it is by sight that we discriminate darkness from light, though not in the same way as we distinguish one colour from another. Further, in a sense even that which sees is coloured; for in each case the sense-organ is capable of receiving the sensible object without its matter. That is why even when the sensible objects are gone the sensings and imaginings [25] continue to exist in the sense-organs.

The activity of the sensible object and that of the sense is one and the same activity, and yet the distinction between their being remains. Take as illustration actual sound and actual hearing: a man may have hearing and yet not be hearing, and that which has a sound is not always sounding. But when that which can hear is actively hearing and that which can sound is sounding, then the actual hearing and the actual sound come about at the same time (these one might call respectively [426<sup>a</sup>1] hearkening and sounding).

If it is true that the movement, i.e. the acting, and the being acted upon,<sup>21</sup> is to be found in that which is acted upon, both the sound and the hearing so far as it is actual must be found in that which has the faculty of hearing; for it is in the passive factor that the actuality of the active or motive factor is realized; that is why that [5] which causes movement may be at rest. Now the actuality of that which can sound is just sound or sounding, and the actuality of that which can hear is hearing or hearkening; 'sound' and 'hearing' are both ambiguous. The same account applies to the other senses and their objects. For as the acting-and-being-acted-upon is to be found in the passive, not in the active factor, so also the actuality of the sensible [10] object and that of the sensitive subject are both realized in the latter. But while in some cases each has a distinct name, e.g. sounding and hearkening, in some one or other is nameless, e.g. the actuality of sight is called seeing, but the actuality of colour has no name: the actuality of the faculty of taste is called tasting, but the [15] actuality of flavour has no name. Since the actualities of the sensible object and of the sensitive faculty are one actuality in spite of the difference between their modes of being, actual hearing and actual

sounding appear and disappear from existence at one and the same moment, and so actual savour and actual tasting, &c, while as potentialities one of them may exist without the other. The earlier students of [20] nature were mistaken in their view that without sight there was no white or black, without taste no savour. This statement of theirs is partly true, partly false: 'sense' and 'the sensible object' are ambiguous terms, i.e. may denote either potentialities [25] or actualities: the statement is true of the latter, false of the former. This ambiguity they wholly failed to notice.

If voice is a concord, and if the voice and the hearing of it are in one sense one and the same, and if concord is a ratio, hearing as well as what is heard must be a [30] ratio. That is why the excess of either the sharp or the flat destroys the hearing. (So also in the case of savours excess destroys the sense of taste, and in the case of [426<sup>b</sup>1] colours excessive brightness or darkness destroys the sight, and in the case of smell excess of strength whether in the direction of sweetness or bitterness is destructive.) This shows that the sense is a ratio.

That is also why the objects of sense are pleasant when e.g. acid or sweet or [5] salt, being pure and unmixed, are brought into the proper ratio; then they are pleasant: and in general what is blended—a concord—is more pleasant than the sharp or the flat alone; or, to touch, that which is capable of being either warmed or chilled:<sup>22</sup> the sense and the ratio are identical; while excess is painful or destructive.

Each sense then is relative to its particular group of sensible qualities: it is [10] found in a sense-organ as such and discriminates the differences which exist within that group; e.g. sight discriminates white and black, taste sweet and bitter, and so in all cases. Since we also discriminate white from sweet, and indeed each sensible quality from every other, with what<sup>23</sup> do we perceive that they are different? It must be by sense; for what is before us is sensible objects. (Hence it is also obvious that [15] the flesh cannot be the ultimate sense-organ: if it were, the discriminating power could not do its work without immediate contact with the object.)

Therefore discrimination between white and sweet cannot be effected by two agencies which remain separate; both the qualities discriminated must be present to something that is one and single. On any other supposition even if I perceived sweet and you perceived white, the difference between them would be apparent. What [20] says that two things are different must be one; for sweet is different from white. Therefore what asserts this difference must be self-identical, and as what

asserts, so also what thinks or perceives. That it is not possible by means of two agencies which remain separate to discriminate two objects which are separate, is therefore obvious; and that it is not possible to do this in separate moments of time may be [25] seen if we look at it as follows. For as what asserts the difference between the good and the bad is one and the same, so also the time at which it asserts the one to be different and the other to be different is not accidental to the assertion (as it is for instance when I now assert a difference but do not assert that there is now a difference); it asserts thus—both now and that the objects are different now; the objects therefore must be present at one and the same moment. Both the discriminating power and the time of its exercise must be one and undivided.

But, it may be objected, it is impossible that what is self-identical should be [30] moved at one and the same time with contrary movements in so far as it is undivided, and in an undivided moment of time. For if what is sweet be the quality perceived, it moves the sense or thought in this determinate way, while what is bitter [427<sup>a</sup>1] moves it in a contrary way, and what is white in a different way. Is it the case then that what discriminates, though both numerically one and indivisible, is at the same time divided in its being? In one sense, it is what is divided that perceives two separate objects at once, but in another sense it does so *qua* undivided; for it is divisible in its being, but spatially and numerically undivided. [5]

But is not this impossible? For while it is true that what is self-identical and undivided may be both contraries at once *potentially*, it cannot be self-identical in its being—it must lose its unity by being put into activity. It is not possible to be at once white and black, and therefore it must also be impossible for a thing to be affected at one and the same moment by the forms of both, assuming it to be the case that sensation and thinking are properly so described.

Just as what is called a point is, as being at once one and two, properly said to [10] be divisible,<sup>24</sup> so here, that which discriminates is *qua* undivided one, and active in a single moment of time, while *qua* divisible it twice over uses the same dot at one and the same time. So far then as it takes the limit as two, it discriminates two separate objects<sup>25</sup> with what in a sense is separated; while so far as it takes it as one, it does so with what is one<sup>26</sup> and occupies in its activity a single moment of time.

About the principle in virtue of which we say that animals are percipient, let [15] this discussion suffice.

3 · There are two distinctive peculiarities by reference to which we characterize the soul—(1) local movement and (2) thinking, understanding, and perceiving. Thinking and understanding are regarded as akin to a form of perceiving; for in [20] the one as well as the other the soul discriminates and is cognizant of something which is. Indeed the ancients go so far as to identify thinking and perceiving; e.g. Empedocles says<sup>27</sup> ‘For tis in respect of what is present that man’s wit is increased’, and again<sup>28</sup> ‘Whence it befalls them from time to time to think diverse thoughts’, and Homer’s phrase<sup>29</sup> ‘For suchlike is man’s mind’ means the same. They all look [25] upon thinking as a bodily process like perceiving, and hold that like is understood as well as perceived by like, as I explained at the beginning of our discussion. Yet they [427<sup>b</sup>1] ought at the same time to have accounted for error also; for it is more intimately connected with animal existence and the soul continues longer in the state of error. They cannot escape the dilemma: either whatever seems is true (and there are some who accept this) or error is contact with the unlike: for that is the opposite of the [5] knowing of like by like.

But it seems that error as well as knowledge in respect to contraries is one and the same.

That perceiving and understanding are not identical is therefore obvious; for the former is universal in the animal world, the latter is found in only a small division of it. Further, thinking is also distinct from perceiving—I mean that in [10] which we find rightness and wrongness—rightness in understanding, knowledge, true opinion, wrongness in their opposites; for perception of the special objects of sense is always free from error, and is found in all animals, while it is possible to think falsely as well as truly, and thought is found only where there is discourse of reason. For imagination is different from either perceiving or discursive thinking, [15] though it is not found without sensation, or judgement without it. That this activity is not the same kind of thinking<sup>30</sup> as judgement is obvious. For imagining lies within our own power whenever we wish (e.g. we can call up a picture, as in the practice of [20] mnemonics by the use of mental images), but in forming opinions we are not free: we cannot escape the alternative of falsehood or truth. Further, when we think something to be fearful or threatening, emotion is immediately produced, and so too with what is encouraging; but when we merely imagine we remain as unaffected as persons who are looking at a painting of some dreadful or encouraging scene. Again [25] within the field of judgement itself we find varieties—knowledge, opinion,

understanding, and their opposites; of the differences between these I must speak elsewhere.

Thinking is different from perceiving and is held to be in part imagination, in part judgement: we must therefore first mark off the sphere of imagination and then [428<sup>a</sup>1] speak of judgement. If then imagination is that in virtue of which an image arises for us, excluding metaphorical uses of the term, is it a single faculty or disposition relative to images, in virtue of which we discriminate and are either in error or not? The faculties in virtue of which we do this are sense, opinion, knowledge, thought.

[5] That imagination is not sense is clear from the following considerations: Sense is either a faculty or an activity, e.g. sight or seeing: imagination takes place in the absence of both, as e.g. in dreams. Again, sense is always present, imagination not. If actual imagination and actual sensation were the same, imagination would be [10] found in all the brutes: this is held not to be the case; e.g. it is not found in ants or bees or grubs. Again, sensations are always true, imaginations are for the most part false. Once more, we do not, when sense functions precisely with regard to its object, say that we imagine it to be a man, but rather when there is some failure of accuracy [15] in its exercise—then it is either true or false.<sup>31</sup> And, as we were saying before, visions appear to us even when our eyes are shut. Neither is imagination any of the things that are never in error: e.g. knowledge or intelligence; for imagination may be false.

It remains therefore to see if it is opinion, for opinion may be either true or false.

But opinion involves belief (for without belief in what we opine we cannot have [20] an opinion), and in the brutes though we often find imagination we never find belief. Further, every opinion is accompanied by belief, belief by conviction, and conviction by discourse of reason, while there are some of the brutes in which we find imagination, without discourse of reason.<sup>32</sup> It is clear then that imagination cannot, again, be opinion *plus* sensation, or opinion mediated by sensation, or a blend of [25] opinion and sensation; this is impossible both for these reasons and because the content of the supposed opinion cannot be different from that of the sensation (I mean that imagination must be the blending of the perception of white with the opinion that it is white: it could scarcely be a blend of the opinion that it is good with the perception that it is white): to imagine is therefore (on this view) identical with [428<sup>b</sup>1] the thinking of exactly the same as what one perceives non-incidentally. But what we imagine is sometimes false though our contemporaneous judgement about



it is true; e.g. we imagine the sun to be a foot in diameter though we are convinced that it is larger than the inhabited part of the earth. Thus either while the fact has not changed and the observer has neither forgotten nor lost belief in the true opinion which he had, that opinion has disappeared, or if he retains it then his opinion is at [5] once true and false. A true opinion, however, becomes false only when the fact alters without being noticed.

Imagination is therefore neither any one of the states enumerated, nor compounded out of them.

But since when one thing has been set in motion another thing may be moved [10] by it, and imagination is held to be a movement and to be impossible without sensation, i.e. to occur in beings that are percipient and to have for its content what can be perceived, and since movement may be produced by actual sensation and that movement is necessarily similar in character to the sensation itself, this movement cannot exist apart from sensation or in creatures that do not perceive, [15] and its possessor does and undergoes many things in virtue of it, and it is true and false.

The reason is as follows. Perception of the special objects of sense is never in error or admits the least possible amount of falsehood. Next comes perception that what is incidental to the objects of perception is incidental to them: in this case [20] certainly we may be deceived; for while the perception that there is white before us cannot be false, the perception that what is white is this or that may be false. Third comes the perception of the common attributes which accompany the incidental objects to which the special sensibles attach (I mean e.g. of movement and magnitude); it is in respect of these that the greatest amount of sense-illusion is [25] possible.

The motion which is due to the activity of sense in these three modes of its exercise will differ; the first kind of derived motion is free from error while the sensation is present; the others may be erroneous whether it is present or absent, especially when the object of perception is far off. If then imagination presents no [429<sup>a</sup>1] other features than those enumerated and is what we have described, then imagination must be a movement resulting from an actual exercise of a power of sense.

As sight is the most highly developed sense, the name φαντασία (imagination) has been formed from φάος (light) because it is not possible to see without light.

[5] And because imaginations remain in the organs of sense and

resemble sensations, animals in their actions are largely guided by them, some (i.e. the brutes) because of the non-existence in them of thought, others (i.e. men) because of the temporary eclipse in them of thought by feeling or disease or sleep.

About imagination, what it is and why it exists, let so much suffice.

[10] **4** · Turning now to the part of the soul with which the soul knows and (whether this is separable from the others in definition only, or spatially as well) we have to inquire what differentiates this part, and how thinking can take place.

If thinking is like perceiving, it must be either a process in which the soul is acted upon by what is capable of being thought, or a process different from but [15] analogous to that. The thinking part of the soul must therefore be, while impassible, capable of receiving the form of an object; that is, must be potentially identical in character with its object without being the object. Thought must be related to what is thinkable, as sense is to what is sensible.

Therefore, since everything is a possible object of thought, mind in order, as Anaxagoras says, to dominate, that is, to know, must be pure from all admixture; [20] for the co-presence of what is alien to its nature is a hindrance and a block: it follows that it can have no nature of its own, other than that of having a certain capacity. Thus that in the soul which is called thought (by thought I mean that whereby the soul thinks and judges) is, before it thinks, not actually any real thing. For this [25] reason it cannot reasonably be regarded as blended with the body: if so, it would acquire some quality, e.g. warmth or cold, or even have an organ like the sensitive faculty: as it is, it has none. It was a good idea to call the soul 'the place of forms', though this description holds only of the thinking soul, and even this is the forms only potentially, not actually.

Observation of the sense-organs and their employment reveals a distinction [30] between the impassibility of the sensitive faculty and that of the faculty of thought. After strong stimulation of a sense we are less able to exercise it than before, as e.g. [429<sup>b</sup>1] in the case of a loud sound we cannot hear easily immediately after, or in the case of a bright colour or a powerful odour we cannot see or smell, but in the case of thought thinking about an object that is highly thinkable renders it more and not less able afterwards to think of objects that are less thinkable: the reason is that while the [5] faculty of sensation is dependent upon the body, thought is separable from it.

When thought has become each thing in the way in which a man who actually knows is said to do so (this happens when he is now able to exercise the power on his own initiative), its condition is still one of potentiality, but in a different sense from the potentiality which preceded the acquisition of knowledge by learning or discovery; and thought is then able to think of itself.<sup>33</sup>

Since we can distinguish between a magnitude and what it is to be a [10] magnitude, and between water and what it is to be water, and so in many other cases (though not in all; for in certain cases the thing and its form are identical), flesh and what it is to be flesh are discriminated either by different faculties, or by the same faculty in two different states; for flesh necessarily involves matter and is like what is snub-nosed, a *this* in a *this*. Now it is by means of the sensitive faculty that we discriminate the hot and the cold, i.e. the factors which combined in a certain ratio [15] constitute flesh: the essential character of flesh is apprehended by something different either wholly separate from the sensitive faculty or related to it as a bent line to the same line when it has been straightened out.

Again in the case of abstract objects what is straight is analogous to what is snub-nosed; for it necessarily implies a continuum: its constitutive essence is different, if we may distinguish between straightness and what is straight: let us take it to be two-ness. It must be apprehended, therefore, by a different power or by [20] the same power in a different state. To sum up, in so far as the realities it knows are capable of being separated from their matter, so it is also with the powers of thought.

The problem might be suggested: if thinking is a passive affection, then if thought is simple and impassible and has nothing in common with anything else, as Anaxagoras says, how can it come to think at all? For interaction between two factors is held to require a precedent community of nature between the factors. [25] Again it might be asked, is thought a possible object of thought to itself? For if thought is thinkable *per se* and what is thinkable is in kind one and the same, then either thought will belong to everything, or it will contain some element common to it with all other realities which makes them all thinkable.

Have not we already disposed of the difficulty about interaction involving a [30] common element, when we said that thought is in a sense potentially whatever is thinkable, though actually it is nothing until it has thought? What it thinks must be<sup>34</sup> in it just as characters may be said to be on a writing-table on which as yet [430<sup>a</sup>1] nothing actually stands written: this is exactly what happens with thought.

Thought is itself thinkable in exactly the same way as its objects are. For in the case of objects which involve no matter, what thinks and what is thought are identical; for speculative knowledge and its object are identical. (Why thought is [5] not always thinking we must consider later.) In the case of those which contain matter each of the objects of thought is only potentially present. It follows that while they will not have thought in them (for thought is a potentiality of them only in so far as they are capable of being disengaged from matter) thought may yet be thinkable.

[10] **5** · Since in every class of things, as in nature as a whole, we find two factors involved, a matter which is potentially all the particulars included in the class, a cause which is productive in the sense that it makes them all (the latter standing to the former, as e.g. an art to its material), these distinct elements must likewise be found within the soul.

And in fact thought, as we have described it, is what it is by virtue of becoming [15] all things, while there is another which is what it is by virtue of making all things: this is a sort of positive state like light; for in a sense light makes potential colours into actual colours.

Thought in this sense of it is separable, impassible, unmixed, since it is in its essential nature activity (for always the active is superior to the passive factor, the originating force to the matter).

[20] Actual knowledge is identical with its object: in the individual, potential knowledge is in time prior to actual knowledge, but absolutely it is not prior even in time. It does not sometimes think and sometimes not think. When separated it is alone just what it is, and this alone is immortal and eternal (we do not remember [25] because, while this is impassible, passive thought is perishable); and without this nothing thinks.

**6** · The thinking of indivisibles is found in those cases where falsehood is impossible: where the alternative of true or false applies, there we always find a sort of combining of objects of thought in a quasi-unity. As Empedocles said that ‘where [30] heads of many a creature sprouted without necks’<sup>35</sup> they afterwards by Love’s power were combined, so here too objects of thought which were separate are combined, e.g. ‘incommensurate’ and ‘diagonal’: if the combination be of objects [430<sup>b</sup>1] past or future the combination of thought includes in its

content the date. For falsehood always involves a combining; for even if you assert that what is white is not white you have combined not-white.<sup>36</sup> It is possible also to call all these cases division. However that may be, there is not only the true or false assertion that [5] Cleon is white but also the true or false assertion that he *was* or *will be* white. In each and every case that which unifies is thought.

Since the word 'indivisible' has two senses, i.e. may mean either 'not capable of being divided' or 'not actually divided', there is nothing to prevent thought from thinking of what is undivided, e.g. when it thinks of a length (which is actually undivided) and that in an undivided time; for the time is divided or undivided in the [10] same manner as the line. It is not possible, then, to tell what part of the line it was thinking of in each half of the time: the object has no actual parts until it has been divided; if in thought you think of each half separately, then by the same act you divided the time also, the half-lines becoming as it were new wholes of length. But if you think of it as a whole consisting of these two parts, then also you think of it in a time which corresponds to both parts together. (But what is not quantitatively but [15] qualitatively simple is thought of in a simple time and by a simple act of the soul.)<sup>37</sup>

But that which thought thinks of and the time in which it thinks are in this case divisible only incidentally and not as such. For in them too there is something indivisible (though, it may be, not separable) which gives unity to the time and the whole of length; and this is found equally in every continuum whether temporal or [20] spatial.

Points and similar instances of things that divide, themselves being indivisible, are realized in consciousness in the same manner as privations.

A similar account may be given of all other cases, e.g. how evil or black is cognized; they are cognized, in a sense, by means of their contraries. That which cognizes must be its objects potentially, and they must be in it. But if there is anything that has no contrary,<sup>38</sup> then it knows itself and is actually and possesses [25] independent existence.

Assertion is the saying of something concerning something, as too is denial, and is in every case either true or false: this is not always the case with thought: the thinking of the definition in the sense of what is is for something to be is never in error nor is it the assertion of something concerning something; but, just as while the seeing of the special object of sight can never be in error, seeing whether the white object is a man or not may be mistaken, so too in the case of objects which are without matter.

7 · Actual knowledge is identical with its object: potential knowledge in the [431<sup>a</sup>1] individual is in time prior to actual knowledge but absolutely it has no priority even in time; for all things that come into being arise from what actually is. In the case of sense clearly the sensitive faculty already was potentially what the object makes it to be actually; the faculty is not affected or altered. This must therefore be a [5] different kind of movement; for movement is an activity of what is imperfect, activity in the unqualified sense, i.e. that of what has been perfected, is different.

To perceive then is like bare asserting or thinking; but when the object is pleasant or painful, the soul makes a sort of affirmation or negation, and pursues or avoids the object. To feel pleasure or pain is to act with the sensitive mean towards [10] what is good or bad as such. Both avoidance and appetite when actual are identical with this: the faculty of appetite and avoidance are not different, either from one another or from the faculty of sense-perception; but their being is different.

To the thinking soul images serve as if they were contents of perception (and [15] when it asserts or denies them to be good or bad it avoids or pursues them). That is why the soul never thinks without an image. The process is like that in which the air modifies the pupil in this or that way and the pupil transmits the modification to some third thing (and similarly in hearing), while the ultimate point of arrival is one, a single mean, with different manners of being.

With what part of itself the soul discriminates sweet from hot I have explained [20] before and must now describe again as follows: That with which it does so is a sort of unity, but in the way a boundary is; and these things being one by analogy and numerically, are each to each as the qualities discerned are to one another (for what difference does it make whether we raise the problem of discrimination between [25] disparates or between contraries, e.g. white and black?). Let then  $C$  be to  $D$  as  $A$ , white is to  $B$ , black: it follows *alternando* that  $C : A :: D : B$ . If then  $C$  and  $A$  belong to one subject, the case will be the same with them as with  $D$  and  $B$ ;  $D$  and  $B$  form a single identity with different modes of being; so too will the former pair. The same [431<sup>b</sup>1] reasoning holds if  $A$  be sweet and  $B$  white.

The faculty of thinking then thinks the forms in the images, and as in the former case what is to be pursued or avoided is marked out for it, so where there is no sensation and it is engaged upon the images it is moved

to pursuit or avoidance. [5] E.g. perceiving by sense that the beacon is fire, it recognizes in virtue of the general faculty of sense that it signifies an enemy, because it sees it moving; but sometimes by means of the images or thoughts which are within the soul, just as if it were seeing, it calculates and deliberates what is to come by reference to what is present; and when it makes a pronouncement, as in the case of sensation it pronounces the object to be pleasant or painful, in this case it avoids or pursues; and so generally in cases of action.<sup>39</sup>

[10] That too which involves no action, i.e. that which is true or false, is in the same province with what is good or bad: yet they differ in this, that the one is absolute and the other relative to someone.

The so-called abstract objects the mind thinks just as, in the case of the snub, one might think of it *qua* snub not separately, but if anyone actually thought of it *qua* hollow<sup>40</sup> he would think of it without the flesh in which it is embodied: it is thus [15] that the mind when it is thinking the objects of mathematics thinks of them as separate though they are not separate. In every case the mind which is actively thinking is the objects which it thinks. Whether it is possible for it while not existing separate from spatial conditions to think anything that is separate, or not, we must consider later.

[20] **8** · Let us now summarize our results about soul, and repeat that the soul is in a way all existing things; for existing things are either sensible or thinkable, and knowledge is in a way what is knowable, and sensation is in a way what is sensible: in *what* way we must inquire.

Knowledge and sensation are divided to correspond with the realities, potential [25] knowledge and sensation answering to potentialities, actual knowledge and sensation to actualities. Within the soul the faculties of knowledge and sensation are *potentially* these objects, the one what is knowable, the other what is sensible. They must be either the things themselves or their forms. The former alternative is of course impossible: it is not the stone which is present in the soul but its form.

[432<sup>a</sup>1] It follows that the soul is analogous to the hand; for as the hand is a tool of tools, so thought is the form of forms and sense the form of sensible things.

Since it seems that there is nothing outside and separate in existence from [5] sensible spatial magnitudes, the objects of thought are in the sensible forms, viz. both the abstract objects and all the states and affections of sensible things. Hence no one can learn or understand

anything in the absence of sense, and when the mind is actively aware of anything it is necessarily aware of it along with an image; for images are like sensuous contents except in that they contain no matter.

Imagination is different from assertion and denial; for what is true or false [10] involves a synthesis of thoughts. In what will the primary thoughts differ from images? Must we not say that neither these nor even our other thoughts are images, though they necessarily involve them?

9 · The soul of animals is characterized by two faculties, the faculty of [15] discrimination which is the work of thought and sense, and the faculty of originating local movement. Sense and thought we have now sufficiently examined. Let us next consider what it is in the soul which originates movement. Is it a single part of the soul separate either spatially or in definition? Or is it the soul as a whole? [20] If it is a part, is that part different from those usually distinguished or already mentioned by us, or is it one of them? The problem at once presents itself, in what sense we are to speak of parts of the soul, or how many we should distinguish. For in a sense there is an infinity of parts: it is not enough to distinguish, with some thinkers, the calculative, the passionate, and the desiderative, or with others the [25] rational and the irrational; for if we take the dividing lines followed by these thinkers we shall find parts far more distinctly separated from one another than these, namely those we have just mentioned: the nutritive, which belongs both to plants and to all animals, and the sensitive, which cannot easily be classed as either irrational or rational; further the imaginative, which is, in its being, different from [432<sup>b</sup>1] all, while it is very hard to say with which of the others it is the same or not the same, supposing we determine to posit separate parts in the soul; and lastly the appetitive, which would seem to be distinct both in definition and in power from all hitherto enumerated.

It is absurd to break up the last-mentioned faculty: for wish is found in the [5] calculative part and desire and passion in the irrational; and if the soul is tripartite appetite will be found in all three parts. Turning our attention to the present object of discussion, let us ask what that is which originates local movement of the animal.

The movement of growth and decay, being found in all living things, must be attributed to the faculty of reproduction and nutrition, which is common to all: [10] breathing in and out, sleep and waking, we must consider later: these too present much difficulty: at present we must consider local movement, asking what it is that originates forward



movement in the animal.

That it is not nutritive faculty is obvious; for this kind of movement is always [15] for an end and is accompanied either by imagination or<sup>41</sup> by appetite; for no animal moves except by compulsion unless it has an impulse towards or away from an object. Further, if it were the nutritive faculty, even plants would have been capable of originating such movement and would have possessed the organs necessary to carry it out. Similarly it cannot be the sensitive faculty either; for there are many [20] animals which have sensibility but remain fast and immovable throughout their lives.

If then Nature never makes anything without a purpose and never leaves out what is necessary (except in the case of mutilated or imperfect growths; and that here we have neither mutilation nor imperfection may be argued from the facts that such animals can reproduce their species and rise to completeness of nature and decay to an end), it follows that, had they been capable of originating forward [25] movement, they would have possessed the organs necessary for that purpose. Further, neither can the calculative faculty or what is called thought be the cause of such movement; for mind as speculative never thinks what is practicable, it never says anything about an object to be avoided or pursued, while this movement is always in something which is avoiding or pursuing an object. No, not even when it is aware of such an object does it thereby enjoin pursuit or avoidance of it; e.g. the [30] mind often thinks of something terrifying or pleasant without enjoining the emotion of fear. It is the heart that is moved (or in the case of a pleasant object some other [433<sup>a</sup>1] part). Further, even when thought does command and bids us pursue or avoid something, sometimes no movement is produced; we act in accordance with desire, as in the case of moral weakness. And, generally, we observe that the possessor of [5] medical knowledge is not necessarily healing, which shows that something else is required to produce action in accordance with knowledge; the knowledge alone is not the cause. Lastly, appetite too is incompetent to account fully for movement; for those who successfully resist temptation have appetite and desire and yet follow thought and refuse to enact that for which they have appetite.

10 · These two at all events appear to be sources of movement: appetite and [10] thought (if one may venture to regard imagination as a kind of thinking; for many men follow their imaginations contrary to

knowledge, and in all animals other than man there is no thinking or calculation but only imagination).

Both of these then are capable of originating local movement, thought and appetite: thought, that is, which calculates means to an end, i.e. practical thought [15] (it differs from speculative thought in the character of its end); while appetite is in every form of it relative to an end; for that which is the object of appetite is the stimulant of practical thought; and that which is last in the process of thinking is the beginning of the action. It follows that there is a justification for regarding these two as the sources of movement, i.e. appetite and practical thought; for the object of appetite starts a movement and as a result of that thought gives rise to movement, [20] the object of appetite being to it a source of stimulation. So too when imagination originates movement, it necessarily involves appetite.

That which moves therefore is a single faculty and the faculty of appetite; for if there had been two sources of movement—thought and appetite—they would have produced movement in virtue of some common character. As it is, thought is never found producing movement without appetite (for wish is a form of appetite; and when movement is produced according to calculation it is also according to wish), [25] but appetite can originate movement *contrary* to calculation, for desire is a form of appetite. Now thought is always right, but appetite and imagination may be either right or wrong. That is why, though in any case it is the object of appetite which originates movement, this object may be either the real or the apparent good. To produce movement the object must be more than this: it must be good that can be brought into being by action; and only what can be otherwise than as it is can thus [30] be brought into being. That then such a power in the soul as has been described, i.e. that called appetite, originates movement is clear. Those who distinguish parts in [433<sup>b</sup>1] the soul, if they distinguish and divide in accordance with differences of power, find themselves with a very large number of parts, a nutritive, a sensitive, an intellective, a deliberative, and now an appetitive part; for these are more different from one another than the faculties of desire and passion.

Since appetites run counter to one another, which happens when a principle of [5] reason and a desire are contrary and is possible only in beings with a sense of time (for while thought bids us hold back because of what is future, desire is influenced by what is just at hand: a pleasant object which is just at hand presents itself as both pleasant and good, without condition in either case, because of want of foresight into what is

farther away in time), it follows that while that which originates [10] movement must be specifically one, viz. the faculty of appetite as such (or rather farthest back of all the object of that faculty; for it is it that itself remaining unmoved originates the movement by being apprehended in thought or imagination), the things that originate movement are numerically many.

All movement involves three factors, (1) that which originates the movement, (2) that by means of which it originates it, and (3) that which is moved. The expression 'that which originates the movement' is ambiguous: it may mean either something which itself is unmoved or that which at once moves and is moved. Here [15] that which moves without itself being moved is the realizable good, that which at once moves and is moved is the faculty of appetite (for that which is moved is moved insofar as it desires, and appetite in the sense of actual appetite is a kind of movement), while that which is in motion is the animal. The instrument which appetite employs to produce movement is bodily: hence the examination of it falls within the province of the functions common to body and soul. To state the matter [20] summarily at present, that which is the instrument in the production of movement is to be found where a beginning and an end coincide as e.g. in a ball and socket joint; for there the convex and the concave sides are respectively an end and a beginning (that is why while the one remains at rest, the other is moved): they are separate in definition but not separable spatially. For everything is moved by pushing and [25] pulling. Hence just as in the case of a wheel, so here there must be a point which remains at rest, and from that point the movement must originate.

To sum up, then, and repeat what I have said, inasmuch as an animal is capable of appetite it is capable of self-movement; it is not capable of appetite without possessing imagination; and all imagination is either calculative or sensitive. In the latter all animals partake. [30]

**11** · We must consider also in the case of imperfect animals, sc. those which have no sense but touch, what it is that in them originates movement. Can they have [434<sup>a</sup>1] imagination or not? or desire? Clearly they have feelings of pleasure and pain, and if they have these they must have desire. But how can they have imagination? Must not we say that, as their movements are indefinite, they have imagination and [5] desire, but indefinitely?

Sensitive imagination, as we have said, is found in all animals,

deliberative imagination only in those that are calculative: for whether this or that shall be enacted is already a task requiring calculation; and there must be a single standard to measure by, for that is pursued which is greater. It follows that what acts in this way must be able to make a unity out of several images.

[10] This is the reason why imagination is held not to involve opinion, in that it does not involve opinion based on inference, though opinion involves imagination.<sup>42</sup> Hence appetite contains no deliberative element. Sometimes it overpowers wish and sets it in movement; at times wish acts thus upon appetite, like a ball,<sup>43</sup> appetite overcoming appetite, i.e. in the condition of moral weakness (though by nature the [15] higher faculty is always more authoritative and gives rise to movement). Thus three modes of movement are possible.

The faculty of knowing is never moved but remains at rest. Since the one premiss or judgement is universal and the other deals with the particular (for the first tells us that such and such a kind of man should do such and such a kind of act, and the second that this is an act of the kind meant, and I a person of the type intended), it is the latter opinion that really originates movement, not the universal; [20] or rather it is both, but the one does so while it remains in a state more like rest, while the other partakes in movement.

**12** · The nutritive soul then must be possessed by everything that is alive and has a soul, from its birth to its death. For what has been born must grow, reach [25] maturity, and decay—all of which are impossible without nutrition. Therefore the nutritive faculty must be found in everything that grows and decays.

But sensation need not be found in all things that live. For it is impossible for touch to belong either to those whose body is uncompounded or to those which are incapable of taking in the forms without their matter.

[30] But animals must be endowed with sensation, since Nature does nothing in vain. For all things that exist by Nature are means to an end, or will be concomitants of means to an end. Every body capable of forward movement would, [434<sup>b</sup>1] if unendowed with sensation, perish and fail to reach its end, which is the aim of Nature; for how could it obtain nutriment? Stationary living things, it is true, have as their nutriment that from which they have arisen; but it is not possible that a body which is not stationary but produced by generation should have a

soul and a discerning mind without also having sensation. (Nor yet even if it were not [5] produced by generation.) Why should it not have sensation? It would have to be better either for the soul or for the body; but in fact it is neither—for the absence of sensation will not enable the one to think better or the other to exist better. Therefore no body which is not stationary has soul without sensation.

But if a body *has* sensation, it must be either simple or compound. And simple [10] it cannot be; for then it could not have touch, which is indispensable. This is clear from what follows. An animal is a body with soul in it: every body is tangible, i.e. perceptible by touch; hence necessarily, if an animal is to survive, its body must have tactual sensation. All the other senses, e.g. smell, sight, hearing, apprehend [15] through media; but where there is immediate contact the animal, if it has no sensation, will be unable to avoid some things and take others, and so will find it impossible to survive. That is why taste also is a sort of touch; it is relative to nutriment, which is just tangible body; whereas sound, colour, and odour are not [20] nutritious, and further neither grow nor decay. Hence it is that taste also must be a sort of touch, because it is the sense for what is tangible and nutritious.

Both these senses, then, are indispensable to the animal, and it is clear that without touch it is impossible for an animal to be. All the other senses subserve well-being and for that very reason belong not to any and every kind of animal, but only to some, e.g. those capable of forward movement must have them; for, if they [25] are to survive, they must perceive not only by immediate contact but also at a distance from the object. This will be possible if they can perceive through a medium, the medium being affected and moved by the perceptible object, and the animal by the medium. Just as that which produces local movement causes a change extending to a certain point, and that which gave an impulse causes another [30] to produce a new impulse so that the movement traverses a medium—the first mover impelling without being impelled, the last moved being impelled without impelling, while the medium (or media, for there are many) is both—so is it also in [435<sup>a</sup>1] the case of alteration, except that the agent produces it without the patient's changing its place. Thus if an object is dipped into wax, the movement goes on until submersion has taken place, and in stone it goes no distance at all, while in water the disturbance goes far beyond the object dipped: in air the disturbance is propagated farthest of all, the air acting and being acted upon, so long as it maintains an unbroken unity. That is why in the case of reflection it is better, instead of saying [5] that

the sight issues from the eye and is reflected, to say that the air, so long as it remains one, is affected by the shape and colour. On a smooth surface the air possesses unity; hence it is that it in turn sets the sight in motion, just as if the impression on the wax were transmitted as far as the wax extends. [10]

13 · It is clear that the body of an animal cannot be simple, i.e. consist of one element such as fire or air. For without touch it is impossible to have any other sense; for every body that has soul in it must, as we have said, be capable of touch. All the other elements with the exception of earth can constitute organs of sense, [15] but all of them bring about perception only through something else, viz. through the media. Touch takes place by direct contact with its objects, whence also its name. All the other organs of sense, no doubt, perceive by contact, only the contact is mediate: touch alone perceives by immediate contact. Consequently no animal body [20] can consist of these other elements.

Nor can it consist solely of earth. For touch is as it were a mean between all tangible qualities, and its organ is capable of receiving not only all the specific qualities which characterize earth, but also the hot and the cold and all other tangible qualities whatsoever. That is why we have no sensation by means of bones, [435<sup>b</sup>1] hair, &c., because they consist of earth. So too plants, because they consist of earth, have no sensation. Without touch there can be no other sense, and the organ of touch cannot consist of earth or of any other single element.

It is evident, therefore, that the loss of this one sense alone must bring about [5] the death of an animal. For as on the one hand nothing which is not an animal can have this sense, so on the other it is the only one which is indispensably necessary to what is an animal. This explains, further, why excesses of the other sensible objects, i.e. excess of colour, sound, and smell, destroys not the animal but only the organs of [10] the sense (except incidentally, as when the sound is accompanied by an impact or shock, or where through the objects of sight or of smell certain other things are set in motion, which destroy by contact—flavour also destroys only in so far as it is at the same time capable of contact), whereas excess in tangible qualities, e.g. heat, cold, [15] or hardness, destroys the animal itself. As in the case of every sensible quality excess destroys the organ, so here what is tangible destroys touch, which is the essential mark of being an animal; for it has been shown that without touch it is impossible for an animal to be. That is why excess in intensity

of tangible qualities destroys not merely the organ, but the animal itself, because this is the only sense which it must have.

[20] All the other senses are necessary to animals, as we have said, not for their being, but for their well-being. Such, e.g., is sight, which, since it lives in air or water, or generally in what is transparent, it must have in order to see, and taste because of what is pleasant or painful to it, in order that it may perceive these qualities in its nutriment and so may desire to be set in motion, and hearing that it [25] may have communication made to it, and a tongue that it may communicate with its fellows.<sup>44</sup>

<sup>1</sup>*Iliad* XXIII 698.

<sup>2</sup>Frag. 109 Diels-Kranz.

<sup>3</sup>35Aff.

<sup>4</sup>See *Physics* VIII 5.

<sup>5</sup>Omitting νόησις.

<sup>6</sup>Retaining μή, with the MSS.

<sup>7</sup>Reading δέ for δή.

<sup>8</sup>Frag. 96 Diels-Kranz.

<sup>9</sup>Ross follows Torstrik in excising the words ‘locomotion or’.

<sup>10</sup>Omitting οὐ.

<sup>11</sup>Omitting ἦ with the MSS.

<sup>12</sup>Ross excises ‘bodies or’.

<sup>13</sup>See *Gen Corr* I 7.

<sup>14</sup>Retaining λέγομεν.

<sup>15</sup>Retaining αἰσθησιν: Ross prints ἀριθμητικήν, ‘arithmetic’.

<sup>16</sup>Retaining τις.

<sup>17</sup>Retaining ἔμψυχον.

<sup>18</sup>See *Gen Corr* II 2–3.

<sup>19</sup>Retaining τὸ ὁρῶν.

<sup>20</sup>Retaining τὸ ὁρῶν.

<sup>21</sup>Ross excises ‘and the being acted upon’.

<sup>22</sup>Ross, following Dittenberger, excises the sentence ‘or, to touch, ... chilled’.

<sup>23</sup>Reading τίνι for τινί.

<sup>24</sup>Ross adds: ‘and indivisible’.



<sup>25</sup>Ross excises ‘two separate objects’.

<sup>26</sup>Reading ἐνί, ἐνί.

<sup>27</sup>Frag. 106 Diels-Kranz.

<sup>28</sup>Frag. 108 Diels-Kranz.

<sup>29</sup>*Odyssey* XVIII 136.

<sup>30</sup>Retaining νόησις.

<sup>31</sup>Retaining τότε ἦ.

<sup>32</sup>Ross, following Biehl, excises ‘Further . . . reason’, as a doublet of lines 19–22.

<sup>33</sup>Retaining δὲ αὐτόν.

<sup>34</sup>Retaining δεῖ.

<sup>35</sup>Frag. 57 Diels-Kranz.

<sup>36</sup>Ross adds: ‘and white’.

<sup>37</sup>Ross, following Bywater, places the bracketed sentence after ‘spatial’ in line 20.

<sup>38</sup>Omitting τῶν αἰτίων.

<sup>39</sup>Retaining ἐν πράξει.

<sup>40</sup>Reading, with most MSS, οὐ κεχωρισμένως, ἧ δὲ κοῖλον εἶ τις.

<sup>41</sup>Retaining ἦ.

<sup>42</sup>Ross, following Bywater, excises the last clause.

<sup>43</sup>Retaining the MSS text: κινεῖ τὴν βούλησιν, ὅτε δ’ ἐκείνη ταύτην ὥσπερ σφαῖρα.

<sup>44</sup>Ross, following Torstrik, excises the last clause.

# SENSE AND SENSIBILIA\*\*

J. I. Beare

1 · Having now considered the soul, by itself, and its several faculties, we [436<sup>a</sup>1] must next make a survey of animals and all living things, in order to ascertain what functions are peculiar, and what functions are common, to them. What has been already determined respecting the soul must be assumed throughout. The remaining [5] parts of our subject must be now dealt with, and we may begin with those that come first.

The most important attributes of animals, whether common to all or peculiar to some, are, manifestly, attributes of soul and body in conjunction, e.g., *sensation, memory, passion, appetite* and *desire* in general, and, in addition, *pleasure* and *pain*. For these may, in fact, be said to belong to all animals. But there are, besides [10] these, certain other attributes, of which some are common to all living things, while others are peculiar to certain species of animals. The most important of these may be summed up in four pairs, viz. *waking* and *sleeping*, *youth* and *old age*, *inhalation* [15] and *exhalation*, *life* and *death*. We must examine these, determining their respective natures, and the causes of their occurrence.

But it behoves the natural scientist to obtain also a clear view of the first principles of *health* and *disease*, inasmuch as neither health nor disease can exist in lifeless things. Indeed we may say of most physical inquirers, and of those physicians who study their art more philosophically, that while the former complete [20] their works with a disquisition on medicine, the latter start from a consideration of nature. [436<sup>b</sup>1]

That all the attributes above enumerated belong to soul and body in conjunction, is obvious; for they all either imply sensation as a concomitant, or have it as their medium. Some are either affections or states of sensation, others, means of defending and safe-guarding it, while others, again, involve its destruction or [5] privation. Now it is clear, alike by reasoning and without reasoning, that sensation is generated in

the soul through the medium of the body.

We have already, in our treatise *On the Soul*, explained the nature of sensation [10] and perceiving, and the reason why this affection belongs to animals. Sensation must, indeed, be attributed to all animals as such, for by its presence or absence we distinguish between what is and what is not an animal.

But coming now to the special senses severally, we may say that touch and taste necessarily appertain to all animals, touch, for the reason given in *On the Soul*, [15] and taste, because of nutrition. It is by taste that one distinguishes in food the pleasant from the unpleasant, so as to flee from the latter and pursue the former; and savour in general is an affection of the nutritive part.

The senses which operate through external media, viz. *smelling*, *hearing*, *seeing*, are found in all animals which possess the faculty of locomotion. To all that [20] possess them they are a means of preservation in order that, guided by antecedent perception, they may both pursue their food, and shun things that are bad or [437<sup>a</sup>1] destructive. But in animals which have also intelligence they serve for the attainment of a higher perfection. They bring in tidings of many distinctive qualities of things, from which knowledge of things both speculative and practical is generated in the soul.

Of the two last mentioned, seeing, regarded as a supply for the primary wants [5] of life is in its own right the superior sense; but for developing thought hearing incidentally takes the precedence. The faculty of seeing, thanks to the fact that all bodies are coloured, brings tidings of multitudes of distinctive qualities of all sorts; whence it is through this sense especially that we perceive the common sensibles, viz. *figure*, *magnitude*, *motion*, *number*; while hearing announces only the distinctive [10] qualities of sound, and, to some few animals, those also of voice. Incidentally, however, it is hearing that contributes most to the growth of intelligence. For rational discourse is a cause of instruction in virtue of its being audible, which it is, not in its own right, but incidentally; since it is composed of words, and each word is [15] a symbol. Accordingly, of persons destitute from birth of either sense, the blind are more intelligent than the deaf and dumb.

2 · Of the distinctive powers of each of the faculties of sense enough has been said already.

But as to the nature of the sensory organs, or parts of the body in

which each of [20] the senses is naturally implanted, some inquire into them with reference to the elements of bodies. Not, however, finding it easy to coordinate five senses with four elements, they are at a loss respecting the fifth sense. They all hold the organ of sight to consist of fire, being prompted to this view by a certain affection of whose true cause they are ignorant. This is that, when the eye is pressed and moved, fire [25] appears to flash from it. This naturally takes place in darkness, or when the eyelids are closed—for then, too, darkness is produced.

This raises another puzzle; for, unless a man can perceive<sup>1</sup> and see without being aware of it, the eye must see itself. But then why does the above affection not occur also when the eye is at rest? The true explanation of this affection, which will [30] contain the answer to our question, and account for the current notion that the eye consists of fire, must be determined in the following way:—

Things which are smooth have the natural property of shining in darkness, without, however, producing light. Now, the part of the eye called the black, i.e. its central part, is smooth. The phenomenon of the flash occurs only when the eye is [437<sup>b</sup>1] moved, because one object then becomes as it were two. The rapidity of the movement has the effect of making that which sees and that which is seen seem different from one another. Hence the phenomenon does not occur unless the motion is rapid and takes place in darkness. For it is in the dark that that which is [5] smooth, e.g. the heads of certain fishes, and the sepia of the cuttlefish, naturally shines, and, when the movement of the eye is slow, it is impossible that that which sees and that which is seen should appear to be simultaneously two and one. The eye sees itself in the above phenomenon as it does so in reflexion. [10]

If the visual organ were fire, which is the doctrine of Empedocles, a doctrine taught also in the *Timaeus*, and if vision were the result of light issuing from the eye as from a lantern, why should the eye not have had the power of seeing even in the dark? It is totally idle to say, as the *Timaeus* does, that the visual ray coming forth [15] in the darkness is quenched. What is a quenching of light? That which, like a fire of coals or an ordinary flame, is hot and dry is, indeed, quenched by the moist or cold; but heat and dryness are not evidently attributes of light. And if they are attributes of it, but belong to it in a degree so slight as to be imperceptible to us, we should have expected that in the daytime the light of the sun should be quenched when rain [20] falls, and that darkness should prevail in frosty weather. After all, flame and ignited bodies are subject to such extinction, but experience shows that nothing

of this sort happens to the sunlight.

Empedocles at times seems to hold, as we said before, that vision occurs when light issues forth from the eye, e.g., in the following passage: — [25]

As when one who purposes going abroad prepares a lantern,  
A gleam of fire blazing through the stormy night,  
Adjusting thereto, to screen it from all sorts of winds, transparent  
sides,  
Which scatter the breath of the winds as they blow,  
While, out through them leaping, the fire, i.e. all the more subtle part  
of this, [30]  
Shines along his threshold with incessant beams:  
So the primaeval fire, fenced within the membranes.  
And delicate tissues gave birth to a round-eyed daughter—  
Tissues bored through with wonderful channels—  
And these fended off the deep surrounding flood, [438<sup>a</sup>1]  
While letting through the fire, i.e. all its more subtle part.

Sometimes he accounts for vision thus, but at other times he explains it by emanations from the visible objects.

Democritus, on the other hand, is right in his opinion that the eye is of water; [5] not, however, when he goes on to explain seeing as mirroring. The mirroring that takes place in an eye is due to the fact that the eye is smooth, and it really has its seat not in the eye, but in that which sees. For the case is one of reflexion. But it would seem that in his time there was no scientific knowledge of the general subject of the formation of images and the phenomena of reflexion. It is strange, too, that it [10] never occurred to him to ask why the eye alone sees, while none of the other things in which images are reflected do so.

True, then, the visual organ proper is composed of water, yet vision appertains to it not because it is water, but because it is transparent—a property common alike [15] to water and to air. But water is more easily confined and more easily condensed than air; it is that the pupil, i.e. the eye proper, consists of water. That it does so is proved by facts of actual experience. The substance which flows from eyes when decomposing is seen to be water, and this in undeveloped embryos is remarkably [20]

cold and glistening. In sanguineous animals the white of the eye is fat and oily, in order that the moisture of the eye may be proof against freezing. Wherefore the eye is of all parts of the body the least sensitive to cold: no one ever feels cold in the part sheltered by the eyelids. The eyes of bloodless animals are covered with a hard scale which gives them similar protection.

[25] It is, to state the matter generally, an irrational notion that the eye should see in virtue of something issuing from it; that the visual ray should extend itself all the way to the stars, or else go out merely to a certain point, and there coalesce, as some say, with rays which proceed from the object. It would be better to suppose this coalescence to take place in the fundament of the eye itself. But even this would be mere trifling. For what is meant by the coalescence of light with light? Or how is it [438<sup>b</sup>1] possible? Coalescence does not occur between any two things taken at random. And how could the light within the eye coalesce with that outside it? For the membrane comes between them.

That without light vision is impossible has been stated elsewhere; but, whether the medium between the eye and its objects is air or light, vision is caused by a process through this medium.

[5] Accordingly, that the inner part of the eye consists of water is easily intelligible, water being transparent.

Now, as vision outwardly is impossible without light, so also it is impossible inwardly. There must, therefore, be some transparent medium within the eye, and, as this is not air, it must be water. The soul or its perceptive part is not situated at the external surface of the eye, but obviously somewhere within: whence the [10] necessity of the interior of the eye being transparent, i.e. capable of admitting light. And that it is so is plain from actual occurrences. It is matter of experience that soldiers wounded in battle by a sword slash on the temple, so inflicted as to sever the passages of the eye, feel a sudden onset of darkness, as if a lamp had gone out; [15] because what is called the pupil, i.e. the transparent, which is a sort of lamp, is then cut off.

Hence, if the facts be at all as here stated, it is clear that—if one should explain the nature of the sensory organs in this way, i.e., by correlating each of them with one of the elements,—we must conceive that the part of the eye which sees consists [20] of water, that what is perceptive of sound consists of air, and that the sense of smell consists of fire. (For the organ of smell is potentially that which the sense of smell is actually; since the object of sense is what causes the actualization of each sense, so that it must beforehand have been potentially such and such.

Now, odour is a smoke-like evaporation, and smoke-like evaporation arises from fire. This also helps [25] us to understand why the olfactory organ has its proper seat in the environment of the brain; for cold matter is potentially hot. In the same way must the genesis of the eye be explained. Its structure is an offshoot from the brain, because the latter is the moistest and coldest of all the bodily parts.)

The organ of touch consists of earth, and the faculty of taste is a particular form of touch. This explains why the sensory organ of both touch and taste is closely [439<sup>a</sup>1] related to the heart. For the heart, as being the hottest of all the bodily parts, is the counterpoise of the brain.

This, then, is the way in which the characteristics of the bodily organs of sense must be determined. [5]

3 · Of the sensibles corresponding to each sensory organ, viz. colour, sound, odour, savour, touch, we have treated in *On the Soul* in general terms, having there determined what their function is, and what is implied in their becoming actualized in relation to their respective organs. We must next consider what account we are to give of any one of them; what, for example, we should say *colour* [10] is, or *sound*, or *odour*, or *savour*; and so also respecting *touch*. We begin with *colour*.

Now, each of them may be spoken of from two points of view, i.e., either as actual or as potential. We have in *On the Soul* explained in what sense the colour, or sound, regarded as actualized, is the same as, and in what sense it is different from, the correlative sensation, the actual seeing or hearing. The [15] point of our present discussion is to determine what each sensible object must be in itself, in order to produce actual sensation.

We have already in *On the Soul* stated of light that it is the colour of the transparent incidentally; for whenever a fiery element is in a medium its presence there is light; while the privation of it is darkness. But what we call transparent is [20] not something peculiar to air, or water, or any other of the bodies usually called transparent, but is a common nature and power, capable of no separate existence of its own, but residing in these, and subsisting likewise in all other bodies in a greater or less degree. As the bodies in which it subsists must have some extreme bounding [25] surface, so too must this. Here, then, we may say that light is a nature inhering in the transparent when the latter is without determinate boundary. But it is manifest that, when the transparent is in determinate bodies, its bounding extreme must be something real; and

that colour is just this something we are plainly taught by facts—colour being actually either at the limit, or being itself that limit, in bodies. [30] (Hence it was that the Pythagoreans named the superficies of a body its hue.) For it is at the limit of the body, but it is not the limit of the body; but the same natural substance which is coloured *outside* must be thought to be so inside too.

Air and water, too are evidently coloured; for their brightness is of the nature [439<sup>b</sup>1] of colour. But the colour which air or sea presents, since the body in which it resides is not determinately bounded, is not the same when one approaches and views it close by as it is when one regards it from a distance; whereas in determinate bodies [5] the colour presented is definitely fixed, unless, indeed, when the atmospheric environment causes it to change. Hence it is clear that that in them which is susceptible of colour is in both cases the same. It is therefore the transparent, according to the degree to which it subsists in bodies (and it does so in all more or [10] less), that causes them to partake of colour. But since the colour is at the extremity of the body, it must be at the extremity of the transparent in the body. Whence it follows that we may define colour as the limit of the transparent in determinately bounded body. For whether we consider the special class of bodies called transparent, as water and such others, or determinate bodies, which appear to possess a fixed colour of their own, it is at the exterior bounding surface that all alike exhibit their colour.

[15] Now, that which when present in air produces light may be present also in the transparent; or again, it may not be present, but there may be a privation of it. Accordingly, as in the case of air the one condition is light, the other darkness, in the same way the colours white and black are generated in determinate bodies.

We must now treat of the other colours, reviewing the several ways in which they can come about.

[20] It is conceivable that the white and the black should be juxtaposed in quantities so minute that either separately would be invisible, though the joint product would be visible; and that they should thus have the other colours for resultants. Their product could, at all events, appear neither white nor black; and, as it must have some colour, and can have neither of these, this colour must be of a [25] mixed character—in fact, a species of colour different from either. Such, then, is a possible way of conceiving the existence of a plurality of colours besides the white and black; and we may suppose that many are the result of a ratio; for they may be juxtaposed in the ratio of 3 to 2, or of 3 to 4, or in



ratios expressible by other numbers; while some may be juxtaposed according to no numerically expressible [30] ratio, but according to some incommensurable relation of excess or defect; and, accordingly, we may regard all these colours as analogous to concords, and suppose that those involving numerical ratios, like the concords in music, may be those [440<sup>a</sup>1] generally regarded as most agreeable; as, for example, purple, crimson, and some few such colours, their fewness being due to the same causes which render the concords few. The other compound colours may be those which are not based on numbers. Or it may be that, while all colours whatever are based on numbers, some are regular in this respect, others irregular; and that the latter, whenever they are [5] not pure, owe this character to a corresponding impurity in their numerical ratios. This then is one way to explain the genesis of intermediate colours.

Another is that the black and white appear the one through the medium of the other, giving an effect like that sometimes produced by painters overlaying a less vivid upon a more vivid colour, as when they desire to represent an object appearing [10] under water or enveloped in a haze, and like that produced by the sun, which in itself appears white, but takes a crimson hue when beheld through a fog or a cloud of smoke. On this hypothesis, too, a variety of colours may be conceived to arise in the same way as that already described; for between those at the surface and those underneath a definite ratio might sometimes exist; in other cases they might stand in no determinate ratio. To say with the ancients that colours are emanations, and [15] that the visibility of object is due to such a cause, is absurd. For they must, in any case, explain sense-perception through touch; so that it were better to say at once that visual perception is due to a process set up by the perceived object in the medium between this object and the sensory organ; due, that is, to contact, not to emanations.

If we accept the hypothesis of juxtaposition, we must assume not only invisible [20] magnitude, but also imperceptible time, in order that the arrival of the movements may be unperceived, and that the colour may appear to be one because they seem to be simultaneous. On the hypothesis of superposition, however, no such assumption is needed: the stimulatory process produced in the medium by the upper colour, when this is itself unaffected, will be different in kind from that produced by it when [25] affected by the underlying colour. Hence it presents itself as a different colour, i.e. as one which is neither white nor black. So that, if it is impossible to suppose any magnitude to be invisible, and we must assume that there is some distance from which every magnitude is visible,

this superposition theory too<sup>2</sup> might pass as a theory of colour-mixture. Indeed, in the previous case also there is no reason why, to persons at a distance from the juxtaposed blacks and whites, some one colour should not appear to present itself as a blend of both. For it will be shown, in a discussion to be undertaken later on, that there is no magnitude absolutely invisible. [30]

There is a mixture of bodies, however, not merely such as some suppose, i.e. by [440<sup>b</sup>1] juxtaposition of their minimal parts, which, owing to sense, are imperceptible by us, but a mixture by which they are wholly blent together, as we have described it in the treatise on mixture, where we dealt with this subject generally in its most comprehensive aspect. For, on the supposition we are criticizing, the only totals capable of being mixed are those which are divisible into minimal parts as men, [5] horses, or seeds. For of mankind as a whole the individual man is such a least part; of horses the individual horse. Hence by the juxtaposition of these we obtain a mixed total, consisting of both together; but we do not say that by such a process any individual man has been mixed with any individual horse. Not in this way, but by complete interpenetration must we conceive those things to be mixed which are not divisible into minima; and it is in the case of these that natural mixture exhibits [10] itself in its most perfect form. We have explained already in our discourse on mixture how such mixture is possible. It is plain that when bodies are mixed their colours also are necessarily mixed at the same time; and that this is the real cause determining the existence of a plurality of colours—not superposition or juxtaposition. [15] For when bodies are thus mixed, their resultant colour presents itself as one and the same at all distances alike; not varying as it is seen nearer or farther away.

Colours will thus, too be many in number on account of the fact that the ingredients may be combined with one another in a multitude of ratios; some will be based on determinate numerical ratios, while others again will have as their basis a [20] relation of quantitative excess. And all else that was said in reference to the colours, considered as juxtaposed or superposed, may be said of them likewise when regarded as mixed.

Why colours, as well as savours and sounds, consist of species determinate and [25] not infinite is a question which we shall discuss hereafter.

are many colours; while before, in our work *On the Soul*, we explained the nature of sound and voice.<sup>3</sup> We have next to speak of odour and savour, both of which are almost the same physical affection, although they each have their being in different [30] things. Savours, as a class, display their nature more clearly to us than odours, the cause of which is that the olfactory sense of man is inferior in acuteness [441<sup>a</sup>1] to that of the animals, and is, when compared with our other senses, the least perfect of all. Man's sense of touch, on the contrary, excels that of all other animals in fineness, and taste is a modification of touch.

Now the natural substance water tends to be tasteless. But either we must suppose that water contains in itself the various kinds of savour, though in amounts [5] so small as to be imperceptible, which is the doctrine of Empedocles; or the water must be a sort of matter, qualified, as it were, to produce germs of savours of all kinds, so that all kinds of savour are generated from the water, though different kinds from its different parts; or else the water is in itself quite undifferentiated in respect of savour, but some agent, such for example as one might conceive heat or the sun to be, is the efficient cause of savour.

[10] Of these three hypotheses, the falsity of that held by Empedocles is only too evident. For we see that when pericarpal fruits are plucked and exposed in the sun,<sup>4</sup> or subjected to the action of fire, their savours are changed by the heat, which shows that their qualities are not due to their drawing anything from the water in the ground, but to a change which they undergo within the pericarp itself; and we see, [15] moreover, that these juices, when extracted and allowed to lie, instead of sweet become by lapse of time harsh or bitter, or acquire savours of any and every sort; and that, again, by the process of boiling they are made to assume almost all kinds of new savours.

It is likewise impossible that water should be a material qualified to generate all kinds of savour germs; for we see different kinds of taste generated from the same water, having it as their nutriment.

[20] It remains, therefore, to suppose that the water is changed by passively receiving some affection. Now, it is manifest that water does not contract the quality of sapidity from the agency of heat alone. For water is of all liquids the thinnest, thinner even than oil itself, though oil, owing to its viscosity, is more [25] ductile than water, the latter being uncohesive in its particles; whence water is more difficult than oil to hold in the hand. But since perfectly pure water does not, when subjected to the action of heat, show any tendency to acquire consistency, we must infer that some other agency than heat is the cause of sapidity. For all

savours exhibit a comparative consistency. Heat is, however, a co-agent in the matter.

Now the savours found in pericarpal fruits evidently exist also in the earth. Hence many of the old natural philosophers assert that water has qualities like [441<sup>b</sup>1] those of the earth through which it flows, a fact especially manifest in the case of saline springs, for salt is a form of earth. Hence also when liquids are filtered through ashes, a bitter substance, the taste they yield is bitter. There are many [5] wells, too, of which some are bitter, others acid, while others exhibit other tastes of all kinds.

As was to be anticipated, therefore, it is among plants that tastes occur in richest variety. For, like all things else, the moist is affected only by its contrary; and this contrary is the dry. Thus we see why the moist is affected by fire, which, as [10] a natural substance, is dry. Heat is, however, the essential property of fire, as dryness is of earth, according to what has been said in our treatise on the elements. Fire and earth, therefore, taken absolutely as such, have no natural power to affect, or be affected; nor have any other pair of substances. Any two things can affect or be affected by, one another only so far as contrariety to the other resides in either of them.

As, therefore, persons washing colours or savours in a liquid cause the water in [15] which they wash to acquire such a quality, so nature, too, by washing the dry and earthy in the moist, and by filtering the latter, that is, moving it on by the agency of heat through the dry and earthy, imparts to it a certain quality. This affection, wrought by the aforesaid dry in the moist, capable of transforming the sense of taste [20] from potentiality to actuality, is savour. Savour brings into actual exercise the perceptive faculty which pre-existed only in potency. The activity of sense-perception in general is analogous, not to the process of acquiring knowledge, but to that of exercising knowledge already acquired.

That savours, either as a quality or as the privation of a quality, belong not to every form of the dry but to the nutrient, we shall see by considering that neither the [25] dry without the moist, nor the moist without the dry, is nutrient. For no single element, but only composite substance, constitutes nutriment for animals. Now, among the perceptible elements of the food which animals assimilate, the tangible are the efficient causes of growth and decay; it is *qua* hot or cold that the food assimilated causes these; for the heat or cold is the direct cause of growth or decay. It is *qua* tastable, however, that the assimilated food supplies nutrition. For all [442<sup>a</sup>1] organisms are nourished by the sweet, either by itself or in combination with other savours. Of this we must speak with

more precise detail in our work on generation: for the present we need touch upon it only so far as our subject here requires. Heat causes growth, and fits the food-stuff for alimentation; it attracts that which is [5] light, while the salt and bitter it rejects because of their heaviness. In fact, whatever effects external heat produces in external bodies, the same are produced by their internal heat in animal and vegetable organisms. Hence it is that nourishment is effected by the sweet. The other savours are introduced into and blended in food on [10] a principle analogous to that on which the saline or the acid is used artificially, i.e. for seasoning. These latter are used because they counteract the tendency of the sweet to be too nutrient, and to float on the stomach.

As the intermediate colours arise from the mixture of white and black, so the intermediate savours arise from the sweet and bitter; and these savours, too, [15] severally involve either a definite ratio, or else an indefinite relation of degree, between their components, either having certain numbers at the basis of their mixture and motion, or else being mixed in proportions not arithmetically expressible. The tastes which give pleasure in their combination are those which have their components joined in a definite ratio.

The sweet taste alone is rich, while the saline is fairly identical with the bitter. Between the extremes of sweet and bitter come the harsh, the pungent, the [20] astringent, and the acid. Savours and colours contain respectively about the same number of species. For there are seven species of each, if, as is reasonable, we regard grey as a variety of black (for the alternative is that yellow should be classed with white, as rich with sweet); while crimson, violet, leek-green, and deep blue, come [25] between white and black, and from these all others are derived by mixture.

Again, as black is a privation of white in the transparent, so saline or bitter is a privation of sweet in the nutrient moist. This explains why the ash of all burnt things is bitter; for the potable moisture has been exuded from them.

Democritus and most of the natural philosophers who treat of sense-perception proceed quite irrationally, for they represent all objects of sense as objects of touch. [442b1] Yet, if this is really so, it clearly follows that each of the other senses is a mode of touch; but one can see at a glance that this is impossible.

Again, they treat the percepts common to all senses as special to one. For [5] magnitude and figure, roughness and smoothness, and, moreover, the sharpness and bluntness found in solid bodies, are percepts common

to all the senses, or if not to all, at least to sight and touch. This explains why it is that the senses are liable to err regarding them, while no such error arises respecting their special sensibles; e.g. the sense of seeing is not deceived as to colour, nor is that of hearing as to sound.

[10] On the other hand, they reduce the special to common sensibles, as Democritus does with white and black; for he asserts that the latter is rough, and the former smooth, while he reduces savours to the atomic figures. Yet surely no one sense, or, if any, the sense of sight rather than any other, can discern the common sensibles. But if we suppose that the sense of taste is better able to do so, then—since to [15] discern the smallest objects in each kind is what marks the acutest sense—taste should have been the sense which best perceived the common sensibles generally, and showed the most perfect power of discerning figures in general.

Again, all the sensibles involve contrariety; e.g. in colour white is contrary to black, and in savours bitter is contrary to sweet; but no one figure is reckoned as [20] contrary to any other figure. Else, to which of the possible polygonal figures is the spherical figure contrary?

Again, since figures are infinite in number, savours also should be infinite; for why should one savour be perceived, and another not?

This completes our discussion of the object of taste, i.e. savour; for the other affections of savours are examined in their proper place in connection with the [25] natural history of plants.

5 · Our conception of the nature of odours must be analogous to that of savours; inasmuch as the sapid moist effects in air and water alike, but in a different province of sense, precisely what the dry effects in the moist of water only. We customarily predicate transparency of both air and water in common; but it is not *qua* that either is a vehicle of odour, but *qua* possessed of a power of washing or [443<sup>a</sup>1] rinsing the sapid dryness.

For the object of smell exists not in air only: it also exists in water. This is proved by the case of fishes and testacea, which are seen to possess the faculty of smell, although water contains no air (for whenever air is generated within water it [5] rises to the surface), and these creatures do not breathe. Hence, if one were to assume that air and water are both moist, it would follow that odour is the natural substance consisting of the sapid dry diffused in the moist, and whatever is of this kind would be an object of smell.

That the property of odorousness is based upon the sapid may be seen

by comparing the things which possess with those which do not possess odour. The elements, viz. fire, air, earth, water, are inodorous, because both the dry and the [10] moist among them are without sapidity, unless some added ingredient produces it. This explains why sea-water possesses odour, for it contains savour and dryness. Salt, too, is more odorous than natron, as the oil which exudes from the former proves, for natron is allied to earth more nearly than salt. Again, a stone is inodorous, just because it is tasteless, while, on the contrary, wood is odorous, [15] because it is sapid. The kinds of wood, too, which contain more water are less odorous than others. Moreover, to take the case of metals, gold is inodorous because it is without taste, but bronze and iron are odorous; and when the moisture has been burnt out of them, their slag is, in all cases, less odorous. Silver and tin are more [20] odorous than the one class of metals, less so than the other, inasmuch as they are watery.

Some writers look upon exhalation, which is a compound of earth and air, as the essence of odour. Heraclitus implied his adherence to it when he declared that if all existing things were turned into smoke, the nose would be the organ to discern them with. All writers incline to refer odour to this cause, but some regard it as [25] vapour, others as exhalation; while others, again, hold it to be either. Vapour is merely a form of moisture, but smoky exhalation is, as already remarked, composed of air and earth. The former when condensed turns into water; the latter, into a particular species of earth. Now, it is unlikely that odour is either of these. For vaporous exhalation consists of mere water; and smoky exhalation cannot occur in [30] water at all, though, as has been before stated, aquatic creatures also have the sense of smell.

Again, the exhalation theory of odour is analogous to the theory of emanations. [443<sup>b</sup>1] If, therefore, the latter is untenable, so, too, is the former.

It is clearly conceivable that the moist, whether in air (for air, too, is essentially [5] moist) or in water, should imbibe the influence of, and have effects wrought in it by, the sapid dryness. Moreover, if the dry produces in moist media and air, an effect as of something washed out in them, it is manifest that odours must be something analogous to savours. Indeed, this analogy is, in some instances, a fact; for odours as [10] well as savours are spoken of as pungent, sweet, harsh, astringent, rich; and one might regard fetid smells as analogous to bitter tastes; which explains why the former are as unpleasant to breathe as the latter are to drink. It is clear, therefore, that odour is in both water and air what savour is in water alone. This explains why [15] coldness and freezing render savours

dull, and abolish odours altogether; for cooling and freezing tend to annul the kinetic heat which helps to fabricate sapidity.

There are two species of the odorous. For the statement of certain writers that the odorous is not divisible into species is false; it is so divisible. We must here define the sense in which these species are to be admitted or denied.

[20] One class of odours, then, is that which runs parallel, as has been observed, to savours: to odours of this class their pleasantness or unpleasantness belongs incidentally. For owing to the fact that savours are qualities of nutrient matter, the odours connected with these are agreeable as long as animals have an appetite for the food, but they are not agreeable to them when sated and no longer in want of it; nor are they agreeable, either, to those animals that do not like the food itself which [25] yields the odours. Hence, as we observed, these odours are pleasant or unpleasant incidentally, and the same reasoning explains why it is that they are perceptible to all animals in common.

The other class of odours consists of those agreeable in their essential nature, e.g. those of flowers. For these do not in any degree stimulate animals to food, nor do they contribute in any way to appetite; their effect upon it, if any, is [30] rather the opposite. For the verse of Strattis ridiculing Euripides—

Use not perfumery to flavour soup,

contains a truth.

[444<sup>a</sup>1] Those who nowadays introduce such flavours into beverages deforce our sense of pleasure by habituating us to them, until, from two distinct kinds of sensations combined, pleasure arises as it might from one simple kind.

Of this species of odour man alone is sensible; the other, viz. that correlated [5] with tastes, is, as has been said before, perceptible also to the other animals. And odours of the latter sort, since their pleasureableness depends upon taste, are divided into as many species as there are different tastes; but we cannot go on to say this of the former kind of odour, since its nature is agreeable or disagreeable *per se*. The reason why the perception of such odours is peculiar to man is found in the [10] characteristic state of man's brain. For his brain is naturally cold, and the blood which it contains in its vessels is thin and pure but easily cooled (whence it happens that the exhalation arising from food, being cooled by the coldness of this region, produces unhealthy rheums);



therefore it is that odours of such a species have been [15] generated for human beings, as a safeguard to health. This is their sole function, and that they perform it is evident. For food, whether dry or moist, though pleasant to taste, is often unwholesome; whereas the odour arising from what is fragrant, that odour which is pleasant in its own right, is, so to say, always beneficial to persons in any state of bodily health whatever.

For this reason, too, the perception of odour is effected through respiration, not in all animals, but in man and certain other sanguineous animals, e.g. quadrupeds, [20] and all that participate freely in the natural substance air; because when odours, on account of the lightness of the heat in them, mount to the brain, the health of this region is thereby promoted. For odour, as a power, is naturally heat-giving. Thus nature has employed respiration for two purposes: primarily for the relief thereby [25] brought to the thorax, secondarily for the inhalation of odour. For while an animal is inhaling, odour moves in through its nostrils, as it were from a side-entrance.

But the perception of the second class of odours above described is confined to human beings, because man's brain is, in proportion to his whole bulk, larger and [30] moister than the brain of any other animal. This is the reason of the further fact that man alone, so to speak, among animals perceives and takes pleasure in the odours of flowers and such things. For the heat and stimulation set up by these odours are commensurate with the excess of moisture and coldness in his cerebral region. On [444<sup>b</sup>1] all the other animals which have lungs, nature has bestowed their due perception of one of the two kinds of odour through the act of respiration, guarding against the needless creation of two organs of sense; for in the fact that they breathe the other animals have already sufficient provision for their perception of the one species of [5] odour only, as human beings have for their perception of both.

But that creatures which do not breathe have the olfactory sense is evident. For fishes, and all insects as a class, have, thanks to the species of odour correlated with nutrition, a keen olfactory sense of their proper food from a distance, even when [10] they are very far away from it; such is the case with bees, and also with the class of small ants, which some denominate *knipes*. Among marine animals, too, the murex and many other similar animals have an acute perception of their food by its odour.

It is not equally certain what the organ is whereby they so perceive. This [15] question, of the organ whereby they perceive odour, may well cause a difficulty, if we assume that smelling takes place in animals only while breathing (for that this is the fact is manifest in all the animals

which do breathe), whereas none of those just mentioned breathes, and yet they have the sense of smell—unless, indeed, they have some other sense not included in the ordinary five. This supposition, is however, impossible. For any sense which perceives odour is a sense of smell, and this they do [20] perceive, though probably not in the same way as creatures which breathe, but when the latter are breathing the current of breath removes something that is laid like a lid upon the organ proper (which explains why they do not perceive odours when not breathing); while in creatures which do not breathe this is always off: just as some animals have eyelids on their eyes, and when these are not raised they [25] cannot see, whereas hard-eyed animals have no lids, and consequently do not need, besides eyes, an agency to raise the lids, but see on the basis of what is possible for them from the start.

Consistently with what has been said above, not one of the animals shows repugnance to the odour of things which are essentially ill-smelling, unless one of [30] the latter is positively pernicious. They are destroyed, however, by these things, just as human beings get headaches from, and are often asphyxiated by, the fumes of charcoal; so the other animals perish from the strong fumes of brimstone and [445<sup>a</sup>1] bituminous substances, and they avoid them because of that quality. For the disagreeable odour in itself they care nothing whatever (though the odours of many plants are essentially disagreeable), unless, indeed, it has some effect upon the taste of their food.

[5] The senses making up an odd number, and an odd number having always a middle unit, the sense of smell occupies in itself as it were a middle position between the tactual senses, i.e. touch and taste, and those which perceive through a medium, i.e. sight and hearing. Hence the object of smell, too, is an affection of nutrient substances (which fall within the class of tangibles), and is also an affection of the [10] audible and visible; whence it is that creatures have the sense of smell both in air and water. Accordingly, the object of smell is something common to both of these provinces, i.e. it appertains both to the tangible on the one hand, and on the other to the audible and transparent. Hence the propriety of the figure by which it has been described by us as an immersion or washing of dryness in the moist and fluid. Such [15] then must be our account of the sense in which one is or is not entitled to speak of the odorous as having species.

The theory held by certain of the Pythagoreans, that some animals are nourished by odours alone, is unsound. For, in the first place, we see that food must be composite, since the bodies nourished by it are not

simple. This explains why [20] waste matter is secreted from food, either within the organisms, or, as in plants, outside them. But since even water by itself alone, that is, when unmixed, will not suffice for food—for anything which is to form a consistency must be corporeal—, it is still much less conceivable that air should be so corporealized. But, besides this, we see that all animals have a receptacle for food, from which, when it has entered, [25] the body absorbs it. Now, the organ which perceives odour is in the head, and odour enters with the inhalation of the breath; so that it goes to the respiratory region. It is plain, therefore, that odour, *qua* odour, does not contribute to nutrition; that, however, it is serviceable to health is equally plain, as well by immediate perception [30] as from the arguments above employed; so that odour is in relation to general health what savour is in the province of nutrition and in relation to the bodies nourished.

[445<sup>b</sup>1] This then must conclude our discussion of the several organs of sense-perception.

6 · One might ask: if every body is infinitely divisible, are its sensible [5] qualities—colour, savour, odour, sound, weight, cold or heat, heaviness or lightness, hardness or softness—also infinitely divisible? Or, is this impossible?

Each of them is productive of sense-perception, since, in fact, all derive their name from the very circumstance of their being able to stimulate this. Hence if their power is divisible, our perception of them should likewise be divisible to infinity, and every part of a body should be a perceptible magnitude. For it is impossible, e.g., to [10] see a thing which is white but not of a certain magnitude.

Since if it were not so, we might conceive a body existing but having no colour, or weight, or any such quality; accordingly not perceptible at all. For these quantities are the objects of sense-perception. On this supposition, every perceptible object should be regarded as composed of non-perceptible parts. Yet it must be really composed of perceptible parts, since assuredly it does not consist of mathematical qualities. Again, by what faculty should we discern and cognize [15] these? Is it by thought? But they are not objects of thought; nor does thought think of objects in space, except when it acts in conjunction with sense-perception. At the same time, if this be the case it seems to tell in favour of the atomistic hypothesis; for thus, indeed, the question might be solved. But it is impossible. Our views on the subject of atoms are to be found in our

treatise on movement. [20]

The solution of these questions will bring with it also the answer to the question why the species of colour, taste, sound, and other sensible qualities are limited. For in all classes of things lying between extremes the intermediates must be limited. But contraries are extremes, and every object of sense-perception involves contrariety; e.g. in colour, white and black; in savour, sweet and bitter, and in all the [25] other sensibles also the contraries are extremes. Now, that which is continuous is divisible into an infinite number of unequal parts, but into a finite number of equal parts, while that which is not *per se* continuous is divisible into species which are finite in number. Since then, the several sensible qualities of things are to be reckoned as species, while continuity always subsists in these, we must take account of the difference between the potential and the actual. It is owing to this difference that we do not see its ten-thousandth part in a grain of millet, although sight has [446<sup>a</sup>1] embraced the whole grain within its scope; and it is owing to this, too, that the sound contained in a quarter-tone escapes notice, and yet one hears the whole strain, inasmuch as it is a continuum; but the interval between the extreme sounds escapes the ear. So, in the case of other objects of sense, extremely small constituents are unnoticed; because they are only potentially not actually visible, unless when they [5] have been parted from the wholes. So the foot-length too exists potentially in the two-foot length, but actually only when it has been separated from the whole. But increments so small might well, if separated from their totals, be dissolved in their environments, like a drop of sapid moisture poured out into the sea. But even if this were not so still, since the increment of sense-perception is not perceptible in itself, [10] nor capable of separate existence (since it exists only potentially in the more distinctly perceivable whole of sense-perception), so neither will it be possible to perceive its correlatively small object when separated in actuality. But yet this is to be considered as perceptible: for it is both potentially so already, and destined to be actually so when it has become part of an aggregate. Thus, therefore, we have shown that some magnitudes and their sensible qualities escape notice, and the [15] reason why they do so, as well as the manner in which they are still perceptible or not perceptible in such cases. Accordingly then, when these are so great as to be perceptible actually, and not merely because they are in the whole, but even apart from it, it follows necessarily that their sensible qualities, whether colours or tastes or sounds, are limited in number.

One might ask:—do the objects of sense-perception, or the

movements [20] proceeding from them in whichever of the two ways sense-perception takes place), when these are actualized for perception, always arrive first at a middle point, as odour evidently does, and also sound? For he who is nearer perceives the odour sooner, and the sound of a stroke reaches us some time after it has been struck. Is it [25] thus also with an object seen, and with light? Empedocles, for example, says that the light from the sun arrives first in the intervening space before it comes to the eye, or reaches the Earth. This might plausibly seem to be the case. For whatever is moved, is moved from one place to another; hence there must be a corresponding interval of time also in which it is moved from the one place to the other. [446<sup>b</sup>1] But any given time is divisible; so that we should assume a time when the sun's ray was not as yet seen, but was still travelling in the middle space.

Now, even if one always hears and has heard—and, in general, perceives and has perceived—at the same time, and these acts do not come into being but occur [5] without coming into being—yet, just as, though the stroke which causes the sound has been already struck, the sound is not yet at the ear (and that this last is a fact is further proved by the transformation which the letters undergo, implying that the local movement takes place in the space between; for the reason why we do not succeed in catching the sense of what is said is that the air in moving towards them has its form changed): is the same also true in the case of colour and light? For [10] certainly it is not true that the beholder sees, and the object is seen, in virtue of some merely abstract relationship between them, such as that between equals. For if it were so, there would be no need that either should occupy some particular place; since to the equalization of things their being near to, or far from, one another makes no difference.

Now this may with good reason take place as regards sound and odour, for [15] these, like air and water, are continuous, but the movement of both is divided into parts. This too is the ground of the fact that the object which the person first in order of proximity hears or smells is the same as that which each subsequent person perceives, while yet it is not the same.

Some, indeed, raise a question also on these very points; they declare it impossible that one person should hear, or see, or smell, the same object as another, [20] urging the impossibility of several persons in different places hearing or smelling the same object; for the one same thing would thus be divided from itself. The answer is that, in perceiving the object which first set up the motion—e.g. a bell, or frankincense, or

fire—all perceive an object numerically one and the same; while, of course, in the special object perceived they perceive an object numerically different for each, though specifically the same for all; and this, accordingly, explains how it is that many persons together see, or smell, or hear the same object. These things [25] are not bodies, but an affection or process of some kind (otherwise this would not have been, as it is, a fact of experience), though, on the other hand, they each imply a body.

But with regard to light the case is different. For light is due to the presence of something, but it is not a movement. And in general, even in qualitative change the case is different from what it is in local movement. Local movements, of course, arrive first at a point midway before reaching their goal (and sound, it is currently believed, is a movement of something locally moved), but we cannot go on to assert this in like manner of things which undergo qualitative change. For this kind of [447<sup>a</sup>1] change may possibly take place in a thing all at once, without one half of it being changed before the other; e.g. it is possible that water should be frozen simultaneously in every part. But still, for all that, if the body which is heated or frozen is extensive, each part of it successively is affected by the part contiguous, while the part first changed in quality is so changed by the cause itself which [5] originates the change, and thus the change throughout the whole need not<sup>5</sup> take place simultaneously and all at once. Tasting would have been as smelling now is, if we lived in a liquid medium, and perceived things at a distance, before touching them.

Naturally, then, the parts of media between a sensory organ and its object are not all affected at once—except in the case of light, for the reason above stated, and also in the case of seeing, for the same reason; for light is an efficient cause of [10] seeing.

7 · Another question respecting sense-perception is as follows: assuming, as is natural, that of two movements the stronger always tends to extrude the weaker, is it possible or not that one should be able to perceive two objects simultaneously in the same individual time? The above assumption explains why persons do not perceive what is brought before their eyes, if they are at the time deep in thought, or [15] in a fright, or listening to some loud noise. This assumption, then, must be made, and also the following: that it is easier to perceive each object of sense when in its simple form than when an ingredient in a mixture; easier, for example, to perceive wine when neat than when blended, and

so also honey, and a colour, or to discern a note by itself alone, than in a chord; the reason being that component elements tend [20] to efface one another. Such is the effect of all ingredients of which, when compounded, some one thing is formed.

If, then, the greater movement tends to expel the less, it necessarily follows that, when they concur, this greater should itself too be less distinctly perceptible than if it were alone, since the less by blending with it has removed some of its individuality, according to our assumption that simple objects are in all cases more perceptible.

Now, if the two stimuli are equal but heterogeneous, no perception of either [25] will ensue; they will alike efface one another's characteristics. But in such a case the perception of either stimulus in its simple form is impossible. Hence either there will then be no sense-perception at all, or there will be a perception compounded of both and differing from either. The latter is what actually seems to result from ingredients blended together, whatever may be the compound in which they are so mixed.

Since, then, from some a resultant object is produced, while from others no such resultant is produced, and of the latter sort are those things which belong to different sense provinces (for only those things are capable of mixture whose [447<sup>b</sup>1] extremes are contraries, and no one compound can be formed from, e.g., white and high, except incidentally, i.e. not as a concord is formed of high and low), there follows logically the impossibility of discerning such concurrent stimuli at the same time. For we must suppose that the stimuli, when equal, tend alike to efface one [5] another, since no one stimulus results from them; while, if they are unequal, the stronger alone is distinctly perceptible.

Again, the soul would be more likely to perceive simultaneously, with one and the same sensory act, two things in the same sensory province, such as the low and the high in sound; for the sensory stimulation in this one province is more likely to be simultaneous than that involving two different provinces, as sight and hearing. But [10] it is impossible to perceive two objects simultaneously in the same sensory act unless they have been mixed, for their amalgamation involves their becoming one, and the sensory act related to one object is itself one, and such act when one, is, of course, simultaneous with itself. Hence, when things are mixed we of necessity perceive them simultaneously: for we perceive them by a perception actually one. For an object numerically one means that which is perceived by a perception actually one, whereas an object specifically one means that which is perceived by a sensory act [15] potentially one. If then the actualized perception is one, it will declare its data to be one

object; they must, therefore, have been mixed. Accordingly, when they have not been mixed, the actualized perceptions which perceive them will be two; but in one and the same faculty the perception actualized at any single moment is necessarily one, only one stimulation or exertion of a single faculty being possible at a single instant, and in the case supposed here the faculty is one. Hence it is not possible to [20] perceive the possibility of perceiving two distinct objects simultaneously with one and the same sense.

But if it be thus impossible to perceive simultaneously two objects in the same province of sense if they are really two, manifestly it is still less conceivable that we should perceive simultaneously objects in two different sensory provinces, as white and sweet. For it appears that when the soul predicates numerical unity it does so in [25] virtue of nothing else than such simultaneous perception while it predicates specific unity in virtue of the discriminating faculty of sense together with the mode in which this operates. What I mean, for example, is this; the same sense no doubt discerns white and black, though they are specifically different from one another, and so, too, a faculty of sense self-identical, but different from the former, discerns sweet and bitter; but while both these faculties differ from one another in their modes of discerning either of their respective contraries, yet in perceiving the co-ordinates in each province they proceed in manners analogous to one another; for [448<sup>a</sup>1] instance, as taste perceives sweet, so sight perceives white; and as the latter perceives black, so the former perceives bitter.

Again, if movements of contraries are themselves contrary, and if contraries cannot subsist together in the same individual subject, and if contraries, e.g. sweet and bitter, come under one and the same sense-faculty, we must conclude that it is [5] impossible to discern them simultaneously. It is likewise clearly impossible so to discern such homogeneous sensibles as are not contrary. For these are, classed some with white, others with black, and so it is, likewise, in the other provinces of sense; for example, of savours, some are classed with sweet, and others with bitter. Nor can one discern the components in compounds simultaneously (for these are ratios of contraries, as e.g. the octave or the fifth); unless, indeed, on condition of perceiving them as one. For thus, and not otherwise, the ratios of the extreme sounds are compounded into one ratio; since we should have together the ratio, [10] on the one hand, of many to few or of odd to even, on the other, that of few to many or of even to odd.

If, then, the sensibles denominated co-ordinates though in different



provinces of sense (e.g. I call sweet and white co-ordinates though in different provinces) [15] stand yet more aloof, and differ more, from one another than do any sensibles in the same province; while sweet differs from white even more than black does from white, it is still less conceivable that one should discern them simultaneously than sensibles which are in the same province. Therefore, if simultaneous perception of the latter be impossible, that of the former is *a fortiori* impossible.

Some of the writers who treat of concords assert that the sounds combined in these do not reach us simultaneously, but only appear to do so, their real [20] successiveness being unnoticed whenever the time it involves is imperceptible. Is this true or not? One might perhaps, following this up, go so far as to say that even the current opinion that one sees and hears simultaneously is due merely to the fact that the intervals of time escape observation. But this can scarcely be true, nor is it conceivable that any portion of time should be imperceptible, or that any should be [25] unnoticeable; the truth being that it is possible to perceive every instant of time. For if it is impossible that a person should, while perceiving himself or anything else in a continuous time, be at any instant unaware of his own existence, and if there is in the time-continuum a time so small as to be absolutely imperceptible, then it is clear that a person would, during such time, be unaware of his own existence, as well as of his seeing and perceiving.

Again, if there is any magnitude, whether time or thing, absolutely imperceptible [448<sup>b</sup>1] owing to its smallness, it follows that there would not be either a thing which one perceives, or a time in which one perceives it, unless in the sense that in some part of the given time he sees some part of the given thing. For if one sees a whole line, and perceives it during a time which forms one and the same continuum—in the sense that he does so in some portion of this time—let us suppose the part CB, [5] representing a time in which he was perceiving nothing, to be cut off from the whole. Well, then, he perceives *in* a certain part or perceives *a part* of the line, after the fashion in which one sees the whole earth by seeing some given part of it, or walks in a year by walking in some given part of the year. But in the part CB he perceives nothing: therefore, he is said to perceive the whole object and during the whole time simply because he perceives in some part of AB. But the same argument [10] holds also in the case of AC; for one always perceives only, in some part and perceives only some part; and it is impossible to perceive any whole.

Therefore, we must conclude that all magnitudes are perceptible, but

their actual dimensions do not present themselves immediately. One sees the sun, or a four-cubit rod at a distance, as a magnitude, but their exact dimensions are not given in their visual presentation: indeed, at times an object of sight appears [15] indivisible, but nothing that one sees is really indivisible. The reason for this has been previously explained. It is clear then, from the above arguments, that no portion of time is imperceptible.

But we must here return to the question proposed above for discussion, whether it is possible or impossible to perceive several objects simultaneously; by 'simultaneously' I mean perceiving the several objects in a time one and indivisible relatively to one another.

[20] First, then, can one perceive different things simultaneously but with different parts of the soul—in a time which is indivisible and forms a continuous whole? Or is it that, first, in the case of a single sense (take, e.g., sight), if we assume it to perceive one colour with one part and another with another, it will have *several* [25] parts the same in kind? For what it perceives is the same in genus.

Should any one urge that, as there are two eyes, so there may be in the soul something analogous, that of the eyes, doubtless, some one organ is formed, and hence their actualization in perception is one; but if this is so in the soul, then in so far as what is formed of both is one, the true perceiving subject also will be one, while if the two parts of soul remain separate, the analogy of the eyes will fail.

Furthermore, the senses will be each at the same time one and many, as if we [449<sup>a</sup>1] should say that they were each a set of diverse sciences; for neither will an activity exist without its proper faculty, nor without activity will there be sensation.

But if the soul does not, in the way suggested, perceive in one and the same individual time sensibles of the same sense, *a fortiori* it is not thus that it perceives sensibles of different senses. For it is, as already stated, more conceivable that it should perceive a plurality of the former together in this way than a plurality of heterogeneous objects.

[5] If then, as is the fact, the soul with one part perceives sweet, with another, white, either that which results from these is some one part, or else there is no such one resultant. But there must be such one, inasmuch as the general faculty of sense-perception is one. What one object, then, does that one faculty perceive? For assuredly no one object arises by composition of these. We must conclude, therefore, that there is, as has been stated before, some one faculty in the soul with [10] which the latter perceives all its percepts, though it perceives each different genus

of sensibles through a different organ.

May we not, then, conceive this faculty which perceives white and sweet to be one *qua* indivisible in its actualization, but different, when it has become divisible in its actualization?

Or is what occurs in the case of the soul possibly analogous to what holds true in that of the things themselves? For the same numerically one thing is white and [15] sweet, and has many other qualities; for if the qualities are not separable from one another, their being is different in each case. In the same way, therefore, we must assume also, in the case of the soul, that the faculty of perception in general is in itself numerically one and the same, but different in its being: different, that is to say, in genus as regards some of its objects, in species as regards others. Hence too, we may conclude that one can perceive numerically different objects simultaneously with a faculty which is numerically one and the same, but not the same in its account.

That every sensible object is a magnitude, and that nothing which it is possible [20] to perceive is indivisible, may be thus shown. The distance whence an object could not be seen is indeterminate, but that whence it is visible is determinate. We may say the same of the objects of smelling and hearing, and of all sensibles not discerned by actual contact. Now, there is, in the interval of distance, some extreme [25] place, the last from which the object is invisible, and the first from which it is visible. This place, beyond which if the object be one cannot perceive it, while if the object be on the hither side one must perceive it, is itself necessarily indivisible. Therefore, if any sensible object be indivisible, such object, if set in the said extreme place whence imperceptibility ends and perceptibility begins, will have to be both visible and invisible at the same time; but this is impossible.

This concludes our survey of the characteristics of the organs of sense-perception [449<sup>b</sup>1] and their objects, whether regarded in general or in relation to each organ. Of the remaining subjects, we must first consider that of memory and remembering.

**\*\*TEXT:** W. D. Ross, *Aristotle: Parva Naturalia*, Clarendon Press, Oxford, 1955

<sup>1</sup>Ross adds μή before αἰσθανόμενον.

<sup>2</sup>Retaining καί.

<sup>3</sup>Ross, following Freudenthal, excises ‘while . . . voice’.

<sup>4</sup>Ross, following Bitterauf, excises ‘exposed . . . sun, or’.

<sup>5</sup>Reading καὶ οὐκ ἀνάγκη.

# ON MEMORY\*\*

*J. I. Beare*

1 · We have to treat of memory and remembering, considering its nature, its [5] cause, and the part of the soul to which this experience, as well as that of recollecting, belongs. For the persons who possess a retentive memory are not identical with those who excel in power of recollection; indeed, as a rule, slow people have a better memory, whereas those who are quick-witted and clever are better at recollecting.

We must first consider the objects of memory, a point on which mistakes are [10] often made. Now to remember what is future is not possible—that is an object of opinion or expectation (and indeed there might be actually a science of expectation, like that of divination, in which some believe); nor is there memory of what is present, but only sense-perception. For by the latter we do not know what is future or past, but what is present only. But memory relates to what is past. No one would [15] say that he remembers what is present, when it is present, e.g. a given white object at the moment when he sees it; nor would one say that he remembers an object of scientific contemplation at the moment when he is actually contemplating it, and has it full before his mind;—of the former he would say only that he perceives it, of the latter only that he knows it. But when one has knowledge or perception apart [20] from the objects, he thus remembers as to the former, that he learned it, or thought it out for himself, as to the latter, that he heard, or saw, it or had some sensible experience of it. For whenever one exercises the faculty of remembering, he must say within himself that he formerly heard or perceived or thought of that.

Memory is, therefore, neither perception nor conception, but a state or [25] affection of one of these, conditioned by lapse of time. As already observed, there is no such thing as memory of the present while present; for the present is object only of perception, and the future, of expectation, but the object of memory is the past. All memory, therefore, implies a time elapsed; consequently only those animals which perceive time remember, and the organ whereby they perceive time is also that

whereby they remember.

The subject of imagination has been already considered in our work *On the* [450<sup>a</sup>1] *Soul*. Without an image thinking is impossible. For there is in such activity an affection identical with one in geometrical demonstrations. For in the latter case, though we do not make any use of the fact that the quantity in the triangle is determinate, we nevertheless draw it determinate in quantity. So likewise when one thinks, although the object may not be quantitative, one envisages it as quantitative, [5] though he thinks of it in abstraction from quantity; while, on the other hand, if it is something by nature quantitative but indeterminate, one envisages it as if it had determinate quantity, though one thinks of it only as a quantity. Why we cannot think of anything without a continuum or think of non-temporal things without time, is another question. Now, one must cognize magnitude and motion by means of the same faculty by which one cognizes time. Thus it is clear that the cognition [10] of these objects is effected by the primary faculty of perception, and memory even of intellectual objects involves an image and the image is an affection of the common sense. Thus memory belongs incidentally to the faculty of thought, and essentially it belongs to the primary faculty of sense-perception.

Hence not only human beings and the beings which possess opinion or intelligence, but also certain other animals, possess memory. If memory were a [15] function of the thinking parts, it would not have been an attribute of many of the other animals, but probably, in that case, no mortal beings<sup>1</sup> would have had memory; since, even as the case stands, it is not an attribute of them all, just because all have not the faculty of perceiving time. Whenever one actually remembers having seen or heard or learned something, he perceives in addition as we have already observed that it happened before; and before and after are in time. [20]

Accordingly, if asked, of which among the parts of the soul memory is a function, we reply: manifestly of that part to which imagination also appertains; and all objects of which there is imagination are in themselves objects of memory, while those which do not exist without imagination are objects of memory incidentally. [25]

One might ask how it is possible that though the affection is present, and the fact absent, the latter—that which is not present—is remembered. It is clear that we must conceive that which is generated through sense-perception in the soul, and in the part of the body which is its seat,—viz. that affection the state whereof we [30] call memory—to be some such

thing as a picture.<sup>2</sup> The process of movement stamps in, as it were, a sort of impression of the percept, just as persons do who make an impression with a seal. This explains why, in those who are strongly moved owing to [450<sup>b</sup>1] passion, or time of life, no memory is formed; just as no impression would be formed if the movement of the seal were to impinge on running water; while there are others in whom, owing to the receiving surface being frayed, as happens to old walls, or owing to the hardness of the receiving surface, the requisite impression is not [5] implanted at all. Hence both very young and very old persons are defective in memory; they are in a state of flux, the former because of their growth, the latter, owing to their decay. Similarly, both those who are too quick and those who are too slow have bad memories. The former are too moist, the latter too hard, so that in the case of the former the image does not remain in the soul, while on the latter it is not [10] imprinted at all.

But then, if this is what happens in the genesis of memory, when one remembers, is it this affection that he remembers, or is it the thing from which this was derived? If the former, it would follow that we remember nothing which is absent; if the latter, how it is possible that, though perceiving directly only the [15] impression, we remember that absent thing which we do not perceive? Granted that there is in us something like an impression or picture, why should the perception of this be memory of something else, and not of this itself? For when one actually remembers, this impression is what he contemplates, and this is what he perceives. How then will he remember what is not present? One might as well suppose it [20] possible also to see or hear that which is not present. Or can this in a way actually happen? A picture painted on a panel is at once a picture and a likeness: that is, while one and the same, it is both of these, although the being of both is not the same, and one may contemplate it either as a picture, or as a likeness. Just in the same way we have to conceive that the image within us is both something in itself [25] and relative to something else. In so far as it is regarded in itself, it is only an object of contemplation, or an image; but when considered as relative to something else, e.g., as its likeness, it is also a reminder. Hence, whenever its movement is actual, if the soul perceives this in its own right, it appears to occur as a mere thought or image; but if the soul perceives it *qua* related to something else, then—just as when [30] one contemplates the painting in the picture as being a likeness, and without having seen the actual Coriscus, contemplates it as a likeness of Coriscus, and in that case the experience involved in this contemplation of it is different from what one has [451<sup>a</sup>1] when he contemplates it simply as a

painted figure—of the objects in the soul, the one presents itself simply as a thought, but the other, just because, as in the painting, it is a likeness, presents itself as a reminder.

We can now understand why it is that sometimes, when we have such processes, based on some former act of perception, occurring in the soul, we do not [5] know whether this really implies our having had perceptions corresponding to them, and we doubt whether the case is or is not one of memory. But occasionally it happens that we get a sudden idea and recollect that we heard or saw something formerly. This happens whenever, from contemplating a mental object in itself, one changes his point of view, and regards it as relative to something else.

The opposite also occurs, as happened in the cases of Antiphron of Oreus and others suffering from mental derangement; for they were accustomed to speak of [10] their images as facts of their past experience, and as if remembering them. This takes place whenever one contemplates what is not a likeness as if it were a likeness.

Mnemonic exercises aim at preserving one's memory of something by repeatedly reminding him of it; which implies nothing else than the frequent contemplation of something as a likeness, and not in its own right.

[15] As regards the question, therefore, what memory or remembering is, it has now been shown that it is the having of an image, related as a likeness to that of which it is an image; and as to the question of which of the faculties within us memory is a function, it has been shown that it is a function of the primary faculty of sense-perception, i.e. of that faculty whereby we perceive time.

2 · Next comes the subject of recollection, in dealing with which we must assume the truths elicited in our tentative discussions. For recollection is not the recovery or acquisition of memory; since at the instant when one at first learns or [20] experiences, he does not thereby recover a memory, inasmuch as none has preceded, nor does he acquire one *ab initio*. It is only at the instant when the state or affection is implanted in the soul that memory exists, and therefore memory is not itself implanted concurrently with the implantation of the sensory experience. Further, when it has first been implanted in the indivisible and ultimate organ, there is then [25] already established in the person affected the affection, or the knowledge (if one ought to apply the term 'knowledge' to the state or affection; and indeed one may well remember,



in the incidental sense, some of the things which one knows; but to remember, strictly speaking, is an activity which will not occur until time has elapsed. For one remembers now what one saw or otherwise experienced formerly; [30] one does not remember now what one experiences now.

Again, it is obviously possible, without any present act of recollection, to remember as a continued consequence of the original perception or other experience; [451<sup>b</sup>1] whereas when one recovers some knowledge which he had before, or some perception, or some other experience, the state of which we above declared to be memory, it is then, and then only, that this recovery may amount to a recollection of any of the things aforesaid; and memory follows on recollection. [5]

But even the assertion that recollection is the reinstatement of something which was there before requires qualification—it is right in one way, wrong in another. For the same person may twice learn, or twice discover the same fact. Accordingly, the act of recollecting ought to be distinguished from these acts; i.e. recollecting must imply in those who recollect the presence of some source over and above that from which they originally learn. [10]

Acts of recollection are due to the fact that one movement has by nature another that succeeds it.

If this order be necessary, whenever a subject experiences the former of two movements thus connected, it will experience the latter; if, however, the order be not necessary, but customary, only for the most part will the subject experience the latter of the two movements. But it is a fact that there are some movements, by a single experience of which persons take the impress of custom more deeply than they do by experiencing others many times; hence upon seeing some things but once [15] we remember them better than others which we may have seen frequently.

Whenever, therefore, we are recollecting, we are experiencing one of the antecedent movements until finally we experience the one after which customarily comes that which we seek. This explains why we hunt up the series, having started in thought from the present or some other, and from something either similar, or contrary, to what we seek, or else from that which is contiguous with it. That is how recollection takes place; for the movements involved in these starting-points are in [20] some cases identical, in others, again, simultaneous, while in others they comprise a portion of them, so that the remnant which one experienced after that portion is comparatively small.

Thus, then, it is that persons seek to recollect, and thus, too, it is that they recollect even without seeking to do so, viz. when the movement has supervened on some other. For, as a rule, it is when antecedent movements of the classes here [25] described have first been excited, that the particular movement implied in recollection follows. We need not examine a series of which the beginning and end lie far apart, in order to see how we remember; one in which they lie near one another will serve equally well. For it is clear that the method is in each case the same. For by the effect of custom the movements tend to succeed one another in a certain order. Accordingly, therefore, when one wishes to recollect, that is what he [30] will do: he will try to obtain a beginning of movement whose sequel shall be the movement which he desires to reawaken. This explains why attempts at recollection succeed soonest and best when they start from a beginning. For, in order of [452<sup>a</sup>1] succession, the movements are to one another as the objects. Accordingly, things arranged in a fixed order, like the successive demonstrations in geometry, are easy to remember, while badly arranged subjects are remembered with difficulty.

[5] Recollecting differs also in this respect from relearning, that one who recollects will be able, somehow, to move, solely by his own effort, to the term next after the starting-point. When one cannot do this of himself, but only by external assistance, he no longer remembers. It often happens that, though a person cannot recollect at the moment, yet by seeking he can do so, and discovers what he seeks. This he succeeds in doing by setting up many movements, until finally he excites one of a kind which will have for its sequel the fact he wishes to recollect. For [10] remembering is the existence of a movement capable of stimulating the mind to the desired movement, and this, as has been said, in such a way that the person should be moved from within himself, i.e. in consequence of movements wholly contained within himself.

But one must get hold of a starting-point. This explains why it is that persons are supposed to recollect sometimes by starting from 'places'. The cause is that they [15] pass swiftly from one point to another, e.g. from milk to white, from white to mist, and thence to moist, from which one remembers Autumn if this be the season he is trying to recollect.

It seems in general that the middle point among all things is a good starting-point. For if one does not recollect before, he will do so when he has come to this, or, if not, nothing can help him; as, e.g. if one were to have in mind A B C D E F [20] G H I. For, if he does not remember at I, he remembers at E; because from E movement in either direction is

possible, to D or to F. But, if it is not for one of these that he is searching, he will remember when he has come to C, if he is searching for A or B. But if not, he will remember by going to G, and so in all cases. The cause of one's sometimes recollecting and sometimes not, though starting from the same [25] point, is, that from the same starting-point a movement can be made in several directions, as, for instance, from C to B or to D. If, then, the mind has not moved in an old path<sup>3</sup>, it tends to move to the more customary; for custom now assumes the role of nature. Hence the rapidity with which we recollect what we frequently think about. For as one thing follows another by nature, so too that happens by custom;<sup>4</sup> and frequency creates nature. And since in the realm of nature occurrences take place which are even contrary to nature, or fortuitous, the same happens *a fortiori* [452<sup>b</sup>1] in the sphere swayed by custom, since in this sphere nature is not similarly established. Hence it is that the mind receives an impulse to move sometimes in the required direction, and at other times otherwise, particularly when something else somehow deflects the mind from the right direction and attracts it to itself. This last consideration explains too how it happens that, when we want to remember a name, [5] if we know one somewhat like it, we blunder on to that.

Thus, then, recollection takes place.

But the point of capital importance is that one should know, determinately or indeterminately, the time-relation. There is,—let it be taken as a fact,—something by which one distinguishes a greater and a smaller time; and it is reasonable to think that one does this in a way analogous to that in which one discerns magnitudes. For it is not by the mind's reaching out towards them, as some say a visual ray from the [10] eye does that one thinks of large things at a distance in space (for even if they are not there, one may similarly think of them); but one does so by a proportionate movement. For there are in the mind similar figures and movements. Therefore, when one thinks of the greater objects, in what will his thinking of those differ from his thinking of the smaller? For all the internal though smaller are as it were proportional. Now, as we may assume within a person something proportional to the [15] forms, so too, we may doubtless assume something else proportional to their distances. It is as though, if one has the movement AB, BE, he constructs CD; for AC and CD are proportional. Why then does he construct CD rather than FG? Is it not because as AC is to AB, so is H to I? These movements therefore he has [20] simultaneously. But if he wishes to think of FG, he thinks of BE in like manner as before; but now, instead of H, I, he thinks of K, L;

for these are so related as is FA to BA.

When, therefore, the movement corresponding to the object and that corresponding to its time concur, then one actually remembers. If one supposes he does without really doing so, he supposes himself to remember. For one may be mistaken, [25] and think that he remembers when he really does not. But it is not possible that when one actually remembers he should not suppose himself to remember, but should remember unconsciously. For that is what remembering is. If however, the movement corresponding to the object takes place without that corresponding to the time, or, if the latter takes place without the former, one does not remember.

The movement answering to the time is of two kinds. Sometimes in remembering a fact one has no determinate time-notion of it, no such notion as that, e.g., he did something or other on the day before yesterday; while in other cases he has a [453<sup>a</sup>1] determinate notion of the time. Still, even though one does not remember with actual determination of the time, he genuinely remembers, none the less. People often say that they remember, but yet do not know when whenever they do not know determinately the exact length of time.

It has been already stated that those who have a good memory are not identical [5] with those who are quick at recollecting. But the act of recollecting differs from that of remembering, not only in respect of time, but also in this, that many also of the other animals have memory, but, of all that we are acquainted with, none, we venture to say, except man, shares in the faculty of recollection. The cause of this is [10] that recollection is, as it were, a mode of inference. For he who endeavours to recollect infers that he formerly saw or heard, or had some such experience, and the process is, as it were, a sort of investigation. But to investigate in this way belongs naturally to those animals alone which are also endowed with the faculty of deliberation; for deliberation is a form of inference.

That the affection is corporeal, i.e. that recollection is a searching for an image [15] in a corporeal substrate, is proved by the fact that some persons, when, despite the most strenuous application of thought, they have been unable to recollect, feel discomfort, which even though they abandon the effort at recollection, persists in them none the less; and especially persons of melancholic temperament. For these [20] are most powerfully moved by images. The reason why the effort of recollection is not under the control of their will is that, as those who throw a stone cannot stop it at their will when thrown, so he who tries to recollect and

hunts sets up a process in a material part, in which resides the affection. Those who have moisture around that part which is the centre of sense-perception suffer most discomfort of this kind. For when once the moisture has been set in motion it is not easily brought to rest, until [25] the idea which was sought for has again presented itself, and thus the movement has found a straight course. For a similar reason bursts of anger or fits of terror, when once they have excited such motions, are not at once allayed, even though the angry or terrified persons set up counter motions, but the passions continue to move them on, in the same direction as at first. The affection resembles also that in the case of words, tunes, or sayings, whenever one of them has become inveterate on the lips. [30] People give them up and resolve to avoid them; yet again and again they find themselves humming the forbidden air, or using the prohibited word.

Those whose upper parts are abnormally large, as is the case with dwarfs, have [453<sup>b</sup>1] abnormally weak memory, as compared with their opposites, because of the great weight which they have resting upon the organ of perception, and because their movements are, from the very first, not able to keep true to a course, but are dispersed, and because, in the effort at recollection, these movements do not easily find a direct onward path. Infants and very old persons have bad memories, owing [5] to the amount of movement going on within them; for the latter are in process of rapid decay, the former in process of vigorous growth; and we may add that children, until considerably advanced in years, are dwarf-like. Such then is our theory as regards memory and remembering—their nature, and the particular [10] organ of the soul by which animals remember; also as regards recollection, its definition, and the manner and causes of its performance.

**\*\***TEXT: W. D. Ross, *Aristotle: Parva Naturalia*, Clarendon Press, Oxford, 1955

<sup>1</sup>Retaining the MSS reading θνητῶν.

<sup>2</sup>Retaining τὸ πάθος.

<sup>3</sup>Reading μὴ διὰ παλαιοῦ.

<sup>4</sup>Reading συνηθεία.

# ON SLEEP\*\*

*J. I. Beare*

1 · With regard to sleep and waking, we must consider what they are; whether they are peculiar to soul or to body, or common to both; and if common, to what part of soul or body they appertain; further, from what cause they are attributes of animals, and whether all animals share in them both, or some partake [15] of the one only, others of the other only, or some partake of neither and some of both.

Further, we must also inquire what dreams are, and from what cause sleepers sometimes dream, and sometimes do not; or whether the truth is that sleepers always dream but do not always remember; and if this occurs, what its explanation [20] is.

Again, we must inquire whether it is possible or not to foresee the future, and if it be possible, in what manner; further, whether it extends only to things to be accomplished by the agency of men, or to those also of which the cause lies in supra-human agency, and which result from the workings of nature, or of spontaneity.

First, then, this much is clear, that waking and sleep appertain to the same part [25] of an animal, inasmuch as they are opposites, and sleep is evidently a privation of waking. For contraries, in natural as well as in all other matters, are seen always to present themselves in the same subject, and to be affections of the same: examples are—health and sickness, beauty and ugliness, strength and weakness, sight and blindness, hearing and deafness. This is also clear from the following considerations. [454<sup>a</sup>1] The criterion by which we know the waking person to be awake is identical with that by which we know the sleeper to be asleep; for we assume that one who is exercising sense-perception is awake, and that every one who is awake perceives either some external movement or else some movement within himself. If waking, then, consists in nothing else than the exercise of sense-perception, the inference is [5] clear, that that in virtue of which animals perceive, is that by which they wake, when they are awake, or sleep, when they are asleep.

But since the exercise of sense-perception does not belong to soul or body exclusively, then (since the subject of actuality is identical with that of potentiality, and what is called sense-perception, as actuality, is a movement of the soul through the body) it is clear that it is not an affection of soul exclusively, and that a soulless [10] body has not the potentiality of perception.

Now, whereas we have already elsewhere distinguished what are called the parts of the soul, and whereas the nutritive is, in all living bodies, capable of existing without the other parts, while none of the others can exist without the nutritive; it is [15] clear that sleep and waking are not affections of such living things as partake only of growth and decay, e.g. not of plants, because these have not the faculty of sense-perception, whether or not this be capable of separate existence; in potentiality, indeed, and in being it is separable.

Likewise it is clear that there is no animal which is always awake or always [20] asleep, but that both these affections belong to the same animals. For if there be an animal not endued with sense-perception, it is impossible that this should either sleep or wake; since both these are affections of the activity of the primary faculty of sense-perception. But it is equally impossible also that either of these two affections [25] should perpetually attach itself to the same animal, e.g. that some species of animal should be always asleep or always awake; for<sup>1</sup> all organs which have a natural function must lose power when they work beyond the time for which they can work; for instance, the eyes tire of seeing, and must give it up; and so it is with the hand and every other member which has a function. Now, if sense-perception is the [30] function of something, this also, if it continues beyond the time for which it can perceive continuously, will lose its power and will do its work no longer. Accordingly, if the waking period is determined by this fact, that in it sense-perception is free; [454<sup>b</sup>1] if in the case of some contraries one of the two must be present, while in the case of others this is not necessary; if waking is the contrary of sleeping, and one of these two must be present to every animal: it must follow that the state of sleeping is necessary. Finally, if such affection is sleep, and this is a state of powerlessness [5] arising from excess of waking, and excess of waking is in its origin sometimes morbid, sometimes not, so that the powerlessness or dissolution of activity will be so or not; it is necessary that every creature which wakes must also be capable of sleeping, since it is impossible that it should always be actualizing its powers.

So, also, it is impossible for any animal to continue always sleeping.



For sleep is [10] an affection of the perceptive part—a sort of bond or motionlessness—so that every creature that sleeps must have a perceptive part. Now, that which is capable of sense-perception in actuality has the faculty of sense-perception; but to actualize this faculty, in the proper and unqualified sense, is impossible while one is asleep. All sleep, therefore, must be susceptible of awakening. Accordingly, almost all [15] other animals are clearly observed to partake in sleep, whether they are aquatic, aerial, or terrestrial, since fishes of all kinds, and molluscs, as well as all others which have eyes, have been seen sleeping. Hard-eyed creatures and insects manifestly assume the posture of sleep; but the sleep of all such creatures is of brief [20] duration, so that often it might well baffle one's observation to decide whether they sleep or not. Of testaceous animals no direct sensible evidence is as yet forthcoming to determine whether they sleep, but if the above reasoning be convincing to any one, he will be persuaded that they do.

That, therefore, all animals sleep may be gathered from these considerations. For an animal is defined as such by its possessing sense-perception; and we assert that sleep is, in a certain way, or, as it were, a motionlessness bond, imposed on [25] sense-perception, while its loosening or remission constitutes the being awake. But no plant can partake in either of these affections; for without sense-perception there is neither sleeping nor waking. But creatures which have sense-perception have likewise the feeling of pain and pleasure, while those which have these have appetite [30] as well; but plants have none of these affections. A mark of this is that the nutritive part does its own work better when the animal is asleep than when it is awake. [455<sup>a</sup>1] Nutrition and growth are then especially promoted, a fact which implies that creatures do not need sense-perception to assist these processes.

2 · We must now proceed to inquire into the cause why one sleeps and wakes, and into the particular nature of the sense-perception, or sense-perceptions, if there be several, on which these affections depend. Since, then, some animals possess all [5] the modes of sense-perception, and some not all, not, for example, sight, while all possess touch and taste, except such animals as are imperfectly developed, a class of which we have already treated in our work on the soul; and since an animal when asleep is unable to exercise, in the simple sense, any sensory faculty whatever, it follows that in the state called sleep the same affection must extend to all the senses; [10] because, if it attaches itself to one of them

but not to another, then an animal while asleep may perceive with the latter; but this is impossible.

Now, since every sense has something special and also something common; special, as, e.g., seeing is to the sense of sight, hearing to the auditory sense, and so on with the other senses severally; while all are accompanied by a common power, in [15] virtue whereof a person perceives that he sees or hears (for, assuredly, it is not by *sight* that one sees that he sees; and it is not by taste, or sight, or both together that one discerns, and that sweet things are different from white things, but by a part common to all the organs of sense; for there is one sensory function, and the [20] controlling sensory organ is one, though differing as a faculty of perception in relation to each genus, e. g., sound or colour); and since this subsists in association chiefly with the faculty of touch (for this can exist apart from all the other organs of sense, but none of them can exist apart from it—a subject of which we have treated in our speculations concerning the soul); it is therefore evident that waking and [25] sleeping are an affection of this. This explains why they belong to all animals; for touch alone belongs to all.

For if sleeping were caused by the senses having all undergone some affection, it would be strange that these senses, for which it is neither necessary nor in a manner possible to be active simultaneously, should necessarily all go idle and [30] become motionless simultaneously. For the contrary, viz. that they should not rest simultaneously, would have been more reasonably anticipated. But, according to the explanation just given, all is quite clear regarding those also. For, when the sense organ which controls all the others, and to which all the others are tributary, [455<sup>b</sup>1] has been in some way affected, it is necessary that these others should be all affected at the same time, whereas, if one of these becomes powerless, there is no necessity for it to do so.

It is indeed evident from many considerations that sleep does not consist in the mere fact that the senses do not function or that one does not employ them, nor even [5] in the inability to exercise the sense-perceptions; for such is what happens in cases of swooning. A swoon means just such impotence of perception, and certain other cases of unconsciousness also are of this nature. Moreover, persons who have the blood-vessels in the neck compressed become insensible. But sleep supervenes when such incapacity of exercise has neither arisen in some chance organ of sense, nor from some chance cause, but when, as has been just stated, it has its seat in the [10] primary organ with which one perceives objects in general. For when this has become powerless all the

other sensory organs also must lack power to perceive; but when one of them has become powerless, it is not necessary for this also to lose its power.

We must next state the cause to which sleep is due, and its quality as an affection. Now, since there are several types of cause (for we say that that for the [15] sake of which, and that whence the origin of motion comes, and the matter, and the account, are all causes), in the first place, then, as we assert that nature operates for the sake of an end, and that this end is a good; and that to every creature which is endowed by nature with the power to move, but cannot with pleasure to itself move [20] always and continuously, rest is necessary and beneficial; and since, taught by truth itself, men apply to sleep this metaphorical term, calling it a rest: we conclude that its end is the conservation of animals. But the waking state is the goal, since the exercise of sense-perception or of thought is the goal for all beings to which either of these appertains; inasmuch as these are best, and the goal is what is best. Again, [25] sleep belongs of necessity to each animal. I use the term 'necessity' in its conditional sense, meaning that if an animal is to exist and have its own proper nature, it must have certain endowments; and, if these are to belong to it, certain others likewise must belong to it.

The next question to be discussed is that of the kind of movement or action, [30] taking place within their bodies, from which the affection of waking or sleeping arises in animals. Now, we must assume that the causes of this affection in all other animals are identical with, or analogous to, those which operate in sanguineous animals; and that the causes operating in sanguineous animals generally are identical with those operating in man. Hence we must consider them all on this basis. Now, it has been determined already in another work that sense-perception in [456<sup>a</sup>1] animals originates in the same part in which movement originates. This is one of three determinate places, viz. that which lies midway between the head and the abdomen. This in sanguineous animals is the region of the heart; for all sanguineous [5] animals have a heart; and from this it is that both motion and the controlling sense-perception originate. Now, as regards movement, it is obvious that the origin of breathing and of the cooling process generally takes its rise there; and it is with a view to the conservation of the heat in this part that nature has provided respiration [10] and the process of being cooled by moisture. Of this *per se* we shall treat hereafter. In bloodless animals, and insects, and such as do not respire, the connatural spirit is seen puffed up and subsiding in the part which is in them

analogous. This is clearly observable in the holoptera as wasps and bees; also in flies and such creatures. And since to move anything, or do anything, is impossible without strength, and holding [15] the breath produces strength—in creatures which inhale, the holding of that breath which comes from without, but in creatures which do not respire, of that which is connatural (which explains why winged insects, when they move, are perceived to make a humming noise, due to the friction of the connatural spirit colliding with the diaphragm of the holoptera); and since every animal moves if some sense-perception, [20] either internal or external, occurs in the primary organ of sense, accordingly if sleeping and waking are affections of this organ, the place in which and the organ in which sleep and waking originate, is evident.

Some persons move in their sleep, and perform many acts like waking acts, but not without an image or an exercise of sense-perception; for a dream is in a certain [25] way a sense-impression. But of them we have to speak later on. Why it is that persons when aroused remember their dreams, but do not remember these acts which are like waking acts, had been explained in the work on *Problems*.

3 · The point for consideration next in order to the preceding is:—What are [30] the processes in which the affection of waking and sleeping originates, and whence do they arise? Now, since it is when it has sense-perception that an animal must first take food and receive growth, and in all cases food in its ultimate form is, in sanguineous animals, the natural substance blood, or, in bloodless animals, that which is analogous to this; and since the veins are the place of the blood, while the [456<sup>b</sup>1] origin of these is the heart—this is clear from the dissections—it is manifest that, when the external nutriment enters the parts fitted for its reception, the exhalation enters into the veins, and there, undergoing a change, is converted into blood, and makes its way to their source. We have treated of all this when discussing the [5] subject of nutrition, but must here recapitulate what was there said, in order that we may consider the beginnings of the process, and come to know what happens to the organ of sense-perception to account for the occurrence of waking and sleep. For sleep, as has been shown, is not any given impotence of the perceptive faculty; for unconsciousness, a certain form of asphyxia, and swooning, all produce such [10] impotence. And some persons in a profound trance have still had the imaginative faculty in play. This last point, indeed, gives rise to a difficulty; for if it is possible

that one who had swooned should fall asleep, the image might be a dream. Persons who have fallen into a deep trance, and have come to be regarded as dead, say many [15] things while in this condition. The same view, however, is to be taken of all these cases.

As we observed above, sleep is not any impotence of the perceptive faculty, but this affection is one which arises from the exhalation attendant upon the process of nutrition. The matter exhaled must be driven onwards to a certain point, then turn [20] back and change like a tide-race. Now, in every animal the hot naturally tends to move upwards, but when it has reached the parts above, it turns back again, and moves downwards in a mass. This explains why fits of drowsiness are especially apt to come on after meals; for the matter, both the liquid and the corporeal, which is [25] borne upwards in a mass, is then of considerable quantity. When, therefore, this comes to a stand it weighs a person down and causes him to nod, but when it has actually sunk downwards, and by its return has repulsed the hot, sleep comes on, and the animal is presently asleep. A confirmation of this appears from considering the things which induce sleep; they all, whether potable or edible, for instance [30] poppy, mandragora, wine, daniel, produce a heaviness in the head; and persons borne down and nodding all seem affected in this way, i. e. they are unable to lift up the head or the eye-lids. And it is after meals especially that sleep comes on like this, for the exhalation from the foods eaten is then copious. It also follows certain forms of fatigue; for fatigue operates as a solvent, and the dissolved matter acts, if not [457<sup>a</sup>1] cold, like food prior to digestion. Moreover, some kinds of illness have this same effect; those arising from moist and hot secretions, as happens with fever-patients and in cases of lethargy. Extreme youth also has this effect; infants, for example, [5] sleep a great deal, because of the food being all borne upwards—a mark whereof appears in the disproportionately large size of the upper parts compared with the lower during infancy, which is due to the fact that growth predominates in the direction of the former. Hence also they are subject to epileptic seizures; for sleep is like epilepsy, and, in a sense, actually is a seizure of this sort. Accordingly, the [10] beginning of this malady takes place with many during sleep, and their subsequent habitual seizures occur in sleep, not in waking hours. For when the spirit moves upwards in a volume, on its return downwards it distends the veins, and forcibly compresses the passage through which respiration is effected. This explains why [15] wines are not good for infants or for wet nurses (for it makes no difference, doubtless, whether the infants themselves, or their nurses,

drink them), but such persons should drink them diluted with water and in small quantity. For wine is spirituous, and of all wines the dark more so than any other. The upper parts, in infants, are so filled with nutriment that within five months they do not even turn the neck; for in them, as in persons deeply intoxicated, there is ever a large quantity [20] of moisture ascending. It is reasonable, too, to think that this affection is the cause of the embryo's remaining at rest in the womb at first. Also, as a general rule, persons whose veins are inconspicuous, as well as those who are dwarf-like, or have abnormally large heads, are addicted to sleep. For in the former the veins are narrow, so that it is not easy for the moisture to flow down through them; while in the case of dwarfs and those whose heads are abnormally large, the impetus of the [25] exhalation upwards is excessive. Those whose veins are large are, thanks to the easy flow through the veins, not addicted to sleep, unless, indeed, they labour under some other affection which counteracts this. Nor are the 'atrabilious' addicted to sleep, for in them the inward region is cooled so that the quantity of exhalation in their case is not great. For this reason they have large appetites, though spare and lean; [30] for their bodily condition is as if they derived no benefit from what they eat. The dark bile, too, being itself naturally cold, cools also the nutrient tract, and the other parts wheresoever such secretion is potentially present.

[457<sup>b1</sup>] Hence it is plain from what has been said that sleep is a sort of concentration, or natural recoil, of the hot matter inwards, due to the cause above mentioned. Hence restless movement is a marked feature in the case of a person when drowsy. But where it begins to fail, he grows cool, and owing to this cooling process his eye-lids droop. Accordingly the upper and outward parts are cool, but the inward [5] and lower, i. e. the parts at the feet and in the interior of the body, are hot.

Yet one might find a difficulty on the facts that sleep is most oppressive in its onset after meals, and that wine, and other such things, though they possess heating properties, are productive of sleep, for it is not probable that sleep should be a process of cooling while the things that cause sleeping are themselves hot. Is the [10] explanation of this, then, to be found in the fact that, as the stomach when empty is hot, while replenishment cools it by the movement it occasions, so the passages and tracts in the head are cooled as the exhalation ascends thither? Or, as those who have hot water poured on them feel a sudden shiver of cold, just so in the case before [15] us, may it be that, when the hot substance ascends, the cold rallying to meet it cools them, deprives their native heat of all its power, and compels it to retire? Moreover,

when much food is taken, which the hot substance carries upwards, this latter, like a fire when fresh logs are laid upon it, is itself cooled, until the food has been digested.

For, as has been observed elsewhere, sleep comes on when the corporeal [20] element is conveyed upwards by the hot, along the veins, to the head. But when that which has been thus carried up can no longer ascend, but is too great in quantity it forces the hot back again and flows downwards. Hence it is that men sink down when the heat which tends to keep them erect (man alone, among animals, being naturally erect) is withdrawn; and this, when it befalls them, causes unconsciousness, [25] and afterwards imagination.

Or are the solutions thus proposed possible accounts of the refrigeration which takes place, while, as a matter of fact, the region of the brain is, as stated elsewhere, the main determinant of the matter? For the brain, or in creatures without a brain that which corresponds to it, is of all parts of the body the coolest. Therefore, as [30] moisture turned into vapour by the sun's heat is, when it has ascended to the upper regions, cooled by the coldness of the latter, and becoming condensed, is carried downwards, and turned into water once more; just so the waste exhalation, when [458<sup>a</sup>1] carried up by the heat to the region of the brain, is condensed into phlegm (which explains why catarrhs are seen to proceed from the head); while that exhalation which is nutrient and not unwholesome, becoming condensed, descends and cools [5] the hot. The tenuity or narrowness of the veins about the brain itself contributes to its being kept cool, and to its not readily admitting the exhalation. This, then, is a sufficient explanation of the cooling which takes place, despite the fact that the exhalation is exceedingly hot.

A person awakes from sleep when digestion is completed: when the heat, which [10] had been previously forced together in large quantity within a small compass from out the surrounding part, has once more prevailed, and when a separation has been effected between the more corporeal and the purer blood. The finest and purest blood is that contained in the head, while the thickest and most turbid is that in the lower parts. The source of all the blood is, as has been stated both here and [15] elsewhere, the heart. Now of the chambers in the heart the central communicates with each of the two others. Each of the latter again acts as receiver from each of the two veins, the one called the 'great' and the 'aorta'. It is in the central chamber [20] that the separation takes place. To go into these matters in detail would, however, be more properly the business of a different treatise from the present. Owing to

the fact that the blood formed after the assimilation of food is especially in need of separation, sleep occurs until the purer part of this blood has been separated off into the upper parts of the body, and the more turbid into the lower parts. When this has taken place animals awake from sleep, being released from the heaviness [25] consequent on taking food.

We have now stated the cause of sleeping, viz., that it consists in the recoil by the corporeal element, borne upwards by the connatural heat, in a mass upon the primary sense-organ; we have also stated what sleep is, having shown that it is a seizure of the primary sense-organ, rendering it unable to actualize its powers; [30] arising of necessity (for it is impossible for an animal to exist if the conditions which render it an animal be not fulfilled), i.e., for the sake of its conservation; since remission of movement tends to the conservation of animals.



**\*\***TEXT: W. D. Ross, *Aristotle: Parva Naturalia*, Clarendon Press, Oxford, 1955

<sup>1</sup>Reading ἐπεὶ (Susemihl) for ἔτι.

# ON DREAMS\*\*

*J. I. Beare*

1 · We must, in the next place, investigate the subject of the dream, and first inquire to which of the faculties of the soul it presents itself, i.e. whether the [458<sup>b</sup>1] affection is one which pertains to the faculty of thought or to that of sense-perception; for these are the only faculties within us by which we acquire knowledge.

If, then, the exercise of the faculty of sight is seeing, that of the auditory faculty, hearing, and, in general that of the faculty of sense-perception, perceiving; and if there are some perceptions common to the senses, such as figure, magnitude, [5] motion, &c, while there are others, as colour, sound, taste, which are special; and further, if all creatures, when the eyes are closed in sleep, are unable to see, and the analogous statement is true of the other senses, it is clear that we perceive nothing when asleep; we may conclude that it is not by sense-perception we perceive a dream.

But neither is it by opinion that we do so. For we not only assert, e.g., that some [10] object approaching is a man or a horse, but that the object is white or beautiful, points on which opinion without sense-perception would say nothing either truly or falsely. It is, however, a fact that the soul makes such assertions in sleep. We seem to see equally well that the approaching figure is a man, and that it is white. Again, we think of something else, over and above the dream, just as we do in waking [15] moments when we perceive something; for we often also reason about that which we perceive. So, too, in sleep we sometimes have thoughts other than the images. This would be manifest to any one who should attend and try, immediately on arising from sleep, to remember. There are cases of persons who have seen such dreams, [20] those, for example, who believe themselves to be mentally arranging a given list of subjects according to the mnemonic rule. They frequently find themselves to be mentally putting into its place some other image apart from the dream. Hence it is plain that not every image in sleep is a dream, and that the thinking which we perform then is due to an exercise of the faculty of

opinion. [25]

So much at least is plain on all these points, viz. that the faculty by which, in waking hours, we are subject to illusion when affected by disease, is identical with that which produces illusory effects in sleep. So, even when persons are in excellent health, and know the facts of the case perfectly well, the sun, nevertheless, appears [30] to them to be only a foot wide. Now, whether the imaginative faculty of the soul be identical with, or different from, the faculty of sense-perception, in either case the thing does not occur without our seeing or perceiving something. Even to see wrongly or to hear wrongly can happen only to one who sees or hears something real, though not exactly what he supposes. But we have assumed that in sleep one [459<sup>a</sup>1] neither sees, nor hears, nor exercises any sense whatever. Perhaps we may regard it as true that the dreamer sees nothing, yet as false that his faculty of sense-perception is unaffected, the fact being that the sense of seeing and the other senses may possibly be then in a certain way affected, while each of these affections, as [5] when he is awake, gives its impulse in a certain manner to his faculty of sense, though not in the same manner as when he is awake. Sometimes, too, opinion says, just as to those who are awake, that it is false; at other times it is inhibited, and follows the image.

It is plain therefore that this affection, which we name dreaming, is no exercise of opinion or thought but yet is not an affection of the faculty of perception in the [10] simple sense. If it were the latter it would be possible to hear and see in the simple sense.

How then, and in what manner, it takes place, is what we have to examine. Let us assume, what is indeed clear enough, that the affection pertains to sense-perception as surely as sleep itself does. For sleep does not pertain to one organ in animals and dreaming to another; both pertain to the same organ.

[15] But since we have, in our work on the soul, treated of imagination, and the faculty of imagination is identical with that of sense-perception, though the being of a faculty of imagination is different from that of a faculty of sense-perception; and since imagination is the movement set up by a sensory faculty when actually discharging its function, while a dream appears to be an image (for which occurs in [20] sleep—whether simply or in some particular way—is what we call a dream): it manifestly follows that dreaming is an activity of the faculty of sense-perception, but belongs to this faculty *qua* imaginative.

2 · We can best consider the nature of the dream and the manner in which it originates by regarding it in the light of the circumstances attending sleep. The [25] objects of sense-perception corresponding to each sensory organ produce sense-perception in us, and the affection due to their operation is present in the organs of sense not only when the perceptions are actualized, but even when they have departed.

What happens in these cases may be compared with what happens in the case of projectiles moving in space. For in the case of these the movement continues even [30] when that which set up the movement is no longer in contact. For that which set them in motion moved a certain portion of air, and this, in turn, being moved excites motion in another portion; and so it is in this way that the bodies, whether in air or in liquids, continue moving, until they come to a standstill.

[459<sup>b</sup>1] This we must likewise assume to happen in the case of qualitative change; for that part which has been heated by something hot, heats the part next to it, and this propagates the affection onwards to the starting-point. This must therefore happen in sense-perception, since actual perceiving is a qualitative change. This explains why the affection continues in the sensory organs, both in their deeper and in their more superficial parts, not merely while they are actually engaged in perceiving, [5] but even after they have ceased to do so. That they do this, indeed, is obvious in cases where we continue for some time engaged in a particular form of perception; for then, when we shift the scene of our perceptive activity, the previous affection remains; for instance, when we have turned our gaze from sunlight into darkness. For the result of this is that one sees nothing, owing to the motion excited by the [10] light still subsisting in our eyes. Also, when we have looked for a long while at one colour, e.g. at white or green, that to which we next transfer our gaze appears to be of the same colour. Again if, after having looked at the sun or some other brilliant object, we close the eyes, then, if we watch carefully, it appears in a right line with the direction of vision (whatever this may be), at first its own colour; then it changes [15] to crimson, next to purple, until it becomes black and disappears. And also when persons turn away from looking at objects in motion, e.g. rivers, and especially those which flow very rapidly, things really at rest are then seen as moving; and persons [20] become deaf after hearing loud noises, and after smelling very strong odours their power of smelling is impaired; and similarly in other cases. These phenomena manifestly take place in the way above described.

That the sensory organs are acutely sensitive to even a slight qualitative difference is shown by what happens in the case of mirrors; a subject to which, even [25] taking it independently, one might devote close consideration and inquiry. At the same time it becomes plain from them that as the eye is affected, so also it produces a certain effect. For in the case of very bright mirrors, when women during their menstrual periods look into the mirror, the surface of the mirror becomes a sort of bloodshot cloud; and if the mirror is new, it is not easy to wipe off such a stain, while if it is old it is easier. The cause is, as we said, that the eye is not only affected by the [460<sup>a</sup>1] air but also has an effect upon it and moves it—as bright objects do (for the eye is a bright object and has colour). Now it is reasonable that the eyes, like any other part whatsoever, should be affected during the menstrual period; for they are veined by [5] nature. That is why, when the menstrual discharges occur because of a disturbance and bloody inflammation, the change in the eyes is not evident to us although it is present (for the nature of the discharges is the same as that of semen); and the air is moved by them, and has a certain effect on the air on the surface of the mirror which is continuous with it, i.e. it makes that air affected in the same way that it is [10] itself; and the air on the mirror affects the surface of the mirror.

As in the case of clothes, the purest mirrors are most quickly stained; for a pure mirror shows accurately whatever it receives, and the purest shows the smallest movements. The bronze, because it is smooth, perceives best any touch at all (one [15] should think of the touch of the air as a sort of rubbing—like a wiping or a washing), and because it is pure the touch, however slight it may be, becomes apparent in it. The reason why the stain does not leave new mirrors quickly is their [20] purity and smoothness; for in their case it penetrates both in depth and all over—in depth because of their purity, all over because of their smoothness. The stain does not remain on old mirrors because it does not penetrate in the same way but more superficially.

It is plain from this that motion is set up even by small differences, and that [25] perception is swift, and that the organ which perceives colour is not only affected but also has an effect in return. Further evidence to the same point is afforded by what takes place in wines, and in the manufacture of unguents. For both oil, when prepared, and wine become rapidly infected by the odours of the things near them; [30] they not only acquire the odours of the things thrown into or mixed with them, but also those of the things which are placed, or which grow, near the vessels containing them.

[460<sup>b</sup>1] In order to answer our original question, let us now, therefore, assume one proposition, which is clear from what precedes, viz. that even when the external object of perception has departed, the impressions it has made persist, and are themselves objects of perception; and let us assume, besides, that we are easily deceived respecting the operations of sense-perception when we are excited by emotions, and different persons according to their different emotions; for example, [5] the coward when excited by fear, the amorous person by amorous desire; so that, with but little resemblance to go upon, the former thinks he sees his foes approaching, the latter, that he sees the object of his desire; and the more deeply one is under the influence of the emotion, the less similarity is required to give rise to these impressions. Thus, too, both in fits of anger, and also in all states of appetite, [10] all men become easily deceived, and more so the more their emotions are excited. This is the reason too why persons in the delirium of fever sometimes think they see animals on their chamber walls because of the faint resemblance to animals of the markings thereon when put together in patterns; and this sometimes corresponds with the emotional states of the sufferers, in such a way that, if the latter be not very [15] ill, they know well enough that it is an illusion; but if the illness is more severe they actually move according to the appearances. The cause of these occurrences is that the faculty in virtue of which the controlling sense judges is not identical with that in virtue of which images come before the mind. A proof of this is, that the sun presents itself as only a foot in diameter, though often something else gainsays the [20] imagination. Again, when the fingers are crossed, one object seems to be two; but yet we deny that it is two; for sight is more authoritative than touch. Yet, if touch stood alone, we should actually have pronounced the one object to be two. The ground of such false judgments is that any appearances whatever present themselves, not only when its object moves a sense, but also when the sense by itself alone [25] is moved, provided only it be moved in the same manner as it is by the object. For example, to persons sailing past the land seems to move, when it is really the eye that is being moved by something else.

3 · From this it is manifest that the movements based upon sensory impressions, whether the latter are derived from external objects or from causes within the body, not only when persons are awake, but also occur when this [30] affection which is called sleep has come upon them, and at that time they appear more. For by day, while the senses and the

intellect are working, they are extruded [461<sup>a</sup>1] and obscured, just as a smaller is beside a larger fire, or as small beside great pains or pleasures, though, as soon as the latter have ceased, even those which are trifling emerge into notice. But by night owing to the inaction of senses, and their powerlessness to realize themselves, which arises from the reflux of the hot from the [5] exterior parts to the interior, they are borne down to the source of sense-perception, and there display themselves as the disturbance subsides. We must suppose that, like the little eddies which are formed in rivers, so the movements are each a continuous process, often remaining like what they were when first started, but [10] often, too, broken into other forms by collisions with obstacles. This gives the reason why no dreams occur in sleep after meals, or to sleepers who are extremely young, e.g., to infants. The movement in such cases is excessive, owing to the heat generated from the food. Hence, just as in a liquid, if one vehemently disturbs it, sometimes no reflected image appears, while at other times one appears, indeed, but [15] utterly distorted, so as to seem quite unlike its original; while, when once the motion has ceased, the reflected images are clear and plain; in the same manner during sleep the images, or residuary movements, which are based upon the sensory impressions, become sometimes quite obliterated by the above described motion [20] when too violent; while at other times the sights are indeed seen, but confused and weird, and the dreams are incoherent, like those of persons who are atrabilious, or feverish, or intoxicated with wine. For all such affections, being spirituous, cause much commotion and disturbance. In sanguineous animals, in proportion as the blood becomes calm and separated the fact that the movement, based on impressions [25] derived from each of the organs of sense, is preserved in its integrity, renders the dreams coherent, causes an image to present itself, and makes the dreamer think, owing to the effects borne in from the organ of sight, that he actually sees, and owing to those which come from the organ of hearing, that he really hears; and so on with those also which proceed from the other sensory organs. For it is owing to [30] the fact that the movement which reaches the source of sense comes from them, that one even when awake believes himself to see, or hear, or otherwise perceive; just as it [461<sup>b</sup>1] is from a belief that the organ of sight is being stimulated, though in reality not so stimulated, that we sometimes declare ourselves to see, or that, from the fact that touch announces two movements, we think that the one object is two. For, as a rule, the governing sense affirms the report of each particular sense, unless another particular sense, more authoritative, makes a

contradictory report. In every case an appearance presents itself, but what appears does not in every case seem real, unless [5] when the deciding faculty is inhibited, or does not move with its proper motion. Moreover, as we said that different men are subject to illusions, each according to the different emotion present in him, so it is that the sleeper, owing to sleep, and to the movements then going on in his sensory organs, as well as to the other facts of the sensory process, is liable to illusion, so that what has little similarity to [10] something appears to be the thing itself. For when one is asleep, in proportion as most of the blood sinks inwards, so the internal movements, some potential, others actual, accompany it inwards. They are so related that, if anything move the blood, some one sensory movement will emerge from it, while if this perishes another will take its place; while to one another also they are related in the same way as the [15] artificial frogs in water which rise to the surface as the salt becomes dissolved. The residuary movements are like these: they are within the soul potentially, but actualize themselves only when the impediment to their doing so has been relaxed; and according as they are thus set free, they begin to move in the blood which remains in the sensory organs, and which is now but scanty, and take on likenesses after the manner of cloud-shapes, which in their rapid metamorphoses one [20] compares now to human beings and a moment afterwards to centaurs. Each of them is however, as has been said, the remnant of a sensory impression taken when sense was actualizing itself; and when this, the true impression, has departed, its remnant is still there, and it is correct to say of it, that though not actually Coriscus, it is like Coriscus. When the person was actually perceiving, his controlling and judging sensory faculty did not call it Coriscus, but, prompted by this, called the genuine [25] person yonder Coriscus. Accordingly, that which, when actually perceiving, says this (unless completely inhibited by the blood), now, as though it were perceiving, is moved by the movements persisting in the sense-organs, and that which is like the thing seems to it to be the thing itself; and the effect of sleep is so great that it causes this mistake to pass unnoticed. Accordingly, just as if a finger be pressed under the [462<sup>a</sup>1] eyeball without being observed, one object will not only present two visual images, but will create an opinion of its being two objects; while if it be observed, the presentation will be the same, but the same opinion will not be formed of it; exactly so it is in states of sleep: if the sleeper perceives that he is asleep, and is conscious of the sleeping state during which the perception comes before his mind, it presents itself still, but something within him speaks to this effect: 'the image of Coriscus [5]



presents itself, but the real Coriscus is not present'; for often, when one is asleep, there is something in the soul which declares that what then presents itself is but a dream. If, however, he is not aware of being asleep, there is nothing which will contradict the testimony of the bare presentation.

That what we here urge is true, i.e. that there are such imaginative movements in the sensory organs, any one may convince himself, if he attends to and tries to [10] remember the affections we experience when sinking into slumber or when being awakened. He will sometimes, in the moment of awakening, surprise the images which present themselves to him in sleep, and find that they are really but movements lurking in the organs of sense. And indeed some very young persons, if it is dark, though looking with wide open eyes, see multitudes of phantom figures moving before them, so that they often cover up their heads in terror.

[15] From all this, then, the conclusion to be drawn is, that the dream is a sort of image and, more particularly, one which occurs in sleep; since the phantoms just mentioned are not dreams, nor is any other dream which presents itself when the sense-perceptions are in a state of freedom. Nor is every image which occurs in sleep necessarily a dream. For in the first place, some persons actually, in a certain way, perceive sounds, light, savour, and contact; feebly, however, and, as it were, [20] remotely. For there have been cases in which persons while asleep, but with the eyes partly open, saw faintly in their sleep (as they supposed) the light of a lamp, and afterwards, on being awakened, recognized it at once as the actual light of the lamp; while, in other cases, persons who faintly heard the crowing of cocks or the barking of dogs identified these clearly as soon as they awoke. Some persons, too, return [25] answers to questions put to them in sleep. For it is quite possible that, of waking or sleeping, while the one is present in the ordinary sense, the other also should be present in a certain way. But none of these occurrences should be called a dream. Nor should the true thoughts, as distinct from the images, which occur in sleep. The dream proper is an image based on the movement of sense impressions, when it [30] occurs during sleep, insofar as it is asleep.

There are cases of persons who in their whole lives have never had a dream, while others dream when considerably advanced in years, having never dreamed [462<sup>b</sup>1] before. The cause of their not having dreams appears somewhat like that which operates in the case of infants, and after meals. It is intelligible enough that no [5] dream-image should occur to persons whose natural constitution is such that in them copious

exhalation is borne upwards, which, when borne back downwards, causes a large quantity of motion. But it is not surprising that, as age advances, a dream should at length appear to them. For, when a change has occurred in them in [10] proportion to age or emotional experience, this reversal must occur also.

\*\*TEXT: W. D. Ross, *Aristotle: Parva Naturalia*, Clarendon Press, Oxford, 1955

# ON DIVINATION IN SLEEP\*\*

*J. I. Beare*

1 · As to the divination which takes place in sleep, and is said to be based on dreams, we cannot lightly either dismiss it with contempt or give it confidence. The [15] fact that all persons, or many, suppose dreams to possess a special significance, tends to inspire us with belief in it, as founded on the testimony of experience; and indeed that divination in dreams should, as regards some subjects, be genuine, is not incredible, for it has a show of reason; from which one might form a like opinion also respecting all other dreams. Yet the fact of our seeing no reasonable cause to account for such divination tends to inspire us with distrust. For, in addition to its further unreasonableness, it is absurd to combine the idea that the sender of such [20] dreams should be God with the fact that those to whom he sends them are not the best and wisest, but merely people at random. If, however, we abstract from the causality of God, none of the other causes assigned appears reasonable. For that certain persons should have foresight in dreams concerning things destined to take [25] place at the Pillars of Hercules, or on the banks of the Borysthenes, seems to be something to discover the explanation of which surpasses the wit of man. Well then, the dreams in question must be regarded either as causes, or as signs, of the events, or else as coincidences; either as all, or some, of these, or as one only. I use the word 'cause' in the sense in which the moon is the cause of an eclipse of the sun, or in which fatigue is a 'sign' of fever; in the sense in which the entrance of a star into the [30] shadow is a sign of the eclipse, or roughness of the tongue of fever; while by 'coincidence' I mean, for example, the occurrence of an eclipse of the sun while [463<sup>a</sup>1] some one is taking a walk; for the walking is neither a sign nor a cause of the eclipse, nor the eclipse of the walking. For this reason no coincidence takes place according to a universal or general rule. Are we then to say that some dreams are causes, others signs, e.g. of events taking place in the bodily organism? At all events, even [5] scientific physicians tell us that one should pay diligent attention to dreams, and to hold this view is

reasonable also for those who are not practitioners, but speculative philosophers. For the movements which occur in the daytime are, unless very great and violent, lost sight of in contrast with the waking movements, which are more [10] impressive. In sleep the opposite takes place, for then even trifling movements seem considerable. This is plain in what often happens during sleep; for example, dreamers fancy that they are affected by thunder and lightning, when in fact there are only faint ringings in their ears; or that they are enjoying honey or other sweet savours, when only a tiny drop of phlegm is flowing down; or that they are walking through fire, and feeling intense heat, when there is only a slight warmth affecting [15] certain parts of the body. When they are awakened, these things appear to them in this their true character. But since the beginnings of all events are small, so, it is clear, are those also of the diseases or other affections about to occur in our bodies. In conclusion, it is manifest that these beginnings must be more evident in sleeping [20] than in waking moments.

Indeed, it is not unreasonable that some of the images which come before the mind in sleep may even be causes of the actions cognate to each of them. For as when we are about to act, or are engaged in any course of action, or have already performed certain actions, we often find ourselves concerned with these actions, or performing them, in a vivid dream; and the cause of this is that the dream-movement [25] has had a way paved for it from the original movements set up in the daytime; exactly so, but conversely, it must often happen that the movements set up first in sleep should also prove to be starting-points of actions to be performed in the daytime, since the recurrence by day of the thought of these actions also has had its way paved for it in the images before the mind at night. Thus then it is quite [30] conceivable that some dreams may be signs and causes.

Most dreams are, however, to be classed as mere coincidences, especially all such as are extravagant, and those in the fulfilment of which the dreamers have no [463<sup>b</sup>1] initiative, such as in the case of a sea-fight, or of things taking place far away. As regards these it is natural that the fact should stand as it does whenever a person, on mentioning something, finds the very thing mentioned come to pass. Why, indeed, should this not happen also in sleep? The probability is, rather, that many such [5] things should happen. As, then, one's remembering a particular person is neither sign nor cause of this person's presenting himself, so, in the parallel instance, the dream is, to him who has seen it, neither sign nor cause of its fulfilment, but a mere coincidence. Hence the fact that many

dreams have no fulfilment, for coincidences [10] do not occur according to any universal or general law.

2 · On the whole, forasmuch as certain of the other animals also dream, it may be concluded that dreams are not sent by God, nor are they designed for this purpose. They have a mysterious aspect, however, for nature is mysterious, though not divine. A sign is this: the power of foreseeing the future and of having vivid [15] dreams is found in persons of inferior type, which implies that God does not send their dreams; but merely that all those whose physical temperament is, as it were, garrulous and melancholic, see sights of all descriptions; for, inasmuch as they experience many movements of every kind, they just chance to have visions resembling objective facts, their luck in these matters being merely like that of persons who play at dice. For the principle which is expressed in the gambler's [20] maxim: 'If you make many throws your luck must change,' holds good in their case also.

That many dreams have no fulfilment is not strange, for it is so too with many bodily symptoms and weather-signs, e.g., those of rain or wind. For if another [25] movement occurs more influential than that from which, while the event still future, the given sign was derived, the event does not take place. So, of the things which ought to be accomplished by human agency, many, though well-planned, are by the operation of other principles more powerful brought to nought. For, speaking generally, that which was going to happen is not in every case what now is happening; nor is that which will in fact happen identical with that which is going to [30] happen. Still, however, we must hold that the beginnings from which, as we said, no consummation follows, are indeed beginnings, and these constitute natural signs of certain events, even though the events do not come to pass.

[464<sup>a</sup>1] As for dreams which involve not such beginnings as we have here described, but such as are extravagant in times, or places, or magnitudes; or those involving beginnings which are not extravagant in any of these respects, while yet the persons who see the dream do not have matters in their own hands: unless the foresight which such dreams give is the result of pure coincidence, the following would be a [5] better explanation of it than that proposed by Democritus, who alleges phantoms and emanations as its cause. As, when something has caused motion in water or air, this moves another and, though the cause has ceased to operate, such motion propagates itself to a certain point, though

there the prime mover is not present; just so it may well be that a movement and a consequent sense-perception should reach [10] sleeping souls from the objects from which Democritus represents emanations as coming; that such movements, in whatever way they arrive, should be more perceptible at night, because when proceeding thus in the daytime they are more liable to dissolution (since at night the air is less disturbed, there being then less [15] wind); and that they shall be perceived within the body owing to sleep, since persons are more sensitive even to slight internal movements when asleep than when awake. It is these movements then that cause images, as a result of which sleepers foresee the future even relatively to such events as those referred to above. These [20] considerations also explain why this experience befalls people at random and not the most intelligent. For it would have regularly occurred both in the daytime and to the wise had it been God who sent it; but, as we have explained the matter, it is quite natural that random persons should be those who have foresight. For the mind of such persons is not given to thinking, but, as it were, derelict, or totally vacant, and, when once set moving, is borne passively on in the direction taken by that which [25] moves it. With regard to the fact that some persons who are liable to derangement have this foresight, its explanation is that their normal mental movements do not impede the alien movements, but are beaten off by them. That is why they have an especially keen perception of the alien movements.

That certain persons in particular should have vivid dreams, e.g. that familiar friends should thus have foresight in a special degree respecting one another, is due to the fact that such friends are most solicitous on one another's behalf. For as [30] acquaintances are quick to recognize and perceive one another a long way off, so also they do as regards the sensory movements respecting one another; for sensory movements which refer to persons familiarly known are themselves more familiar. Atrabilious persons, owing to their impetuosity, are, when they, as it were, shoot from a distance, expert at hitting; while, owing to their mutability, the series of movements deploys quickly before their minds. For as even the insane recite the [464<sup>b</sup>1] poems of Philaenis, so what they say and think is connected by mere similarity— e.g. 'Aphrodite, phrodite'—and thus they go on stringing things together. Moreover, owing to their impetuosity, one movement within them is not liable to be knocked out of its course by some other movement. [5]

The most skilful interpreter of dreams is he who has the faculty of observing resemblances. Any one may interpret dreams which are vivid

and plain. But, speaking of resemblances, I mean that dream images are analogous to the forms reflected in water, as indeed we have already stated. In the latter case, if the motion [10] in the water be great, the reflexion has no resemblance to its original, nor do the forms resemble the real objects. Skilful, indeed, would he be in interpreting such reflexions who could rapidly discern, and at a glance comprehend, the scattered and distorted fragments of such forms, so as to perceive that one of them represents a man, or a horse, or anything whatever—similarly, then, in the case of seeing what [15] this dream means; for the internal movement effaces the clearness of the dream.

The questions, therefore, which we proposed as to the nature of sleep and the dream, and the cause to which each of them is due, and also as to divination as a result of dreams, in every form of it, have now been discussed.



\*\*TEXT: W. D. Ross, *Aristotle: Parva Naturalia*, Clarendon Press, Oxford, 1955

# ON LENGTH AND SHORTNESS OF LIFE\*\*

*G. R. T. Ross*

[20] 1 · The reasons for some animals being long-lived and others short-lived, and, in a word, the causes of the length and brevity of life call for investigation.

The necessary beginning to our inquiry is a statement of the difficulties about these points. For it is not clear whether in animals and plants universally it is a single or diverse cause that makes some to be long-lived, others short-lived. Plants [25] too have in some cases a long life, while in others it lasts but for a year.

Further, in a natural structure are longevity and a sound constitution coincident, or is shortness of life independent of unhealthiness? Perhaps in the case of certain maladies a diseased state of the body and shortness of life are [30] interchangeable, while in the case of others ill-health is perfectly compatible with long life.

Of sleep and waking we have already treated; about life and death we shall speak later on, and likewise about health and disease, in so far as it belongs to the [465<sup>a</sup>1] science of nature to do so. But at present we have to investigate the causes of some creatures being long-lived, others short-lived as we have said before. We find this distinction affecting not only entire genera opposed as wholes to one another, but applying also to contrasted sets of individuals within the same species. As an [5] instance of the difference applying to the genus I give man and horse (for mankind has a longer life than the horse), while within the species there is the difference between man and man; for of men also some are long-lived, others short-lived, differing from each other in respect of the different regions in which they dwell. Races inhabiting warm countries have longer life, those living in a cold climate live [10] a shorter time. Likewise there are similar differences among individuals occupying the same locality.

2 · We must answer the question, What is that which, in natural objects, makes them easily destroyed, or the reverse? Since fire and water, and whatsoever [15] is akin thereto, do not possess identical powers they are reciprocal causes of generation and decay. Hence it is natural to infer that everything else arising from them and composed of them should share in the same nature, in all cases where things are not, like a house, a composite unity formed by the synthesis of many things.

In other matters a different account must be given; for in many things their mode of dissolution is something peculiar to themselves, e.g. in knowledge and [20] ignorance, health and disease. These pass away even though the medium in which they are found is not destroyed but continues to exist; for example, take the termination of ignorance, which is recollection or learning, while knowledge passes away into forgetfulness, or error. But accidentally the disintegration of a natural object is accompanied by the destruction of the other things; for, when the animal dies, the health or knowledge resident in it passes away too. Hence from these [25] considerations we may draw a conclusion about the soul too; for, if the inherence of soul in body is not a matter of nature but like that of knowledge in the soul, there would be another mode of dissolution pertaining to it besides that which occurs when the body is destroyed. But since evidently it does not admit of this dual [30] dissolution, the soul must stand in a different case in respect of its union with the body.

3 · Perhaps one might reasonably raise the question whether there is any [465<sup>b</sup>1] place where what is corruptible becomes incorruptible, as fire does in the upper regions where it meets with no opposite. Opposites destroy each other, and hence accidentally, by their destruction, whatsoever is attributed to them is destroyed. But no opposite in a real substance is accidentally destroyed, because real substance is [5] not predicated of any subject. Hence a thing which has no opposite, or which is situated where it has no opposite, cannot be destroyed. For what will that be which can destroy it, if destruction comes only through contraries, but no contrary to it exists either absolutely or in the particular place where it is? But perhaps this is in [10] one sense true, in another sense not true, for it is impossible that anything containing matter should not have in any sense an opposite. Heat and straightness can be present in every part of a thing, but it is impossible that the thing should be nothing but hot or white or straight; for, if that were so, attributes would have a

separate existence. Hence if, in all cases, whenever the active and the passive exist [15] together, the one acts and the other is acted on, it is impossible that no change should occur. Further, this is so if a waste product is an opposite, and waste must always be produced; for opposition is always the source of change, and waste is what remains of the previous opposite. But, after expelling everything of a nature actually opposed, an object would in this case also be imperishable. Or would it be [20] destroyed by the environment?

If then that is so, what we have said sufficiently accounts for the change; but, if not, we must assume that something of actually opposite character is in the changing object, and waste is produced.

Hence accidentally a lesser flame is consumed by a greater one, for the nutriment, to wit the smoke, which the former takes a long period to expend, is used [25] up by the big flame quickly.<sup>1</sup>

Hence all things are at all times in a state of transition and are coming into being or passing away. The environment acts on them either favourably or antagonistically, and, owing to this, things that change their situation become more or less enduring than their nature warrants, but never are they eternal when they [30] contain contrary qualities; for their matter is an immediate source of contrariety, so that if it involves locality they show change of situation, if quantity, increase and diminution, while if it involves qualitative affection we find alteration of character.

[466<sup>a</sup>1] **4** · We find that a superior immunity from decay attaches neither to the largest animals (the horse has shorter life than man) nor to those that are small (for many insects live but for a year). Nor are plants as a whole less liable to perish than animals (many plants are annuals), nor have sanguineous animals the pre-eminence [5] (for the bee is longer-lived than certain sanguineous animals). Neither is it the bloodless animals that live longest (for molluscs live only a year, though bloodless), nor terrestrial organisms (there are both plants and terrestrial animals of which a single year is the period), nor the occupants of the sea (for there we find the crustaceans and the molluscs, which are short-lived).

Speaking generally, the longest-lived things occur among the plants, e.g. the [10] date-palm. Next in order we find them among the sanguineous animals rather than among the bloodless, and among land animals rather than among water animals. Hence, taking these two characters together, the longest-lived animals fall among sanguineous

land animals, e.g. man and elephant. As a matter of fact also it is a [15] general rule that the larger live longer than the smaller, for the other long-lived animals too happen to be of a large size, as are also those I have mentioned.

5 · The following considerations may enable us to understand the reasons for all these facts. We must remember that an animal is by nature humid and warm, and to live is to be of such a constitution, while old age is dry and cold, and so is a [20] corpse. This is plain to observation. But the material constituting the bodies of all animals consists of the following—the hot and the cold, the dry and the moist. Hence when they age they must become dry, and therefore the fluid in them requires to be not easily dried up. Thus we explain why fat things are not liable to decay. The reason is that they contain air; now air relatively to the other elements is fire, and fire never becomes rotten.

[25] Again the humid element in animals must not be small in quantity, for a small quantity is easily dried up. This is why both plants and animals that are large are, as a general rule, longer-lived than the rest, as was said before; it is to be expected that the larger should contain more moisture. But it is not merely this that makes them longer lived; for the cause is twofold, to wit, the quality as well as the quantity of the [30] fluid. Hence the moisture must be not only great in amount but also warm, in order to be neither easily congealed nor easily dried up.

It is for this reason also that man lives longer than some animals which are larger; for animals live longer though there is a deficiency in the amount of their moisture, if the ratio of its qualitative [466<sup>b</sup>1] superiority exceeds that of its quantitative deficiency.

In some creatures the warm element is their fatty substance, which prevents at once desiccation and cooling; but in others it assumes a different flavour. Further, that which is designed to be not easily destroyed should not yield waste products. [5] Anything of such a nature causes death either by disease or naturally, for the potency of the waste product works adversely and destroys now the entire constitution, now a particular member.

This is why animals that copulate frequently and those abounding in seed age quickly; the seed is a residue, and further, by being lost, it produces dryness. Hence the mule lives longer than either the horse or the ass from which it sprang, and [10] females live longer than males if the males copulate frequently. Accordingly cock-sparrows have a shorter

life than the females. Again males subject to great toil are short-lived and age more quickly owing to the labour; toil produces dryness and old age is dry. But by natural constitution and as a general rule males live longer [15] than females, and the reason is that the male is an animal with more warmth than the female.

The same kind of animals are longer-lived in warm than in cold climates for the same reason as they are of larger size. The size of animals of cold constitution illustrates this particularly well, and hence snakes and lizards and scaly reptiles are [20] of great size in warm localities, as also are testacea in the Red Sea: the warm humidity there is the cause equally of their augmented size and of their life. But in cold countries the humidity in animals is more of a watery nature, and hence is readily congealed. Consequently it happens that animals with little or no blood are [25] in northerly regions either entirely absent (both land and water animals) or, when they do occur, they are smaller and have shorter life; for the frost prevents growth.

Both plants and animals perish if not fed, for in that case they consume themselves; just as a large flame consumes and burns up a small one by using up its [30] nutriment, so the natural warmth which is the primary cause of digestion consumes the material in which it is located.

Water animals have a shorter life than terrestrial creatures, not strictly because they are humid, but because they are watery, and watery moisture is easily [467<sup>a</sup>1] destroyed, since it is cold and readily congealed. For the same reason bloodless animals perish readily unless protected by great size, for there is neither fatness nor sweetness about them. In animals fat is sweet, and hence bees are longer-lived than other animals of larger size. [5]

6 · It is amongst the plants that we find the longest life—more than among the animals, for, in the first place, they are less watery and hence less easily frozen. Further they have an oiliness and a viscosity which makes them retain their moisture in a form not easily dried up, even though they are dry and earthy.

But we must discover the reason why trees are of an enduring constitution, for [10] it is peculiar to them and is not found in any animals except the insects.

Plants continually renew themselves and hence last for a long time. New shoots continually come and the others grow old, and with the roots the same thing happens. But both processes do not occur together. Rather

it happens that at one [15] time the trunk and the branches alone die and new ones grow up beside them, and it is only when this has taken place that the fresh roots spring from the surviving part. Thus it continues, one part dying and the other growing, and hence also it lives a long time.

There is a similarity, as has been already said, between plants and insects, for they live, though divided, and two or more may be derived from a single one. [20] Insects, however, though managing to live, are not able to do so long, for they do not possess organs; nor can the principle resident in each of the separated parts create organs. In the case of a plant, however, it can do so; every part of a plant contains potentially both root and stem. Hence it is from this source that issues that continued growth when one part is renewed and the other grows old; it is practically [25] a case of longevity. The taking of cuttings furnishes a similar instance; for we might say that, in a way, when we take a cutting the same thing happens; the shoot cut off is part of the plant. Thus in taking cuttings this perpetuation of life occurs though their connexion with the plant is severed, but in the former case it is the continuity that is operative. The reason is that the life principle potentially belonging to them is present in every part.

[30] Identical phenomena are found both in plants and in animals. For in animals the males are, in general, the longer-lived. They have their upper parts larger than the lower (the male is more of the dwarf type of build than the female), and it is in the upper part that warmth resides, in the lower cold. In plants also those with great [467<sup>b</sup>1] heads are longer-lived, and such are those that are not annual but of the tree-type, for the roots are the head and upper part of a plant, and among the annuals growth occurs in the direction of their lower parts and the fruit.

These matters however will be specially investigated in the work *On Plants*. [5] But this is our account of the reasons for the duration of life and for short life in animals. It remains for us to discuss youth and age, and life and death. To come to a definite understanding about these matters would complete our course of study on animals.

**\*\*TEXT:** W. D. Ross, *Aristotle: Parva Naturalia*, Clarendon Press, Oxford, 1955

<sup>1</sup>Ross excises this paragraph.



# ON YOUTH, OLD AGE, LIFE AND DEATH, AND RESPIRATION\*\*

G. R. T. Ross

1 · We must now treat of youth and old age and life and death. We must [10] probably also at the same time state the causes of respiration as well, since in some cases living and the reverse depend on this.

We have elsewhere given an account of the soul, and while it is clear that its substance cannot be corporeal, yet manifestly it must exist in some bodily part [15] which must be one of those possessing control over the members. Let us for the present set aside the other parts or faculties of the soul (whichever of the two be the correct name). But as to being what is called an animal and a living thing, we find that in all beings endowed with both characteristics (viz. being an animal and being alive) there must be a single identical part in virtue of which they live and are called [20] animals; for an animal *qua* animal cannot avoid being alive. But a thing need not, though alive, be animal; for plants live without having sensation, and it is by sensation that we distinguish animal from what is not animal. [25]

This part, then, must be one and the same in number and yet multiple and disparate in being; for being animal and living are not identical. Since then the organs of special sensation have one common organ in which the senses when functioning must meet, and this must be situated midway between what is called before and behind (we call 'before' the direction from which sensation comes, [30] 'behind' the opposite), further, since in all living things the body is divided into upper and lower (they all have upper and lower parts, so that this is true of plants as well), clearly the nutritive principle must be situated midway between these regions. That part where food enters we call upper, considering it by itself and not [468<sup>a</sup>1] relatively to the surrounding universe, while downward is that part by which the primary excrement is discharged.

Plants are the reverse of animals in this respect. To man in particular among the animals, on account of his erect stature, belongs the

characteristic of having his [5] upper parts pointing upwards in the sense in which that applies to the universe, while in the others these are in an intermediate position. But in plants, owing to their being stationary and drawing their sustenance from the ground, the upper part [10] must always be down; for there is a correspondence between the roots in a plant and what is called the mouth in animals, by means of which they take in their food, some from the earth, some by their own efforts.

2 · All perfectly formed animals are to be divided into three parts, one that [15] by which food is taken in, one that by which excrement is discharged, and the third the region intermediate between them. In the largest animals this latter is called the chest and in the others something corresponding; in some also it is more distinctly marked off than in others. All those also that are capable of progression have additional members subservient to this purpose, by means of which they bear the [20] whole trunk, to wit legs and feet and whatever parts are possessed of the same powers. Now it is evident both by observation and by inference that the source of the nutritive soul is in the middle of the three parts. For many animals, when either part—the head or the receptacle of the food—is cut off, retain life in that member [25] to which the middle remains attached. This can be seen to occur in many insects, e.g. wasps and bees, and many animals also besides insects can, though divided, continue to live by means of the part connected with nutrition.

While this member is indeed in actuality single, yet potentially it is multiple, [30] for these animals have a constitution similar to that of plants; plants when cut into sections continue to live, and a number of trees can be derived from one single source. A separate account will be given of the reason why some plants cannot live when divided, while others can be propagated by the taking of cuttings. In this [468<sup>b</sup>1] respect, however, plants and insects are alike.

It is true that the nutritive soul, in beings possessing it, while actually single must be potentially plural. And so it is too with the principle of sensation, for [5] evidently the divided segments of these animals have sensation. They are unable, however, to preserve their constitution, as plants can, not possessing the organs on which the continuance of life depends; for some lack the means for seizing, others for receiving their food, and some lack both of these and others too.

[10] Divisible animals are like a number of animals grown together, but animals of superior construction behave differently because their

constitution is a unity of the highest possible kind. Hence some of the organs on division display slight sensitiveness because they retain some psychical susceptibility; the animals continue to move after the vitals have been abstracted: tortoises, for example, do so [15] even after the heart has been removed.

3 · The same phenomenon is evident both in plants and in animals, and in plants we note it both in their propagation by seed and in grafts and cuttings. Genesis from seeds always starts from the middle. All seeds are bivalvular, and it is [20] from the meeting-place and mid-point of the two parts that both root and stem of growing things emerge; the starting-point is in a central position between them. In the case of grafts and cuttings this is particularly true of the buds; for the bud is in a way the starting-point of the branch, but at the same time it is in a central position. [25] Hence it is either this that is cut off, or into this that the new shoot is inserted, when we wish either a new branch or a new root to spring from it; which proves that the point of origin in growth is intermediate between stem and root.

Likewise in sanguineous animals the heart is the first organ developed; this is evident from what has been observed in those cases where observation of their growth is possible. Hence in bloodless animals also what corresponds to the heart [30] must develop first. We have already asserted in our treatise on the parts of animals that it is from the heart that the veins issue, and that in sanguineous animals the blood is the final nutriment from which the members are formed. Hence it is clear [469a1] that there is one function in nutrition which the mouth has the faculty of performing, and a different one appertaining to the stomach. But it is the heart that has supreme control, exercising an additional and completing function. Hence in sanguineous animals the source both of the sensitive and the nutritive soul must be [5] in the heart, for the functions relative to nutrition exercised by the other parts are ancillary to the activity of the heart. It is the part of the dominating organ to achieve the final result, as of the physician's efforts to be directed towards health, and not to be occupied with subordinate offices.

Certainly, however, all sanguineous animals have the supreme organ of the [10] sense-faculties in the heart, for it is here that we must look for the common sensorium belonging to all the sense-organs. These in two cases, taste and touch, can be clearly seen to extend to the heart, and hence the others also must lead to it, for in it the other organs may

possibly initiate changes, whereas with the upper region of [15] the body taste and touch have no connexion. Apart from these considerations, if the life is always located in this part, evidently the principle of sensation must be situated there too, for it is *qua* animal that a body is said to be a living thing, and it is called animal because endowed with sensation. Elsewhere in other works we have stated the reasons why some of the sense-organs are, as is evident, connected with [20] the heart, while others are situated in the head. (It is this fact that causes some people to think that it is in virtue of the brain that the function of perception belongs to animals.)

4 · Thus if, on the one hand, we look to the observed facts, what we have said makes it clear that the source of the sensitive soul, together with that connected with growth and nutrition, is situated in this organ and in the central one of the [25] three divisions of the body. But it follows by reason also; for we see that in every case, when several paths are open, Nature always chooses the best. Now if both principles are located in the midst of the substance, the two parts of the body, viz. [30] that which elaborates and that which receives the nutriment in its final form will best perform their appropriate function; for the soul will then be close to each, and the central situation which it will, as such, occupy the position of a dominating power.

[469<sup>b</sup>1] Further, that which employs an instrument and the instrument it employs must be distinct both in capacity and, if possible, in location, just as the flute and that which plays it—the hand—are diverse. Thus if animal is defined by the possession of sensitive soul, this principle must in the sanguineous animals be in the [5] heart, and, in the bloodless ones, in the corresponding part of their body. But in animals all the members and the whole body possess some connate natural heat, and hence when alive they are observed to be warm, but when dead and deprived of life [10] they are the opposite. Indeed, the source of this warmth must be in the heart in sanguineous animals, and in the case of bloodless animals in the corresponding organ, for, though all parts of the body by means of their natural heat work upon and concoct the nutriment, the governing organ takes the chief share in this process. Hence, even when the other members become cold, life remains; but when the [15] warmth here is quenched, death always ensues, because the source of heat in all the other members depends on this, and the soul is, as it were, set aglow with fire in this part, which in sanguineous

animals is the heart and in the bloodless order the analogous member. Hence, of necessity, life must be simultaneous with the [20] maintenance of heat, and what we call death is its destruction.

5 · However, it is to be noticed that there are two ways in which fire ceases to exist; it may go out either by exhaustion or by extinction. That which is self-caused we call exhaustion, that due to its opposites extinction. But either of these ways in which fire ceases to be may be brought about by the same cause, for, when there is a [25] deficiency of nutriment and the warmth can obtain no maintenance, the fire fails; and the reason is that the opposite, checking digestion, prevents the fire from being fed. But in other cases the result is exhaustion,—when the heat accumulates excessively owing to lack of respiration and of refrigeration. For the heat, accumulating in great quantity, quickly uses up its nutriment and consumes it all [30] before more is sent up by exhalation. Hence not only is a smaller fire readily put out by a larger one, but of itself the lamp's flame is consumed when inserted in a large [470a1] blaze, just as is the case with any other combustible. The reason is that the nutriment in the flame is seized by the larger one before fresh fuel can be added, for fire is ever coming into being and flowing like a river, but so speedily as to elude observation.

[5] Clearly, therefore, if the bodily heat must be conserved (as is necessary if life is to continue), there must be some way of cooling the heat resident in the source of warmth. Take as an illustration what occurs when coals are confined in a brazier. If they are kept covered up continuously by the so-called 'choker', they are quickly [10] extinguished, but, if the lid is in rapid alternation lifted up and put on again they remain glowing for a long time. Banking up a fire also keeps it in, for the ashes, being porous, do not prevent the passage of air, and again they enable it to resist extinction by the surrounding air by means of the supply of heat which it possesses. [15] However, we have stated in the *Problems* the reasons why these operations, namely banking up and covering up a fire, have the opposite effects (in the one case the fire goes out, in the other it continues alive for a considerable time).

6 · Everything living has soul, and it, as we have said, cannot exist without [20] the presence of natural heat. In plants the natural heat is sufficiently well kept alive by the aid which their nutriment and the surrounding air supply. For the food has a cooling effect when it enters

(as it does for men immediately after a meal), whereas abstinence from food produces heat and thirst. The air, if it be motionless, becomes [25] hot, but by the entry of food a motion is set up which lasts until digestion is completed and so cools it. If the surrounding air is excessively cold owing to the time of year, there being severe frost, the force of the heat dwindles; but when there are hot spells and the moisture drawn from the ground cannot produce its cooling [30] effect, the heat comes to an end by exhaustion. Trees suffering at such seasons are said to be blighted or star-stricken. Hence the practice of laying beneath the roots stones of certain species or water in pots, for the purpose of cooling the roots of the [470<sup>b</sup>1] plants.

Some animals pass their life in the water, others in the air, and therefore these media furnish the source and means of refrigeration, water in the one case, air in the other. We must proceed—and it will require further application on our part—to give an account of the way and manner in which this refrigeration occurs. [5]

7(1) · A few of the earlier natural scientists have spoken of respiration. The reason, however, why it exists in animals they have either not declared or, when they have, their statements are not correct and show a comparative lack of acquaintance with the facts. Moreover they assert that all animals respire—which is untrue. [10] Hence these points must first claim our attention, in order that we may not be thought to make unsubstantiated charges against authors no longer alive.

First then, it is evident that all animals with lungs breathe, but in some cases breathing animals have a bloodless and spongy lung, and then there is less need for respiration. These animals can remain under water for a time, which relatively to [15] their bodily strength, is considerable. All oviparous animals, e.g. the frog-tribe, have a spongy lung. Also turtles and terrapins can remain for a long time immersed in water; for their lung, containing little blood, has not much heat. Hence, when [20] once it is inflated, it itself, by means of its motion, produces a cooling effect and enables the animal to remain immersed for a long time. Suffocation, however, always ensues if the animal is forced to hold its breath for too long a time, for none of this class take in water in the way fishes do. On the other hand, animals which have the lung charged with blood have greater need of respiration on account of the [25] amount of their heat, while none at all of the others which do not possess lungs, breathes.

8(2) · Democritus of Abdera and certain others who have treated of respiration, while saying nothing definite about the lungless animals, nevertheless seem to speak as if all breathed. But Anaxagoras and Diogenes both maintain that [30] all breathe, and state the manner in which fishes and oysters respire. Anaxagoras says that when fishes discharge water through their gills, air is formed in the mouth, [471<sup>a</sup>1] for there can be no vacuum, and that it is by drawing in this that they respire. Diogenes' statement is that, when they discharge water through their gills, they suck the air out of the water surrounding the mouth by means of the vacuum formed [5] in the mouth, for he believes there is air in the water.

But these theories are untenable. Firstly, they state only what is the common element in both operations and so leave out the half of the matter. For what goes by the name of respiration consists, on the one hand, of inhalation, and, on the other, of the exhalation of breath; but, about the latter they say nothing, nor do they describe [10] how such animals emit their breath. Indeed, explanation is for them impossible for, when the creatures respire, they must discharge their breath by the same passage as that by which they draw it in, and this must happen in alternation. Hence, as a result, they must take the water into their mouth at the same time as they breathe out. But the air and the water must meet and obstruct each other. Further, when [15] they discharge the water they must emit their breath by the mouth or the gills, and the result will be that they will breathe in and breathe out at the same time, for it is at that moment that respiration is said to occur. But it is impossible that they should do both at the same time. Hence, if respiring creatures must both exhale and inhale the air, and if none of these animals can breathe out, evidently none can respire at all.

[20] 9(3) · Further, the assertion that they draw in air out of the mouth or out of the water by means of the mouth is an impossibility, for, not having a lung, they have no windpipe; rather the stomach is closely juxtaposed to the mouth, so that they must do the sucking with the stomach. But in that case the other animals would do so also, which is not the truth; and the water-animals also would be seen to do it [25] when out of the water, whereas quite evidently they do not. Further, in all animals that respire and draw breath there is to be observed a certain motion in the part of the body which draws in the air, but in the fishes this does not occur. Fishes do not appear to move any of the parts in the

region of the stomach, except the gills alone, [30] and these move both when they are in the water and when they are thrown on to dry land and gasp. Moreover, always when respiring animals are killed by being [471<sup>b</sup>1] suffocated in water, bubbles are formed of the air which is forcibly discharged, as happens, e.g. when one forces a tortoise or a frog or any other animal of a similar class to stay beneath water. But with fishes this result never occurs, in whatsoever way we try to obtain it, since they do not contain air drawn from an external source. [5] Again, the manner of respiration said to exist in them might occur in the case of men also when they are under water. For if fishes draw in air out of the surrounding water by means of their mouth why should not men too and other animals do so?—they should also, in the same way as fishes, draw in air out of the mouth. If in [10] the former case it were possible, so also should it be in the latter. But, since in the one it is not so, neither does it occur in the other. Furthermore, why do fishes, if they respire, die in the air and gasp (as can be seen) as in suffocation? It is not want of [15] food that produces this effect upon them, and the reason given by Diogenes is foolish, for he says that in air they take in too much air and hence die, but in the water they take in a moderate amount. But that should be a possible occurrence with land animals also; as facts are, however, no land animal is suffocated by excessive respiration. Again, if all animals breathe, insects must do so also. But [20] many of them seem to live though divided not merely into two, but into several parts, e.g. those called millipedes. But how can they, when thus divided, breathe, and what is the organ they employ? The main reason why these writers have not given a good account of these facts is that they have no acquaintance with the internal parts, and that they did not grasp that nature does everything for the sake [25] of some end. If they had asked for what purpose respiration exists in animals, and had considered this with reference to the parts, e.g. the gills and the lungs, they would have discovered the reason more speedily.

10(4) · Democritus, however, does teach that in the breathing animals [30] there is a certain result produced by respiration; he asserts that it prevents the soul from being extruded from the body. Nevertheless, he by no means asserts that it is [472<sup>a</sup>1] for this purpose that nature so contrives it, for he, like the other natural scientists, altogether fails to attain to any such explanation. His statement is that the soul and the hot element are identical, being the primary forms among the spherical particles. Hence, when these are being separated out by the surrounding



atmosphere [5] thrusting them out, respiration, according to his account, comes in to succour them. For in the air there are many of those particles which he calls mind and soul. Hence, when we breathe and the air enters, these enter along with it, and by their action cancel the pressure, thus preventing the expulsion of the soul which [10] resides in the animal.

This explains why life and death are bound up with the taking in and letting out of the breath; for death occurs when the compression by the surrounding air gains the upper hand, and, the animal being unable to respire, the air from outside can no longer enter and counteract the compression. Death is the departure of those forms owing to the expulsive pressure exerted by the surrounding air. As to the [15] reason why all must die at some time—not, however, at any chance time but, when natural, owing to old age, and, when unnatural, to violence.

But the reason for this and why all must die Democritus has by no means made clear. And yet, since evidently death occurs at one time of life and not at another, he should have said whether the cause is external or internal. Neither does he assign [20] the cause of the beginning of respiration, nor say whether it is internal or external. Indeed, it is not the case that the external mind superintends the reinforcement; rather the origin of breathing and of the respiratory motion must be within: it is not due to pressure from around. It is absurd also that what surrounds should compress and at the same time by entering dilate. This then is practically his theory, and how [25] he puts it.

But if we must consider that our previous account is true, and that respiration does not occur in every animal, we must deem that this explains death not universally, but only in respiring animals. Yet neither is it a good account of these even, as may clearly be seen from the facts and phenomena of which we all have [30] experience. For in hot weather we grow warmer, and, having more need of respiration, we always breathe faster. But, when the air around is cold and contracts and solidifies the body, retardation of the breathing results. Yet this was just the [472<sup>b</sup>1] time when the external air should enter and annul the expulsive movement, whereas it is the opposite that occurs. For when the breath is not let out and the heat accumulates too much then we need to respire, and to respire we must draw in the breath. When hot, people breathe rapidly, because they must do so in order to cool [5] themselves, just when the theory of Democritus would make them add fire to fire.

the breath by pushing, by no means determines how, in the case of the animals other than land-animals, their heat is preserved, and whether it is due to the same or a different cause. For if respiration occurs only in land-animals we should be told [10] what is the reason of that. Likewise, if it is found in others also, but in a different form, this form of respiration, if they all can breathe, must also be described.

Further, the method of explaining involves a fiction. It is said that when the hot air issues from the mouth it pushes the surrounding air, which being carried on enters the very place whence the internal warmth issued, through the interstices of [15] the porous flesh; and this reciprocal replacement is due to the fact that a vacuum cannot exist. But when it has become hot the air passes out again by the same route, and pushes back inwards through the mouth the air that had been discharged in a warm condition. It is said that it is this action which goes on continuously when the breath is taken in and let out.

[20] But according to this way of thinking it will follow that we breathe out before we breathe in. But the opposite is the case, as evidence shows, for though these two functions go on in alternation, yet the last act when life comes to a close is the letting out of the breath, and hence its admission must have been the beginning of the process.

Once more, those who give this kind of explanation by no means state the final [25] cause of the presence in animals of this function (to wit the admission and emission of the breath), but treat it as though it were a contingent accompaniment of life. Yet it evidently has control over life and death, for when respiring animals are unable to breathe they perish. Again, it is absurd that the passage of the hot air out [30] through the mouth and back again should be quite perceptible, while we were not able to detect the passage of the breath into the thorax and its return outwards once more when heated. It is also nonsense that respiration should consist in the entrance of heat, for the evidence is to the contrary effect; what is breathed out is hot, and what is breathed in is cold. When it is hot we pant in breathing, for, because what [473<sup>a</sup>1] enters does not adequately perform its cooling function, we have as a consequence to draw the breath frequently.

12(6) · But we must not entertain the notion that it is for purposes of *nutrition* that respiration is designed, and believe that the internal fire is fed by the [5] breath; respiration, as it were, adding fuel to the fire, while the feeding of the flame results in the outward passage of the

breath. To combat this doctrine I shall repeat what I said in opposition to the previous theories. This, or something analogous to it, should occur in the other animals also, for all possess vital heat. Further, how are we to describe this fictitious process of the generation of heat from the breath? [10] Observation shows rather that it is a product of the food. A consequence also of this theory is that the nutriment would enter and the refuse be discharged by the same channel, but this does not appear to occur in the other instances.

13(7) · Empedocles also gives an account of respiration without, however, [15] making clear what its purpose is, or whether or not it is universal in animals. Also when dealing with respiration by means of the nostrils he imagines he is dealing with what is the primary kind of respiration. Even the breath which passes through the nostrils passes through the windpipe out of the chest as well, and without the latter the nostrils cannot act. Again, when animals are bereft of respiration through [20] the nostrils, no detrimental result ensues, but, when prevented from breathing through the windpipe, they die. Nature employs respiration through the nostrils as a secondary function in certain animals in order to enable them to smell. That is why [25] though almost all animals are endowed with the sense of smell, the sense-organ is not the same in all.

A more precise account has been given about this elsewhere. Empedocles, however, explains the passage inwards and outwards of the breath, by the theory [473<sup>b</sup>1] that there are certain blood-vessels, which, while containing blood, are not filled by it, but have passages leading to the outer air, the calibre of which is fine in contrast to the size of the solid particles, but large relatively to those in the air. Hence, since it is the nature of the blood to move upwards and downwards, when it moves down [5] the air rushes in and inspiration occurs; when the blood rises, the air is forced out and the outward motion of the breath results. He compares this process to what occurs in a clepsydra.<sup>1</sup>

Thus all things outwards breathe and in;—their flesh has tubes  
Bloodless, that stretch towards the body's outmost edge, [10]  
Which, at their mouths, full many frequent channels pierce,  
Cleaving the extreme nostrils through; thus, while the gore  
Lies hid, for air is cut a thoroughfare most plain.  
And thence, whenever shrinks away the tender blood,  
Enters the blustering wind with swelling billow wild. [15]  
But when the blood leaps up, backward it breathes. As when

With clepsydra of polished bronze a maiden sporting,  
Sets on her comely hand the narrow of the tube  
And dips it in the frail-formed water's silvery sheen;  
Not then the flood the vessel enters, but the air, [20]  
Pressing within on the dense orifices, checks it,

Until she frees the crowded stream. But then indeed  
Upon the air's escape runs in the water meet.  
So also when within the vessel's deeps the water  
[25] Remains, the opening by the hand of flesh being closed,  
The outer air that entrance craves restrains the flood  
At the gates of the sounding, upon the surface pressing,  
[474<sup>a</sup>1] Until the maid withdraws her hand. But then in  
contrariwise  
Once more the air comes in and water meet flows out.  
Thus too the subtle blood, surging throughout the limbs,  
Whene'er it shrinks away into the far recesses  
[5] Admits a stream of air rushing with swelling wave,  
But, when it backward leaps, in like bulk air flows out.

This then is what he says of respiration. But, as we said, all animals that evidently respire do so by means of the windpipe, when they breathe either through the mouth or through the nostrils. Hence, if it is of this kind of respiration that he is [10] talking, we must ask how it tallies with the explanation given. But the facts seem to be quite opposed. The region is raised in the manner of a forge-bellows when the breath is drawn in—it is quite reasonable that it should be heat which raises it up and that the blood should occupy the hot region—but it collapses and sinks down, [15] like the bellows once more, when the breath is let out. The difference is that in a bellows it is not by the same channel that the air is taken in and let out, but in breathing it is.

But, if Empedocles is accounting only for respiration through the nostrils, he is much in error, for that does not involve the nostrils alone, but passes by the channel [20] beside the uvula where the extremity of the roof of the mouth is, some of the air going this way through the apertures of the nostrils and some through the mouth, both when it enters and when it passes out. Such then is the nature and magnitude of the difficulties besetting the theories of other writers concerning respiration.

[25] 14(8) · We have already stated that life and the presence of soul involve a certain heat. Not even the digesting process to which is due the nutrition of animals occurs apart from soul and warmth, for it is fire that in all cases does the work. It is for this reason, precisely, that the primary nutritive soul also must be located in that part of the body and in that division of this region which is the immediate vehicle of [474<sup>b</sup>1] this principle. The region in question is intermediate between that where food enters and that where excrement is discharged. In bloodless animals it has no name, but in the sanguineous class this part is called the heart. The blood constitutes the nutriment from which the parts of the animal are directly formed. Likewise the [5] blood-vessels must have the same originating source, as the blood, since the one exists for the sake of the other—as a vessel or receptacle for it. In sanguineous animals the heart is the starting-point of the veins; they do not traverse it, but are found to stretch out from it, as dissections enable us to see.

[10] Now the other faculties of the soul cannot exist apart from the power of nutrition (the reason has already been stated in the treatise on the soul), and this depends on the natural fire, by the union with which Nature has set it aglow. But fire, as we have already stated, is destroyed in two ways, either by extinction or by exhaustion. It suffers extinction from its opposites. Hence it can be extinguished by [15] the surrounding cold both when in mass and (though more speedily) when scattered. Now this way of perishing is due to violence equally in living and in lifeless objects, for the division of an animal by instruments and consequent congelation by excess of cold cause death. But exhaustion is due to excess of heat; [20] for, if there is too much heat close at hand and the thing burning does not have a fresh supply of fuel added to it, it goes out by exhaustion, not by the action of cold. Hence, if it is going to continue it must be cooled, for cold is a preventive against this form of extinction.

15(9) · Some animals occupy the water, others live on land, and, that being [25] so, in the case of those which are very small and bloodless the refrigeration due to the surrounding water or air is sufficient to prevent destruction from this cause. Having little heat, they require little cold to combat it. Hence too such animals are almost all short-lived, for, being small, they have less scope for deflection towards either extreme. But some insects are longer-lived (though bloodless, like all the [475<sup>a</sup>1] others), and these have a deep indentation beneath the waist, in order to secure cooling through the membrane, which there is thinner. They are

warmer animals and hence require more refrigeration, and such are bees (some of which live as long as seven years) and all that make a humming noise, like wasps, cockchafer, and [5] crickets. They make a sound as if of panting by means of air; for, in the middle section itself which rises and falls with the intake breath, friction is produced against the membrane. The way in which they move this region is like the motion due to the lungs in animals that breathe the outer air, or to the gills in fishes. What [10] occurs is comparable to the suffocation of a respiring animal by holding its mouth, for then the lung causes a heaving motion of this kind. In the case of these animals this motion is not sufficient for refrigeration, but in insects it is. It is by friction [15] against the membrane that they produce the humming sound, as we say, in the way that children do by blowing through the holes of a reed covered by a fine membrane. It is thus that the singing crickets too produce their song; they possess greater warmth and are indented at the waist, but the songless variety have no fissure [20] there.

Animals also which are sanguineous and possess a lung, though that contains little blood and is spongy, can in some cases, owing to the latter fact, live a long time without breathing; for the lung, containing little blood or fluid, can rise a long way: its own motion can for a long time produce sufficient refrigeration. But at last it ceases to suffice, and the animal dies of suffocation if it does not respire—as we [25] have already said. For of exhaustion that kind which is destruction due to lack of refrigeration is called suffocation, and whatsoever is thus destroyed is said to be suffocated.

We have already stated that among animals insects do not respire, and the fact is evident in the case of even small creatures like flies and bees, for they can swim about in a fluid for a long time if it is not too hot or too cold. Yet animals with little [475<sup>b</sup>1] strength tend to breathe more frequently. These, however, die of what is called suffocation when the stomach becomes filled and the heat in the central segment is [5] destroyed. This explains also why they revive after being among ashes for a time.

Again among water-animals those that are bloodless remain alive longer in air than those that have blood and admit the sea-water, as, for example, fishes. Since it is a small quantity of heat they possess, the air is for a long time adequate for the purposes of refrigeration in such animals as the crustacea and the polyps. Their lack [10] of heat does not, however, suffice to keep them finally in life; for many fishes also live in the earth, yet in a motionless state, and are to be found by digging. For

all animals that have no lung at all or have a bloodless one require less refrigeration.

[15] **16(10)** · Concerning the bloodless animals we have declared that in some cases it is the surrounding air, in others fluid, that aids the maintenance of life. But in the case of animals possessing blood and heart, all which have a lung admit the air and produce the cooling effect by breathing in and out. All animals have a lung [20] that are viviparous and are so internally, not externally merely (the Selachia are viviparous, but not internally), and of the oviparous class those that have wings, e.g. birds, and those with scales, e.g. tortoises, lizards, and snakes. The former class have a lung charged with blood, but in the most part of the latter it is spongy. Hence [25] they employ respiration more sparingly as already said. The function is found also in all that frequent and pass their life in the water, e.g. the class of water-snakes and frogs and crocodiles and turtles, both sea- and land-tortoises, and seals.

All these and similar animals both bring forth on land and sleep on shore or, when they do so in the water, keep the head above the surface in order to respire. [476<sup>a</sup>1] But all with gills produce refrigeration by taking in water; the Selachia and all other footless animals have gills. Fish are footless, and the limbs they have get their name [5] from their similarity to wings. But of those with feet one only, so far as observed, has gills. It is called the newt.

No animal yet has been seen to possess both lungs and gills, and the reason for this is that the lung is designed for the purpose of refrigeration by means of the air (it seems to have derived its name (πνεύμων) from its function as a receptacle of the [10] breath (πνεῦμα)) while gills are relevant to refrigeration by water. Now for one purpose one organ is adapted and one single means of refrigeration is sufficient in every case. Hence, since we see that nature does nothing in vain, and if there were [15] two organs one would be purposeless, this is the reason why some animals have gills, others lungs, but none possess both.

**17(11)** · Every animal in order to exist requires nutriment, in order to prevent itself from dying, refrigeration; and so nature employs the same organ for both purposes. For, as in some cases the tongue serves both for discerning tastes and [20] for speech, so in animals with lungs the mouth is employed both in working up the food and in the passage of the breath outwards and inwards. In lungless and non-respiring animals it

is employed in working up the food, while in those of them that require refrigeration it is the gills that serve for this purpose.

We shall state further on how it is that these organs have the faculty of [25] producing refrigeration. But to prevent their food from impeding these operations there is a similar contrivance in the respiring animals and in those that admit water. At the moment of respiration they do not take in food, for otherwise suffocation results owing to the food, whether liquid or dry, slipping in through the windpipe [30] and lying on the lung. The windpipe is situated before the oesophagus, through which food passes into what is called the stomach, but in quadrupeds which are sanguineous there is, as it were, a lid over the windpipe—the epiglottis. In birds and oviparous quadrupeds this covering is absent, but its office is discharged by a [476<sup>b</sup>1] contraction of the windpipe. The latter class contract the windpipe when swallowing their food; the former close down the epiglottis. When the food has passed, the epiglottis is in the one case raised, and in the other the windpipe is expanded, and the air enters to effect refrigeration. In animals with gills the water is first [5] discharged through them and then the food passes in through the mouth; they have no windpipe and hence can take no harm from liquid lodging in this organ, only from its entering the stomach. For these reasons the expulsion of water and the seizing of their food is rapid, and their teeth are sharp and in almost all cases [10] arranged in a saw-like fashion, for they are debarred from chewing their food.

18(12) · Among water-animals the cetaceans may give rise to some perplexity, though they too can be rationally explained.

Examples of such animals are dolphins and whales, and all others that have a [15] blow-hole. They have no feet, yet possess a lung though admitting the sea-water. The reason for possessing a lung is that which we have just stated; the admission of water is not for the purpose of refrigeration. That is effected by respiration, for they have a lung. Hence they sleep with their head out of the water, and dolphins, at any [20] rate, snore. Further, if they are entangled in nets they soon die of suffocation owing to lack of respiration, and hence they can be seen to come to the surface owing to the necessity of breathing. But since they have to feed in the water, they must admit it, and it is in order to discharge this that they all have a blow-hole; after admitting the [25] water they expel it through the blow-hole as the fishes do through the gills. The position of the blow-hole is an indication of this, for it leads to



none of the organs which are charged with blood, but lies before the brain.

It is for the very same reason that molluscs and crustaceans admit water—I [30] mean such animals as crayfish and crabs. For none of these is refrigeration a necessity, for in every case they have little heat and are bloodless, and hence are sufficiently cooled by the surrounding water. But in feeding they expel the water in [477<sup>a</sup>1] order to prevent its being swallowed simultaneously with the food. Thus crustaceans, like the crayfish and crabs, discharge water through the folds beside their shaggy parts, while cuttle-fish and the polyps employ for this purpose the hollow above the head. There is, however, a more precise account of these in the *History of* [5] *Animals*.

Thus it has been explained that the cause of the admission of the water is refrigeration, and the fact that animals constituted for a life in water must feed in [10] it.

**19(13)** · An account must next be given of refrigeration and the manner in which it occurs in respiring animals and those possessed of gills. We have already said that all animals with lungs respire. The reason why some creatures have this [15] part, and why those having it need respiration, is that the higher animals have a greater proportion of heat, for at the same time they must have been assigned a higher soul and they have a higher nature than plants.<sup>2</sup> Hence too those with most [20] blood and most warmth in the lung are of greater size, and that animal in which the blood in the lung is purest and most plentiful is the most erect, namely man; and the reason why he alone has his upper part directed to the upper part of the universe is that he possesses such a part. Hence this as much as any other part must be assigned as a cause of the essence of the animal both in man and in other cases.

[25] This then is the purpose of refrigeration. As for the constraining and efficient cause, we must believe that it created animals like this, just as it created many others also not of this constitution. For some have a greater proportion of earth in their composition, like plants, and others, e.g. aquatic animals, contain a larger [30] amount of water; while winged and terrestrial animals have an excess of air and fire respectively. Each has its station in the appropriate regions.

**20(14)** · Empedocles is then in error when he says that those

animals [477<sup>b</sup>1] which have the most warmth and fire live in the water to counterbalance the excess of heat in their constitution, in order that, since they are deficient in cold and fluid, they may be kept in life by the contrary character of the region they occupy; for [5] water has less heat than air. But it is wholly absurd that the water-animals should in every case originate on dry land, and afterwards change their place of abode to the water; for they are almost all footless. He, however, when describing their original structure says that, though originating on dry land, they have abandoned it and migrated to the water. But again it is evident that they are not warmer than [10] land-animals, for in some cases they have no blood at all, in others little.

The question, however, as to what sorts of animals should be called warm and what cold, has in each special case received consideration. Though in one respect there is reason in the explanation which Empedocles aims at establishing, yet his [15] account is not correct. Excess in a bodily state is cured by a situation or season of opposite character, but the constitution is best maintained by an environment akin to it. There is a difference between the material of which any animal is constituted and the states and dispositions of that material. For example, if nature were to constitute a thing of wax or of ice, she would not preserve it by putting it in a hot [20] place, for the opposing quality would quickly destroy it, seeing that heat dissolves that which cold congeals. Again, a thing composed of salt or nitre would not be taken and placed in water, for fluid dissolves that of which the consistency is due to the dry.

Hence if the fluid and the dry supply the material for all bodies, it is reasonable [25] that things the composition of which is due to the fluid should have liquid for their medium, while that which is due to the dry will be found in the dry. Thus trees grow not in water but on dry land. But the same theory would relegate them to the water, on account of their excess of dryness, just as it does the things that are excessively fiery. They would have migrated there not on account of its cold but owing to its fluidity.

Thus the natural character of the material of objects is of the same nature as [30] the region in which they exist; the liquid is found in liquid, the dry on land, the warm in air. With regard, however, to states of body, a cold situation has, on the other hand, a beneficial effect on excess of heat, and a warm environment on excess [478<sup>a</sup>1] of cold, for the region reduces to a mean the excess in the bodily condition. This must be sought in the regions appropriate to each type of matter, and according to the

changes of the seasons which are common to all; for, while states of the body can [5] be opposed in character to the environment, the material of which it is composed can never be so. This, then, is a sufficient explanation of why it is not owing to the heat in their constitution that some animals are aquatic, others terrestrial, as Empedocles maintains, and of why some possess lungs and others do not. [10]

**21(15)** · The explanation of the admission of air and respiration in those animals in which a lung is found, and especially in those in which it is full of blood, is to be found in the fact that it is of a spongy nature and full of tubes, and that it is the most fully charged with blood of all the visceral organs. All animals with a full-blooded lung require rapid refrigeration because there is little scope for [15] deviation from the normal amount of their vital fire; the air also must penetrate all through it on account of the large quantity of blood and heat it contains. But both these operations can be easily performed by air, for, being of a subtle nature, it penetrates everywhere and that rapidly, and so performs its cooling function; but [20] water has the opposite characteristics.

The reason why animals with a full-blooded lung respire most is hence manifest; the more heat there is, the greater is the need for refrigeration, and at the same time breath can easily pass to the source of heat in the heart. [25]

**22(16)** · In order to understand the way in which the heart is connected with the lung by means of passages, we must consult both dissections and the account in the *History of Animals*. In general, the constitution of animals needs refrigeration because the soul is ignited in the heart. Respiration is the means of effecting refrigeration, of which those animals make use that possess a lung as well [30] as a heart. But when they, as for example the fishes, which on account of their aquatic nature have no lung, possess the latter organ without the former, the cooling is effected through the gills by means of water. For ocular evidence to how the heart is situated relatively to the gills we must employ dissections, and for precise details [478<sup>b</sup>1] we must refer to the *History of Animals*. As a summarizing statement, however, and for present purposes, the following is the account of the matter.

It might appear that the heart has not the same position in terrestrial animals and in fishes, but the position really is identical, for the apex of the heart is in the [5] direction in which they incline their heads. But it is

towards the mouth in fishes that the apex of the heart points, seeing that they do not incline their heads in the same direction as land-animals do. Now from the extremity of the heart a tube of a sinewy, arterial character runs to the centre where the gills all join. This then is the [10] largest of those ducts, but on either side of the heart others also issue and run to the extremity of each gill, and by means of the ceaseless flow of water through the gills, effect the cooling which passes to the heart.

[15] In similar fashion as the fish move their gills, respiring animals with rapid action raise and let fall the chest according as the breath is admitted or expelled. If the air is limited in amount and unchanged they are suffocated, for either medium, owing to contact with the blood, rapidly becomes hot, and, being hot, counteracts the refrigeration. And when respiring animals can no longer move the lung or [20] aquatic animals their gills, whether owing to disease or old age, their death ensues.

**23(17)** · To be born and to die are common to all animals, but there are specifically diverse ways in which these phenomena occur; of destruction there are different types, though yet something is common to them all. There is violent death [25] and again natural death, and the former occurs when the cause of death is external, the latter when it is internal, and involved from the beginning in the constitution of the organ, and not an affection derived from a foreign source. In the case of plants the name given to this is withering, in animals old age. Death and decay pertain to all things that are not imperfectly developed; to the imperfect also they may be [30] ascribed in nearly the same but not an identical sense. Under the imperfect I class eggs and seeds of plants as they are before the root appears.

It is always to some lack of heat that death is due, and in perfect creatures the cause is its failure in the organ containing the source of the creature's essential nature. This member is sited, as has been said, at the junction of the upper and lower parts; in plants it is intermediate between the root and the stem, in [479<sup>a</sup>1] sanguineous animals it is the heart, and in those that are bloodless the corresponding part of their body. But some of these animals have potentially many sources of life, though in actuality they possess only one. This is why some insects live when divided, and why, even among sanguineous animals, all whose vitality is not intense [5] live for a long time after the heart has been removed. Tortoises, for example, do so and make movements with their feet, so long as the shell

is left, a fact to be explained by the natural inferiority of their constitution, as it is in insects also.

The source of life is lost to its possessors when the heat with which it is bound up is no longer tempered by cooling, for, as I have often remarked, it is consumed by [10] itself. Hence when, owing to lapse of time, the lung in the one class and the gills in the other get dried up, these organs become hard and earthy and incapable of movement and cannot be expanded or contracted. Finally things come to a climax, and the fire goes out from exhaustion.

[15] Hence a small disturbance will speedily cause death in old age. Little heat remains, for the most of it has been breathed away in the long period of life preceding, and hence any increase of strain on the organ quickly causes extinction. It is just as though the heart contained a tiny feeble flame which the slightest movement puts out. Hence in old age death is painless, for no violent disturbance is [20] required to cause death, and the severance of the soul is entirely imperceptible. All diseases which harden the lung by forming tumours or waste residues, or by excess of morbid heat, as happens in fevers, accelerate the breathing owing to the inability [25] of the lung to move far either upwards or downwards. Finally, when motion is no longer possible, the breath is given out and death ensues.

**24(18)** · Generation is the initial participation, mediated by warm substance, in the nutritive soul, and life is the maintenance of this participation. Youth is the period of the growth of the primary organ of refrigeration, old age of its decay, [30] while the intervening time is the prime of life.

A violent death or dissolution consists in the extinction or exhaustion of the vital heat (for either of these may cause dissolution), while natural death is the [479<sup>b</sup>1] exhaustion of the heat owing to lapse of time, and occurring at the end of life. In plants this is to wither, in animals to die. Death, in old age, is the exhaustion due to inability on the part of the organ, owing to old age, to produce refrigeration. [5]

This then is our account of generation and life and death, and the reason for their occurrence in animals.

**25(19)** · It is hence also clear why respiring animals are suffocated in [10] water and fishes in air. For it is by water in the latter

class, by air in the former that refrigeration is effected, and either of these means of performing the function is removed by a change of environment.

There is also to be explained in either case the cause of the motion of the gills and of the lungs, the rise and fall of which effects the admission and expulsion of the breath or of water. The following, moreover, is the manner of the constitution of the [15] organ.

**26(20)** · In connexion with the heart there are three phenomena, which, though apparently of the same nature, are really not so, namely palpitation, pulsation, and respiration.

Palpitation is the rushing together of the hot substance in the heart owing to the chilling influence of residual or waste products. It occurs, for example, in the [20] ailment known as spasms and in other diseases. It occurs also in fear, for when one is afraid the upper parts become cold, and the hot substance, fleeing away, by its concentration in the heart produces palpitation. It is crushed into so small a space that sometimes life is extinguished, and the animals die of the fright and morbid [25] disturbance.

The beating of the heart, which, as can be seen, goes on continuously, is similar to the throbbing of an abscess. That, however, is accompanied by pain, because the change produced in the blood is unnatural, and it goes on until the matter formed by concoction is discharged. There is a similarity between this phenomenon and that of [30] boiling; for boiling is due to the volatilization of fluid by heat and the expansion consequent on increase of bulk. But in an abscess, if there is no evaporation through [480<sup>a</sup>1] the walls, the process terminates in suppuration due to the thickening of the liquid, while in boiling it ends in the escape of the fluid out of the containing vessel.

In the heart the beating is produced by the heat expanding the fluid, of which the food furnishes a constant supply. It occurs when the fluid rises to the outer wall [5] of the heart, and it goes on continuously; for there is a constant flow of the fluid that goes to constitute the blood, it being in the heart that the blood is first created. That this is so we can perceive in the initial stages of generation, for the heart can be seen to contain blood before the veins become distinct. This explains why pulsation in [10] youth exceeds that in older people, for in the young the exhalation is more abundant.

All the veins pulse, and do so simultaneously with each other, owing

to their connexion with the heart. The heart always beats, and hence they also beat continuously and simultaneously with each other and with it.

Palpitation, then, is the recoil of the heart against the compression due to cold; [15] and pulsation is the volatilization of the heated fluid.

**27(21)** · Respiration takes place when the hot substance which is the seat of the nutritive principle increases. For it, like the rest of the body, requires nutrition, and more so than the other parts, for it is through it that they are nourished. But when it increases it necessarily causes the organ to rise. This organ [20] we must take to be constructed like the bellows in a smithy, for both heart and lungs conform pretty well to this shape. Such a structure must be double, for the nutritive principle must be situated in the centre of the cooling force.

Thus on increase of bulk expansion results, which necessarily causes the surrounding parts to rise. Now this can be seen to occur when people respire; they [25] raise their chest because the principle of the organ described resident within the chest causes an identical expansion of this organ. When it dilates the outer air, being cold, must rush in as into a bellows, and by its chilling influence reduce by [480<sup>b</sup>1] extinction the excess of the fire. But, as the increase of bulk causes the organ to dilate, so diminution causes contraction, and when it collapses the air which entered must pass out again. When it enters the air is cold, but on issuing it is warm owing to [5] its contact with the heat resident in this organ, and this is specially the case in those animals that possess a full-blooded lung. The numerous canal-like ducts in the lung, into which it passes, have each a blood-vessel lying alongside, so that the whole lung is thought to be full of blood. The inward passage of the air is called respiration, the [10] outward expiration, and this double movement goes on continuously just so long as the animal lives and keeps this organ in continuous motion; it is for this reason that life depends on the passage of the breath outwards and inwards.

It is in the same way that the motion of the gills in fishes takes place. When the [15] hot substance in the blood throughout the members rises, the gills rise too, and let the water pass through, but when it is chilled and retreats through its channels to the heart, they contract and eject the water. As the heat in the heart continually rises, so the heart continually receives it and expels it again when it is chilled. Hence, as in respiring animals life and death depend on respiration, so in the other animals they depend on the admission of water. [20]

Our discussion of life and death and kindred topics is now practically complete. But as to health and disease, not only the physician but also the natural scientist must, up to a point, give an account of their causes. The extent to which these two differ and investigate diverse provinces must not escape us, since facts [25] show that their inquiries are, to a certain extent, at least co-terminous. For those physicians who are cultivated and learned make some mention of natural science, and claim to derive their principles from it, while the most accomplished investigators into nature generally push their studies so far as to conclude with an account of medical principles. [30]



**\*\*TEXT:** W. D. Ross, *Aristotle: Parva Naturalia*, Clarendon Press, Oxford, 1955

<sup>1</sup>The clepsydra was a device for lifting small quantities of liquid, similar in operation to the modern pipette.

<sup>2</sup>Retaining φυτῶν.

# ON BREATH\*\*

*J. F. Dobson*

[481<sup>a</sup>1] 1 · What is the mode of growth of the natural breath and its mode of maintenance? For we see that it increases in volume and strength in accordance with both changes of age and the varying condition of the body. May we suppose that it increases as the other parts do, through the addition of some substance to it? [5] Now it is nutriment that is thus added to living creatures; so that we must consider the nature and origin of the nutriment in this case.

Nutrition may result in either of two ways—by means of respiration, or, as in the case of the other parts of the body, by the digestive process consequent on the introduction of the nutriment; and of the two the process by means of the nutriment is perhaps the more likely; for body is nourished by body, and the breath is of the nature of body.

[10] What then is the method? Clearly we must suppose that the breath is nourished by drawing and digesting nutriment from the vein-system, for the blood is the ultimate and universal nutriment. So the breath receives nutriment into the hot element as into its vessel and receptacle.<sup>1</sup>

The air draws the nutriment and imparts the activity, and applying to itself the [15] digestive power is the cause of its own growth and nutrition.

Perhaps there is nothing absurd in this, but rather in the proposition that the breath is originally derived from the nutriment; for that which is akin to the soul is purer—unless we were to say that the soul itself is a later product than the body, arising when the seeds are sorted out and move towards the development of their nature.

[20] Again, if<sup>2</sup> there is some residue left from all nutriment, by what passage is it ejected in this case? It is not reasonable to suppose that it is by the process of exhalation, for this succeeds immediately to the inhalation. Clearly there remains only the explanation that it is through the ducts of the wind-pipe.

The residue which is secreted from it must be either finer or coarser; in either case there is a grave difficulty, if the breath is assumed to be the purest of all substances. But if it is coarser we shall have to assume that there are certain ducts of larger size.

The assumption that we take in and expel the breath by the same ducts is again [25] strange and unreasonable.

Such then are the questions raised by the theory that the breath is maintained and increased by nutriment.

2 · Aristogenes supposes that the growth of the breath is due to respiration, the air being digested in the lungs; for the breath, he holds, is also a form of nutriment, and is distributed into the various vessels, and the refuse is ejected [30] again.

This theory involves more difficulties, for what can cause this digestion? [481<sup>b</sup>1] Apparently the breath digests itself, as it digests other things; but this is strange intrinsically, unless the breath is different from the external air. If it is different, perhaps the bodily warmth in it may cause digestion.

However, it may be reasonably maintained that the breath<sup>3</sup> is coarser than the [5] outside air, since it is combined with the moisture from the vessels and from the solid parts in general; so that digestion will be a process towards corporeality; but the theory that it is finer is not convincing.

Moreover, the rapidity of its digestion is contrary to reason; for the exhalation follows immediately on the inhalation. What then is the agent which so quickly changes and modifies it? [10]

We must naturally suppose that it is the warmth of the body, and the evidence of sense supports this, for the air when exhaled is warm.

Again, if the substance which is digested is in the lungs and the wind-pipe, the active warmth must also reside there: but the common view is that it is not so, but that the nutriment is evaporated by the motion of the breath.

It is still more astonishing if the breath in process of digestion attracts the warmth to itself or receives it because some other agent sets it in motion; moreover, [15] on this theory it is not in itself the primary moving cause.

Then again, respiration extends as far as the lungs only, as the followers of Aristogenes themselves state; but the natural breath is

distributed throughout the whole body. If it is from the lungs that the breath is distributed to all parts of the body, including those lower than the lungs, how can the process of its digestion be so [20] rapid? This is more remarkable and involves a greater difficulty; for the lungs cannot distribute the air to the lower parts during the actual process of its digestion. And yet to some extent it would seem that this must be the case, if the digestion takes place in the lungs, and the lower parts also are affected by the respiration.

But the conclusion in this case is still more remarkable and important[25]—namely that the digestion is effected, as it were, entirely by transit and contact.

This also is unreasonable, and still more untenable,<sup>4</sup> since it assumes that the same duct is used by the nutriment and the excretions; while if we assume that digestion is effected by any of the other internal parts, the objections already stated will apply: unless we were to assume that excrement is not formed from all [482<sup>a</sup>1] nutriment, nor in all animals, any more than in plants, for we cannot find it in every one of the bodily parts, or even if we do, at least not in all animals.<sup>5</sup>

But according to this view the vessels grow just like the other parts, and as they [5] become broadened and distended, the volume of air which flows in and out is increased: and if there must inevitably be some air contained in them, the actual question which we are now asking,<sup>6</sup> ‘What is the air which naturally exists in them; and how does this increase under healthy conditions?’ will be obvious from the preceding statement.

How is the natural breath nourished and developed in the case of creatures which have not respiration? For in their case the nutriment can no longer come from without. If in the former case it was from forces within, and from the common [10] nutriment of the body, it is reasonable to say that the same is true in their case also, for similar effects come in like manner from the same causes—unless really in the case of these creatures too it is from without, like their perception of smell; but then they must have some process similar to respiration.<sup>7</sup>

Under this head we might raise the question whether such creatures can truly be called non-respiratory—pointing to this argument and also to the way in which [15] they take in nutriment; for we should say that they must draw in some breath at the same time; and we should further urge that they must respire for the sake of refrigeration, which they must require just as other creatures do.

But if in their case the refrigeration takes place through the diaphragm, it is clear that the entry of the air must also be by the same pressure; so that there is some process similar to respiration.

But it cannot be determined how or by what agency the air is drawn in; or if [20] there is a drawing in, how the entry takes place—unless, indeed, it is spontaneous. This is a subject for separate investigation.

But how is the natural breath nourished and increased in the case of creatures that live in the water? Apart from their inability to respire, we say further that air cannot exist in water: so it only remains to say that in their case it is by means of the food: and so either all creatures are not uniform in their methods, or else in the case [25] of the others also it is by means of the food. Such are the three possible theories, of which one must be right. So much, then, as regards the nutrition and growth of the breath.

3 · With regard to respiration, some philosophers—such as Empedocles and Democritus—do not deal with its purpose, but only describe the process; others do [30] not even deal with the process at all, but assume it as obvious. But we ought further to make it quite clear whether its purpose is refrigeration. For if the bodily heat is inherent in the upper parts, it follows that the lower parts would have no need of refrigeration: but as a matter of fact the innate breath pervades the whole body, and its origin is from the lungs.

The inspired breath also is thought to be distributed uniformly over all parts, so that it remains to be proved that this is not the case. [35]

Again, it is strange if the lower parts do not require some motive force and, as it were, some nutriment. And it would no longer be for the sake of refrigeration, if it [482<sup>b</sup>1] does pervade the whole.

Further, the process of the breath's distribution in general is imperceptible, and so is its speed; and again, the matter of its counter-flow, if, as assumed, it is from all parts, is remarkable, unless it flows back from the most remote parts in some different way, while in its proper and primary sense the action takes place [5] from the regions about the heart.

In many instances such a want of symmetry in functions and faculties may be observed.

However, it is at any rate<sup>8</sup> strange if breath is distributed even into the bones—for they say that this is the case, and that it passes there from the air-ducts. Therefore, as I have shown, we must consider the

respiration—its purpose, and the parts which it affects, and how it affects them. Again, nutriment is not carried by [10] the air-ducts to all parts, for instance to the vessels themselves and certain other parts; but nevertheless plants live and receive nourishment.<sup>9</sup> This question belongs rather to a treatise on methods of nutrition.

4 · Whereas there are three motions belonging to the breath in the windpipe—respiration, pulsation, and a third which introduces and assimilates the [15] nutriment—we must define how and where and for what purpose each takes place.

Of these, the motion of the pulse is perceptible by the senses wherever we touch the body. That of the respiration is perceptible up to a certain point, but is recognized in the majority of parts by a reasoning process. That of nutrition is in practically all parts determinable by reasoning, but by sense in so far as it can be [20] observed from its results.

Now clearly the respiration has its motive principle from the inward parts, whether we ought to call this principle a power of the soul, the soul, or some other combination of bodies which through their agency causes this attraction, and the nutritive faculty would seem to be caused by the respiration, for the respiration [25] corresponds to it, and is in reality similar to it. And to discover whether the whole body is not uniform with regard to the time taken by such motion, or whether there is no difference as to its simultaneity, we must consider all the parts.<sup>10</sup>

The pulse is something peculiar and distinct from the other motions and in some respects may be seen to be contingent, assuming that when there is an excess [30] of warmth in a fluid, that fluid which is evaporated must set up a pulsation owing to the air being intercepted in the interior, and pulsation must arise in the originating part and in the earliest stage, since it is inborn in the earliest parts. For it arises firstly and in the greatest degree in the heart, and thence extends to the other parts.<sup>11</sup> Perhaps this must be an inseparable consequence of the essential nature [35] underlying the living creature, which is manifested when the creature is in a condition of activity.

That the pulse has no connexion with the respiration is shown by the following [483a1] indication—whether one breathes quickly or regularly, violently or gently, the pulse remains the same and unchanged, but it becomes irregular and spasmodic owing to certain bodily affections and in consequence of fear, hope, and anguish affecting the soul.

[5] Next we ought to consider whether the pulse occurs also in the arteries and with the same rhythm and regularity. This does not appear to be so in the case of parts widely separated, and, as has been noted, it seems to serve no purpose whatsoever.

For, on the other hand, the respiration and reception of food, whether they are [10] regarded as quite independent or as correlated, clearly exist for a purpose, and admit of rational explanation.

And of the three, we may reasonably say that the pulsatory and respiratory motions are prior to the other, for nutrition assumes their pre-existence. Or is this not so? for respiration begins when the young is separated from the mother; the reception of nutriment, and nutrition, occur both while the embryo is forming and [15] after it is formed; but the pulsation occurs at the earliest stage, as soon as the heart begins to form, as is evident in the case of eggs. So the pulse comes first, and resembles an activity and not an interception of the breath, unless that also can conduce towards its activity.

5 · They say that the breath which is respired is carried into the belly, not [20] through the gullet—that is impossible—but there is a duct along the loins through which the breath is carried by the respiration from the trachea into the belly and out again: and this can be perceived by the sense.

The question of this perception raises a difficulty: for if the windpipe alone has perception, does it perceive by means of the wind which passes through it, or by its [25] bulk or by its bodily constitution? Or if the air comes first below soul, may it perceive by means of this air which is superior and prior in origin?

What then is the soul? They make it out to be a potentiality which is the cause of such a motion as this. Or is it clear that you will not be right in impugning those who say it is the rational and spirited faculty? for they too refer to these as potentialities.

[30] But if the soul resides in this air, the air is at any rate a neutral substance. Surely, if it becomes animate or becomes soul, it suffers some change and alteration, and so naturally moves towards what is akin to it, and like grows by the addition of like. Or is it otherwise? for it may be contended that the air is not the whole of soul but is something which contributes to this potentiality or in this sense makes it,<sup>12</sup> and that which has made it is its principle and foundation.

In the case of non-respiring creatures, where the internal air is not

mixed with [483<sup>b</sup>1] the external<sup>13</sup>—or is this not the case, is it rather mixed in some other way than by respiration?—what is the difference between the air in the air-duct and the outside air? It is reasonable—perhaps inevitable—to suppose that the former surpasses the latter in fineness.

Again, is it warm by its inherent nature or by the influence of something else? [5] For it seems that the inner air is just like the outer, but it is helped by the cooling. But which is really the case? for when outside it is soft, but when enclosed the air becomes breath, being as it were condensed and in some manner distributed through the vessels. Or must it be mixed in some way, when it moves about in the fluids, and among the solid particles of the body? It is not, therefore, the finest of substances, if it is mixed. We may, however, reasonably expect that the substance [10] which is first capable of receiving soul should be the finest, unless, indeed, soul is something such as has been described, i.e. something not pure nor unmixed: and that the air-duct should be capable of receiving the breath, while the sinew is not.

There is this difference too, that the sinew is tensible, but the air-duct is easily broken, just like a vein.

The skin contains veins, sinews, and air-ducts—veins because when pricked it [15] exudes blood, sinews because it is elastic, air-ducts because air is breathed through it—for only an air-duct can admit air.

The veins must have pores in which resides the bodily heat which heats the blood as if in a cauldron; for it is not hot by nature, but is diffused like molten [20] metals. For this reason too the air-duct becomes hardened, and has moisture both in itself and in the coats which surround its hollow passage.

It is also proved both by dissection and by the fact that the veins and air-ducts, [25] which apparently conduct the nutriment, connect with the intestines and the belly. From the veins the nutriment is distributed to the flesh—not sideways from the veins but out at their mouths, as it were through pipes. For fine veins run sideways<sup>14</sup> from the great vein and the windpipe along each rib, and a vein and an air-duct [30] always run side by side.

The sinews and veins form the connexion between the bones, joining them with the centre of the body, and also form the meeting-place between the head and the body, through which fishes receive nutriment and breathe; if they did not respire, they would die immediately on being taken out of the water.



But it is plain even from observations of sense that the veins and air-ducts [484<sup>a</sup>1] connect with each other; but this would not occur if the moisture did not require breath and the breath moisture,—because there is warmth both in sinew, in air-duct, and in vein, and that which is in the sinew is hottest and most similar to [5] that of the veins. Now the heat seems unsuited to the space where the breath is located, especially with a view to refrigeration: but if the animal produces and as it were re-kindles the heat by heat from without, then there may well be heat there. Besides this, permanence is in a sense natural to all things which have warmth, [10] provided that nothing resists or cools it;<sup>15</sup> for that all things require refrigeration is practically proved by the fact that the blood retains its heat in the veins and as it were shelters it there; so when the blood has flowed out it loses its heat, and the creature dies, through the liver having no air-duct.

6 · Does the seed pass through the air-duct? Is its passage due also to [15] pressure, and does this take place only in process of emission? Through this we have evidence of the transformation of the blood into flesh—through the fact that the sinews are nourished from the bones; for they join the bones together. Or is this not true? For sinew is found in the heart, and sinews are attached to the bones: but those in the heart do not connect with anything else, but they end in the flesh. Or does this [20] amount to nothing, and would those which connect the bones be nourished from the bones? But we might say, that rather the bones themselves get their nutriment from the sinew. For this too is strange—since the bone is dry by nature and has no ducts for fluid;<sup>16</sup> while the nutriment is fluid. But we must consider first, if the nutriment of the sinews is from the bones, what is the nutriment of the bone. Do the ducts [25] carry it both from the veins and from the air-duct into the bone itself? In many parts these ducts are visible, particularly those leading to the spine, and those leading from the bones are continuous, e.g. in the case of the ribs; but how do we suppose that these ducts lead from the belly, and how does the drawing of the nutriment take place?

Surely most bones are without cartilage like the spine, in no way adapted to [30] motion. Or are they designed to form connexions? And similarly, if bone is nourished from sinew, we must know the means by which sinew is nourished. We say that it is from the fluid surrounding the sinew, which is of a glutinous nature: but we must determine whence and how this arises. To say that the flesh is nourished from vein and air-duct,

on the ground that blood comes from any point [35] where you prick it, is false in the case of the other animals, e.g. birds, snakes, and fishes, and oviparous creatures in general. The universal dispersion of the blood is a peculiarity of creatures with a large blood-supply: for e.g. even when a small bird's breast is cut, not blood but serum flows.

Empedocles says that nail is formed from sinew by a hardening process. Is the [484<sup>b</sup>1] same true of skin in relation to flesh?

But how can hard and soft-shelled creatures get their nutriment from outside? On the contrary it seems that they get it from inside rather than out. Again, how and by what course does the passage of foods from the belly take place, and again [5] their return into the form of flesh, unaccountable as it is? For this process seems extraordinary and absolutely impossible.

Do different things, then, have different nutriment, not all things being nourished by the blood except indirectly?

7 · We must then consider the nature of bone, whether it exists with a view to motion or to support, or covering and surrounding, and further, whether some bones [10] are as it were originators of motion, like the axis of the universe.

By motion I mean, e.g. that of the foot, the hand, the leg, or the elbow, both the bending motion and motion from place to place—for the latter cannot take place either without the bending, and usually the supporting functions belong to these same bones. And by covering and surrounding I mean as e.g. the bones in the head [15] surround the brain; and those who make the marrow the originator of motion treat the bones as primarily meant to protect it. The ribs are for the purpose of locking together; the originator of motion, itself immovable, is the spine, from which spring the ribs for the purpose of locking the body together: for there must be something of this kind, since everything that is in motion depends on something that is in a state of rest.

At the same time a final cause must exist—under which head some class the [20] originator of motion; i.e. the spinal marrow and the brain.

Besides these there are others which are at a joining<sup>17</sup> and whose purpose is locking together, e.g. the collar-bone, which perhaps is named the 'key-bone' from its functions. Every one is well adapted for its purpose, for there could be no flexion either of whole or parts, if the parts were not such as they are: e.g. the spine, foot, [25] and elbow: for the bending of the elbow must be inwards to serve our purpose. Similarly, the

bending of the foot and the other parts must be such as it is. All exist for a purpose, and so do the smaller bones contained in these larger ones—e.g. the radius in the fore-arm to enable us to twist the fore-arm and the hand; for we should not be able to turn the palm down or up nor lift nor bend the feet if there were not [30] the two radii which are used in these motions. Similarly we must investigate the other details, e.g. whether the motion of the neck is due to only one bone or more. Also we must examine all that are for the purpose of gripping or knitting together, e.g. the patella over the knee; and why other parts have no such bone.

Now all parts which are capable of motion are connected with sinews—and [35] perhaps those concerned with action in a positive way are especially so—thus we find sinews in the elbow, the legs, the hands, and the feet; the other sinews are for the purpose of fastening together all those bones which require fastening; for perhaps some, e.g. the spine, have little or no function except that of bending,<sup>18</sup> for the substance which connects the vertebrae is a serum or mucous fluid; others are [485a1] bound together by sinews—thus we find sinews in the joints of the limbs.

8 · The best description of everything may be obtained by an investigation like the present; but we must adequately investigate the final causes. We must not [5] suppose that the bones are for the sake of movement; that is rather the purpose of the sinews or what corresponds to them, viz. the immediate receptacle of the breath which causes motion, since even the belly moves and the heart has sinews—but only some, not all parts have bones: every part must have sinews appropriate for [10] performing such motion or for . . . <sup>19</sup> For the octopus walks little and walks badly. We must take as a starting-point the fact that all animals have different organs for different purposes with a view to the peculiar motion of each, e.g. terrestrial animals have feet—those that are upright having two; others which move altogether upon the earth, the material of whose bodies is more earthy and colder, have several.

[15] Some creatures again may be entirely without feet, for it is possible for them under these conditions to be moved only by external force. Similarly, flying creatures have wings, and their shape is appropriate to their nature. The parts differ in proportion as they are to fly faster or slower. They have feet for the purpose of seeking food and to enable them to stand; bats are an exception; as they cannot use [20] their

feet, they get their food in the air, and do not need to rest for the purpose; for they certainly do not need to do so for any other reason.

The hard-shelled aquatic animals have feet on account of their weight; thus they are enabled to move from place to place: all that concerns their other needs is as ordered by the individual requirements of each, even if the principle is not [25] clear—e.g. why many-footed creatures are the slowest, and yet quadrupeds are swifter than bipeds. Is it because the whole of their body is on the ground or because they are naturally cold and hard to move, or for some other reason?

9 · We cannot agree with those who say that it is not the heat-principle which is active in bodies, or that fire has only one kind of motion and one [30] power—the power to cleave. For in the case of inanimate things the action of fire is not universally<sup>20</sup> the same on all—some it condenses, others it rarefies; some it dissolves, others it hardens; and so we must suppose that in the case of animate creatures the same results are found, and we must investigate the fire of nature by comparing her processes to those of an art; for different results are achieved by fire [35] in the work of the goldsmith, the coppersmith, the carpenter, and the cook—though, perhaps, it is truer to say that the arts themselves achieve these different results, for [485<sup>b</sup>1] that by using fire as an instrument they soften, liquefy, and desiccate substances, and some they temper.

Individual natures work in the same way, and so they differ one from another; so that it is ridiculous to judge by externals; for whether we regard the heat as [5] separating or refining, or whatever the effect of warming or burning is, the results will be different according to the different natures of the agencies which employ it. But while the crafts use the fire merely as an instrument, nature uses it as a material as well.

Certainly no difficulty is involved in this; but rather it is remarkable that nature, who employs the instrument, is herself an intelligent agent, who will assign to objects their proper symmetry together with the visible effects of her action: for [10] this is no longer a function either of fire or of breath, so it is remarkable that we should find such a faculty combined with these two bodies. Again, with regard to soul we find the same cause of wonder, for it must be assumed in the functions of these two, and therefore there is some sense in referring to the same agent—either generally or to some particular creative part—the fact that its motion always operates<sup>21</sup> in the same way; for nature, from which they are

generated, is always [15] constant. But now what variation can there be in individual heat, whether we regard it as an instrument or material, or both? The variations in fire are simply quantitative; but this is practically a question of whether it is mixed with other substances or unmixed, for the purer substance has the proper qualities of its kind in a higher degree.

The same statement applies in the case of all other simple things; for whereas [20] there is a difference between the bone and flesh of a horse and those of an ox,<sup>22</sup> this must be the case either because they are produced from different materials, or because the materials are used differently. Now if they are different, what are the distinctive characteristics of each of the simple things and what is . . . ?<sup>23</sup> for it is these that we are seeking.

But if they are the same in nature, they may be different in their proportions: for one or the other must be the case—as holds good with other things—for the consistencies of wine and honey are different on account of the difference of [25] substance; difference in wine itself, if there is any, is a matter of proportion.

And so Empedocles stated the nature of bone too simply;<sup>24</sup> for,<sup>25</sup> on the supposition that all bones follow the same proportion in the mixture of elements, the bones of a lion, a horse, and a man ought to be indistinguishable; whereas they actually differ in hardness and softness, density, and other qualities. Similarly with [30] the flesh and other parts of the body.

Further, the various parts in the same creature differ in density and rarity, and in other qualities, so that the blending of their constituents cannot be identical; for, granted that coarseness and fineness, greatness and smallness are quantitative differences, hardness, density, and the opposites certainly depend on the qualitative nature of the mixing. But those who give this account of it must know how the creature element can vary, by excess or deficiency, by being in isolation or in [486<sup>a</sup>1] combination or heated in something else, like food that is boiled or baked,—which last is perhaps the true explanation; for in the process of mixing it produces the effect designed by nature.

So I suppose we must give the same account of flesh; for the variations are the [486<sup>b</sup>1] same; and practically the same observations apply to the veins and air-ducts and the rest; so that, in conclusion, either the proportion observed in their mixture is not constant, or the definitions must not be stated in terms of hardness, density, and their opposites.

<sup>1</sup>Reading τὸ περιέχον.

<sup>2</sup>Reading εἰ τε.

<sup>3</sup>Reading αὐτό (and ὃν in line 6).

<sup>4</sup>Reading λογοδεέστερον.

<sup>5</sup>Retaining οὐτι γε.

<sup>6</sup>Reading αὐτὸ ὃ ζητεῖται.

<sup>7</sup>Reading οὕτως γε.

<sup>8</sup>Reading γοῦν.

<sup>9</sup>Omitting ὥσπερ.

<sup>10</sup>Omitting the comma after μή (line 26) and the full stop after κίνησιν (line 28).

<sup>11</sup>Jaeger excises this sentence.

<sup>12</sup>Reading ἀήρ, ἥ οὕτω ταύτην.

<sup>13</sup>Placing ἥ οὐ...μειγνύμενος in parentheses.

<sup>14</sup>Omitting φλεβῶν.

<sup>15</sup>Reading σύμφυτόν πως...καταψύχντος· ὅτι.

<sup>16</sup>Reading ἡροῦ.

<sup>17</sup>Reading ἐπὶ συναφῆς.

<sup>18</sup>Reading ἀλλ' ἥ κάμψις.

<sup>19</sup>Jaeger marks a lacuna here.

<sup>20</sup>Reading ὅλως.

<sup>21</sup>Retaining ἐνέργειαν.

<sup>22</sup>Reading ἡ ὑπὸ τοῦ καὶ ἡ βοός.

<sup>23</sup>Jaeger marks a lacuna here.

<sup>24</sup>Reading λίαν ἀπλῶς.



# HISTORY OF ANIMALS\*\*

*d'A. W. Thompson*

## BOOK I

[486<sup>a</sup>5] **1** · Of the parts of animals some are simple: to wit, all such as divide into parts uniform with themselves, as flesh into flesh; others are composite, such as divide into parts not uniform with themselves, as, for instance, the hand does not divide into hands nor the face into faces.

[10] And of such as these, some are called not parts merely, but members. Such are those parts that, while entire in themselves, have within themselves other parts: as, for instance, the head, foot, hand, the arm as a whole, the chest; for these are all in themselves entire parts, and there are other parts belonging to them.

All those parts that do not subdivide into parts uniform with themselves are composed of parts that do so subdivide, for instance, hand is composed of flesh, sinews, and bones.

[15] Of animals, some resemble one another in all their parts, while others have parts wherein they differ. Sometimes the parts are identical in form, as, for instance, one man's nose or eye resembles another man's nose or eye, flesh flesh, and bone bone; and in like manner with a horse, and with all other animals which we [20] reckon to be of one and the same species; for as the whole is to the whole, so each to each are the parts severally. In other cases the parts are identical, save only for a difference in the way of excess or defect, as is the case in such animals as are of one and the same genus. By 'genus' I mean, for instance, Bird or Fish; for each of these is subject to difference in respect of its genus, and there are many species of fishes and of birds.

[486<sup>b</sup>5] Among them, most of the parts as a rule exhibit differences through contrariety of properties, such as colour and shape, in that some are more and some in a less degree the subject of the same property; and



also in the way of multitude or fewness, magnitude or smallness, in short in the way of excess or defect. Thus in [10] some the texture of the flesh is soft, in others firm; some have a long bill, others a short one; some have abundance of feathers, others have only a small quantity. It happens further that, even in the cases we are considering, some have parts that others have not: for instance, some have spurs and others not, some have crests and others not; but as a general rule, most parts and those that go to make up the bulk of the body are either identical with one another, or differ from one another in the way [15] of contrariety and of excess and defect. For the more and the less may be represented as excess and defect.

There are some animals whose parts are neither identical in form nor differing in the way of excess or defect; but they are the same only in the way of analogy, as, for instance, bone is only analogous to fish-bone, nail to hoof, hand to claw, and [20] scale to feather; for what the feather is in a bird, the scale is in a fish.

The parts, then, which animals severally possess are diverse from, or identical with, one another in the fashion above described. And they are so furthermore in the way of local disposition; for many animals have identical parts that differ in position; for instance, some have teats in the breast, others close to the thighs. [487<sup>a</sup>1]

Of the substances that are composed of parts uniform with themselves, some are soft and moist, others are dry and solid. The moist are such either absolutely or so long as they are in their natural conditions, as, for instance, blood, serum, lard, suet, marrow, sperm, gall, milk in such as have it, flesh and the like; and also, in a different way, the waste products, as phlegm and the excretions of the belly and the [5] bladder. The dry and solid are such as sinew, skin, vein, hair, bone, gristle, nail, horn (a term which as applied to the part involves an ambiguity, when the whole also by virtue of its form is designated horn),<sup>1</sup> and such parts as present an analogy to these. [10]

Animals differ from one another in their modes of subsistence, in their actions, in their habits, and in their parts. Concerning these differences we shall first speak in broad and general terms, and subsequently we shall treat of the same with close reference to each particular genus.

Differences are manifested in modes of subsistence, in habits, and in actions as follows: some animals live in water and others on land. And of those that live in [15] water some do so in one way, and some in another: that is to say, some live and feed in the water, take in and emit water, and cannot live if deprived of water, as is the case with the great majority

of fishes; others get their food and spend their days in [20] the water, but do not take in water but air, nor do they bring forth in the water. Many of these creatures are furnished with feet, as the otter, the beaver, and the crocodile; some are furnished with wings, as the diver and the grebe; some are destitute of feet, as the water-snake. Some creatures get their living in the water and cannot exist outside it: but for all that do not take in either air or water, as, for [25] instance, the sea-anemone and the oyster. And of creatures that live in the water some live in the sea, some in rivers, some in lakes, and some in marshes, as the frog and the newt.

Of animals that live on land some take in air and emit it, which phenomena are termed 'inhalation' and 'exhalation'; as, for instance, man and all such land animals [30] as are furnished with lungs. Others, again, do not inhale air, yet live and find their sustenance on dry land; as, for instance, the wasp, the bee, and all other insects. And by insects I mean such creatures as have notches on their bodies, either on their bellies or on both backs and bellies.

[487<sup>b</sup>1] And of land animals many, as has been said, derive their subsistence from the water; but of creatures that live in and inhale water none derives its subsistence from the land.

Some animals at first live in water, and by and by change their shape and live [5] out of water, as is the case with river worms—for out of these the gadfly develops.<sup>2</sup>

Furthermore, some animals are stationary, and some move about. Stationary animals are found in water, but no such creature is found on land. In the water are many creatures that live in close adhesion to an external object, as is the case with [10] several kinds of shellfish. (The sponge actually appears to be endowed with a certain sensibility: as a sign of which it is alleged that the difficulty in detaching it is increased if the movement is not covertly applied.)

Other creatures adhere at one time to an object and detach themselves from it at other times, as is the case with a species of the so-called sea-anemone; for some of these creatures seek their food in the night-time loose and unattached.

Many creatures are unattached but motionless, as is the case with oysters and [15] the so-called holothuria. Some can swim, as, for instance, fishes, molluscs, and crustaceans, such as the crayfish. But some move by walking, as the crab, for it is the nature of the creature, though it lives in water, to move by walking.

Of land animals some are furnished with wings, such as birds and

bees, and these are so furnished in different ways one from another; others are furnished with [20] feet. Of the animals that are furnished with feet some walk, some creep, and some wriggle. But no creature is able only to move by flying, as the fish is able only to swim; for the animals with leathern wings can walk, the bat has feet, and the seal has imperfect feet.

Some birds have feet of little power, and are therefore called *apodes*.<sup>3</sup> This [25] little bird is powerful on the wing; and, as a rule, birds that resemble it are weak-footed and strong-winged, such as the swallow and the swift; for all these birds resemble one another in their habits and in their wings and look like one another. (The *apous* is to be seen at all seasons, but the swift only after rainy [30] weather in summer; for this is the time when it is seen and captured, though, as a general rule, it is a rare bird.)

Again, many animals move by walking as well as by swimming.

Furthermore, the following differences are manifest in their modes of living and in their actions. Some are gregarious, some are solitary, whether they be [488a1] furnished with feet or wings or be fitted for a life in the water; and some partake of both characters. And of the gregarious, some are social, others independent.

Gregarious creatures are, among birds, such as the pigeon, the crane, and the swan (no bird furnished with crooked talons is gregarious). Of creatures that live in [5] water many kinds of fishes are gregarious, such as the so-called migrants, the tunny, the pelamys, and the bonito.

Man partakes of both characters.

Social creatures are such as have some one common object in view; and this property is not common to all creatures that are gregarious. Such social creatures are man, the bee, the wasp, the ant, and the crane. [10]

Again, of these social creatures some submit to a ruler, others are subject to no rule: as, for instance, the crane and the several sorts of bee submit to a ruler, whereas ants and numerous other creatures are subject to no rule.

And again, both of gregarious and of solitary animals, some are attached to a fixed home and others are nomadic.

Also, some are carnivorous, some graminivorous, some omnivorous: whilst [15] some feed on a peculiar diet, as for instance the bees and the spiders (for the bee lives on honey and certain other sweets, and the spider lives by catching flies); and some creatures live on fish. Again, some creatures catch their food, others treasure it up, whereas others do

not.

Some creatures provide themselves with a dwelling, others go without one: of [20] the former kind are the mole, the mouse, the ant, the bee; of the latter kind are many insects and quadrupeds. Further, in respect to locality of dwelling-place, some creatures dwell under ground, as the lizard and the snake; others live on the surface of the ground, as the horse and the dog. Some make themselves holes, others do not do so.<sup>4</sup>

Some are nocturnal, as the owl and the bat; others live in the daylight. [25]

Moreover, some creatures are tame and some are wild: some are at all times tame, as the jennet and the mule; others are at all times wild, as the leopard and the wolf; and some creatures can be rapidly tamed, as the elephant.

Again, we may regard animals in another light. For, whenever a race of animals is found domesticated, the same is always to be found in a wild condition; as we find to be the case with horses, cattle, pigs, donkeys,<sup>5</sup> sheep, goats, and dogs. [30]

Further, some animals emit sound while others are mute, and some are endowed with voice: of these latter some have articulate speech, while others are inarticulate; some are noisy, some are prone to silence; some are musical, and some unmusical; but all animals without exception exercise their power of singing or chattering chiefly in connexion with the intercourse of the sexes. [488<sup>b</sup>1]

Again, some creatures live in the fields, as the cushat; some on the mountains, as the hoopoe; some frequent the abodes of men, as the pigeon.

Some, again, are peculiarly salacious, as the partridge and the cockerel; others are inclined to chastity, as the whole tribe of crows, for birds of this kind indulge but [5] rarely in sexual intercourse.

Of marine animals, again, some live in the open seas, some near the shore, some on rocks.

Furthermore, some are combative, others defensive. Of the former kind are such as act as aggressors upon others or retaliate when subjected to ill usage, and of the latter kind are such as have some means of guarding themselves against [10] attack.

Animals also differ from one another in regard to character in the following respects. Some are good-tempered, sluggish, and not prone to ferocity, as the ox; [15] others are quick-tempered, ferocious and unteachable, as the wild boar; some are intelligent and timid, as the stag

and the hare;<sup>6</sup> others are mean and treacherous, as the snake; others are free and courageous and high-bred, as the lion; others are thorough-bred and wild and treacherous, as the wolf. (An animal is high-bred if it come from a good stock, and an animal is thorough-bred if it does not deflect from its natural characteristics.)

[20] Further, some are crafty and mischievous, as the fox; some are spirited and affectionate and fawning, as the dog; others are easy-tempered and easily domesticated, as the elephant; others are cautious and watchful, as the goose; others are jealous and self-conceited, as the peacock. But of all animals man alone is capable of deliberation.

[25] Many animals have memory, and are capable of instruction; but no other creature except man can recall the past at will.

With regard to the several genera of animals, particulars as to their characters and ways of life will be discussed more precisely later on.

2 · Common to all animals are the parts by which and the parts into which [30] they take food; and these are either identical with one another, or are diverse in the ways above specified: to wit, either identical in form, or varying in respect of excess or defect, or resembling one another analogically, or differing in position.

Furthermore, the great majority of animals have other parts besides these in common, whereby they discharge the residuum of their food—but this is not true of [489<sup>a</sup>1] all. The part by which food is taken in is called the mouth, and the part into which it is taken, the belly; the remainder has a great variety of names.

Now the residuum of food is twofold in kind and such creatures as have parts receptive of wet residuum are found with parts receptive of dry residuum too; but [5] such as have the latter do not all have the former. That is why an animal has a belly if it has a bladder; but those that have a belly do not all have a bladder. For the part receptive of wet residuum is termed ‘bladder’, and that of dry residuum ‘belly’.

3 · Of the rest, a great many have, besides the parts above-mentioned, a part [10] for the emission of the sperm; and of animals capable of generation one emits into another, and the other into itself. The latter is termed ‘female’, and the former ‘male’; but some animals have neither male nor female. Consequently, the parts connected with this function differ in form; for some animals have a womb and others an

organ analogous thereto.

The above-mentioned parts, then, are the most indispensable for animals; and [15] with some of them all animals, and with others animals for the most part, are provided.

One sense, and one alone, is common to all animals—the sense of touch. Consequently, there is no special name for the part in which it has its seat; for in some groups of animals it is identical, in others it is analogous.

4 · Every animal is supplied with moisture, and if the animal be deprived of [20] the same by natural causes or by violence, death ensues; further, every animal has another part in which the moisture is contained. These parts are blood and vein, and in other animals there is something to correspond; but in these latter the parts are imperfect, being fibre and serum.

Touch has its seat in a part uniform with itself as in the flesh or something of the kind, and generally, with animals supplied with blood, in the parts charged with [25] blood. In other animals it has its seat in parts analogous to the parts charged with blood; but in all cases it is seated in parts that are uniform with themselves.

The active faculties, on the contrary, are seated in the parts that are not uniform: as, for instance, the business of preparing the food is seated in the mouth, and the office of locomotion in the feet, the wings, or in organs to correspond.

Again, some animals are supplied with blood, as man, the horse, and all [30] such animals as are, when full-grown, either destitute of feet, or two-footed, or four-footed; other animals are bloodless, such as the bee and the wasp, and, of marine animals, the cuttle-fish, the crayfish, and all such animals as have more than four feet.

5 · Again, some animals are viviparous, others oviparous, other vermiparous. Some are viviparous, such as man, the horse, the seal, and all other animals that are [489<sup>b</sup>1] hair-coated, and, of marine animals, the cetaceans, as the dolphin, and the so-called selachia. (Of these latter animals, some have a tubular air-passage and no gills, as the dolphin and the whale: the dolphin with the air-passage going through its back, [5] the whale with the air-passage in its forehead; others have uncovered gills, as the selachia, the sharks and rays.)

What we term an egg is a certain completed result of conception out of which the animal that is to be develops—from a part of it at first, while the rest serves for food as it develops. A grub on the other hand is a thing out of which in its entirety the animal in its entirety develops, by differentiation and growth of the embryo. [10]

Of viviparous animals, some hatch eggs in their own interior, as the selachia; others engender in their interior, as man and the horse. When the result of conception is perfected, with some animals a living creature is brought forth, with others an egg is brought to light, with others a grub. Of the eggs, some have egg-shells and are of two different colours, such as birds' eggs; others are [15] soft-skinned and of uniform colour, as the eggs of the selachia. Of the grubs, some are from the first capable of movement, others are motionless. However, with regard to these phenomena we must speak precisely hereafter when we come to treat of generation.

Furthermore, some animals have feet and some do not. Of such as have feet, some animals have two, as is the case with men and birds only; some have four, as [20] the lizard and the dog; some have more, as the centipede and the bee; but all have an even number of feet.

Of swimming creatures that are destitute of feet, some have fins, as fishes; and of these some have four fins, two above on the back, two below on the belly, as the [25] gilt-head and the basse; some have two only,—to wit, such as are exceedingly long and smooth, as the eel and the conger; some have none at all, as the muraena and others that use the sea just as snakes use dry ground—and snakes swim in water in [30] just the same way. Of the selachia some have no fins, such as those that are flat and long-tailed, as the ray and the sting-ray, but these fishes swim actually by means of their flat bodies; the fishing-frog however, has fins, and so likewise have all such fishes as have not their flat surfaces thinned off to a sharp edge.

Of those swimming creatures that appear to have feet, as is the case with the molluscs, these creatures swim by the aid of their feet and their fins as well, and they swim most rapidly backwards in the direction of the trunk, as is the case with [490<sup>a</sup>1] the cuttle-fish and the calamary; but neither of these latter can walk as the octopus can.

The hard-skinned animals, like the crayfish, swim by their tail-parts; and they swim most rapidly tail foremost, by the aid of the fins developed upon that member. The newt swims by means of its feet and tail; and its tail resembles that of the [5] sheat-fish, to compare little with great.

Of animals that can fly some are furnished with feathered wings, as the eagle and the hawk; some are furnished with membranous wings, as the bee and the cockchafer; others are furnished with leathern wings, as the flying fox and the bat. Those possessed of blood have feathered wings or leathern wings; the bloodless [10] creatures have membranous wings, as insects. The creatures that have feathered wings or leathern wings all have either two feet or no feet at all:<sup>7</sup> for there are said to be certain flying serpents in Ethiopia of this sort.

Creatures that have feathered wings are classed as a genus under the name of 'bird'; the other two genera have no single name.

Of creatures that can fly and are bloodless some are coleopterous; for they [15] have their wings in a sheath or shard, like the cockchafer and the dung beetle; others are sheathless, and of these latter some are dipterous and some tetrapterous: tetrapterous, such as are large or have their stings in the tail, dipterous, such as are small or have their stings in front. The coleoptera are, without exception, devoid of [20] stings; the diptera have the sting in front, as the fly, the horsefly, the gadfly, and the gnat.

Bloodless animals are all inferior in point of size to blooded animals; but there are found in the sea some few bloodless creatures of larger size, as in the case of certain molluscs. And of these bloodless genera, those are the largest that dwell in [25] milder climates, and those that inhabit the sea are larger than those living on dry land or in fresh water.

All creatures that are capable of motion move with four or more points of motion; the blooded animals with four only: as, for instance, man with two hands and two feet, birds with two wings and two feet, quadrupeds and fishes severally [30] with four feet and four fins. Creatures that have two fins, or that have none at all like serpents, move all the same with four points of motion; for they have four joints, or two plus their fins. Bloodless many-footed animals, whether furnished with wings or feet, move with more than four points of motion; as, for instance, the dayfly moves with four feet and four wings—for this creature is exceptional not only in [490<sup>b</sup>1] regard to the duration of its existence, whence it receives its name, but also because though a quadruped it has wings also.

All animals move alike, four-footed and many-footed; they all move cross-corner-wise. And animals in general have two feet in advance; the crab alone has [5] four.



6 · Very extensive genera of animals, into which other subdivisions fall, are the following: one, of birds; one, of fishes; and another, of cetaceans. Now all these creatures are blooded.

There is another genus of the hard-shell kind, which is called the shell-fish; [10] another of the soft-shell kind, not designated by a single term, such as the crayfish and the various kinds of crabs and lobsters; and another of molluscs, as the two kinds of calamary and the cuttle-fish; that of insects is different. All these are bloodless, and such of them as have feet have a large number of them; and of the [15] insects some have wings as well as feet.

Of the other animals the genera are not extensive. For in them one species does not comprehend many species; but in one case, as man, the species is simple, admitting of no differentiation, while other cases admit of differentiation, but the species lack particular designations.

So, for instance, creatures that are quadrupedal and unprovided with wings [20] are blooded without exception, but some of them are viviparous, and some oviparous. Such as are viviparous are hair-coated, and such as are oviparous have a horny tessellation—the tessellation holds the place of scales.

An animal that is blooded and terrestrial, but is naturally unprovided with feet, belongs to the serpent genus; and animals of this genus possess tessellation. Serpents in general are oviparous; the adder alone is viviparous; for not all [25] viviparous animals are hair-coated, and some fishes also are viviparous.

All animals, however, that are hair-coated are viviparous. For one must regard as a kind of hair such prickly hairs as hedgehogs and porcupines carry; for these spines perform the office of hair, and not of feet as is the case with similar parts in [30] sea-urchins.

In the genus that combines all viviparous quadrupeds are many species, but under no common appellation. They are only named as it were one by one, as man is—e.g. the lion, the stag, the horse, the dog, and so on; though there is actually<sup>8</sup> a single genus in the case of the so-called bushy-tailed animals, such as the horse, the [491<sup>a</sup>1] ass, the mule, the jennet, and the animals that are called mules in Syria,—from their resembling mules, though they are not strictly of the same species, for they mate with and breed from one another.

For all these reasons, we must take animals species by species, and discuss [5] their peculiarities severally.

These preceding statements, then, have been put forward thus in a

general way, as a kind of foretaste of the number of subjects and of the properties that we have to consider in order that we may first get a clear notion of their actual differences and common properties. By and by we shall discuss these matters with [10] greater accuracy.

After this we shall pass on to the discussion of causes. For to do this when the investigation of the details is complete is the natural method; for from them the subjects and the premisses of our proof become clear.

In the first place we must look to the constituent parts of animals. For it is [15] relative to these parts, first and foremost, that animals in their entirety differ from one another: either in the fact that some have this or that, while they have not that or this; or by peculiarities of position or of arrangement; or by the differences that have been previously mentioned, depending upon form, on excess, on analogy, or on contrariety of qualities.

To begin with, we must take into consideration the parts of man. For, just as [20] any group tests coinage against that with which it is most familiar, so must we do in other matters. And, of course, man is the animal with which we are the most familiar.

Now the parts are obvious enough to perception. However, with the view of observing due order and sequence and of combining reason with perception, we [25] shall proceed to enumerate the parts: firstly, the organic, and afterwards the uniform.

7 · The chief parts into which the body as a whole is divided, are the head, the neck, the thorax, two arms and two legs.

[30] Of the parts of which the head is composed the hair-covered portion is called the skull. The front portion of it is termed the sinciput, developed after birth—for it is the last of all the bones in the body to acquire solidity,—the hinder part is termed the occiput, and the part intervening between the sinciput and the occiput is the crown. The brain lies underneath the sinciput; the occiput is hollow. The skull [491<sup>b</sup>1] consists entirely of thin bone, rounded in shape, and contained within a wrapper of fleshless skin.

The skull has sutures: one, of circular form, in the case of women; in the case of men, as a general rule, three meeting at a point. Instances have been seen of a man's [5] skull devoid of suture altogether. In the skull the middle line, where the hair parts, is called the crown. In some cases the parting is double; that is to say, some men are double-crowned, not in regard to the bony skull, but in consequence of the parting of the

hair.

8 · The part that lies below the skull is called the face: but in the case of man [10] only, for the term is not applied to a fish or to an ox. In the face the part below the sinciput and between the eyes is termed the forehead. When men have large foreheads, they are slow; when they have small ones, they are quickly moved; when they have broad ones, they are apt to be distraught; when they have foreheads rounded, they are quick-tempered.<sup>9</sup>

9 · Underneath the forehead are two eyebrows. Straight eyebrows are a sign [15] of softness of disposition; such as curve in towards the nose, of harshness; such as curve out towards the temples, of humour and dissimulation.

Under the eyebrows come the eyes. These are naturally two in number. Each of them has an upper and a lower eyelid, and the hairs on the edges of these are termed eyelashes. The inner part of the eye includes the moist part whereby vision is [20] effected, termed the pupil, and the part surrounding it called the iris; the part outside this is the white. A part common to the upper and lower eyelid is a pair of nicks, one in the direction of the nose, and the other in the direction of the temples. When these are long they are a sign of bad disposition; if the side toward the nostril be fleshy, as in the case of kites,<sup>10</sup> they are a sign of dishonesty. [25]

All the other animals are provided with eyes, excepting the ostracoderms and other imperfect creatures; at all events, all viviparous animals have eyes, with the exception of the mole. And yet one might assert that, though the mole has not eyes in the full sense, yet it has eyes in a kind of way. For in point of fact it cannot see, [30] and has no eyes visible externally; but when the outer skin is removed, it is found to have the place where eyes are usually situated, and the black parts of the eyes rightly situated, and all the place that is usually devoted on the outside to eyes: showing that the parts are stunted in development, and the skin allowed to grow over.

10 · Of the eye the white is pretty much the same in all creatures; but what is called the iris differs. In some it is black, in some distinctly blue, in some [492<sup>a</sup>1] greyish-blue, in some greenish; and this last colour

is the sign of an excellent disposition, and is particularly well adapted for sharpness of vision.

Man is the only, or nearly the only, creature, that has eyes of diverse colours. [5] The others have eyes of one colour only. Some horses have blue eyes.

Of eyes, some are large, some small, some medium-sized; of these, the medium-sized are the best. Moreover, eyes sometimes protrude, sometimes recede, sometimes are neither protruding nor receding. Of these, the receding eye is in all animals the most acute; but the last kind are the sign of the best disposition. Again, [10] eyes are sometimes inclined to blink, sometimes to stare, and sometimes neither. The last kind are the sign of the best nature, and of the others, the latter kind indicates impudence, and the former indecision.

**11** · Furthermore, there is a portion of the head, whereby an animal hears, a part incapable of breathing, the ear. For Alcmaeon is mistaken when he says that goats inspire through their ears. Of the ear one part is unnamed, the other part is [15] called the lobe; and it is entirely composed of gristle and flesh. The ear is constructed internally like the trumpet-shell, and the innermost-bone is like the ear itself, and into it at the end the sound makes its way, as into a jar. This does not communicate by any passage with the brain, but does so with the palate, and a vein [20] extends from the brain towards it. The eyes also are connected with the brain, and each of them lies at the end of a little vein.<sup>11</sup> Of animals possessed of ears man is the only one that cannot move this part. Of creatures possessed of hearing, some have [25] ears, whilst others have none, but merely have the passages for ears visible, as, for example, feathered animals or animals with horny tessellation.

Viviparous animals, with the exception of the seal, the dolphin, and those others which after a similar fashion to these are cetaceans, are all provided with ears; [for the shark-kind are also viviparous. But man alone does not move his ears. [30] Now, the seal has the passages visible whereby it hears; but the dolphin can hear, but has no ears. All other animals can move them.]<sup>12</sup> And the ears lie on the same circumference as the eyes, and not in a plane above them as is the case with some quadrupeds. Of ears, some are smooth, some are shaggy, and some are of medium texture; the last kind are best for hearing, but they serve in no way to indicate [492<sup>b</sup>1] character. Some ears are large, some small, some medium-sized; again, some stand out far, some not at all, and some take

up a medium position; of these the medium sort are indications of the best disposition, while the large and outstanding ones indicate a tendency to irrelevant talk or chattering. The part between the eye, the ear, and the crown is termed the temple.

[5] Again, there is a part of the countenance that serves as a passage for the breath, the nose. For a man inhales and exhales by this organ, and sneezing is effected by its means—this is an outward rush of collected breath, and is the only mode of breath used as an omen and regarded as supernatural. Both inhalation and exhalation go right on towards the chest; and with the nostrils alone and separately [10] it is impossible to inhale or exhale, owing to the fact that the inspiration and respiration take place from the chest along the windpipe, and not by any portion connected with the head; and indeed it is possible for a creature to live without using its nose.

Again, smelling takes place by means of the nose—that is, perception of odour. [15] And the nostril admits of easy motion, and is not, like the ear, intrinsically immovable. A part of it, composed of gristle, constitutes a septum, and part is an open passage; for the nostril consists of two separate channels. The nostril of the elephant is long and strong, and the animal uses it like a hand; for by means of this organ it draws objects towards it, and takes hold of them, and introduces its food [20] into its mouth, whether liquid or dry food, and it is the only living creature that does so.

Furthermore, there are two jaws; the front part of them constitutes the chin, and the hinder part the cheek. All the animals move the lower jaw, with the exception of the river-crocodile; this creature moves the upper jaw only.

[25] Next after the nose come two lips, composed of flesh, and facile of motion. The mouth lies inside the jaws and lips. Parts of the mouth are the roof and the pharynx.

The part that is sensible of taste is the tongue. The sensation has its seat at the tip—if something is placed on the flat surface of the organ, the taste is less. The tongue can also perceive everything that flesh in general can—e.g. hardness, or warmth and cold, in any part of it, just as it can appreciate taste. The tongue is [30] sometimes broad, sometimes narrow, and sometimes of medium width; the last kind is the best and the clearest. Moreover, the tongue is sometimes loosely hung, and sometimes fastened: as in the case of those who mumble and who lisp.

The tongue consists of flesh, soft and spongy, and the so-called

epiglottis is a part of this organ.

That part of the mouth that splits into two bits is called the tonsils; that part [493<sup>a</sup>1] that splits into many bits, the gums. Both the tonsils and the gums are composed of flesh. In the gums are teeth, composed of bone.

Inside the mouth is another part, shaped like a bunch of grapes, a pillar streaked with veins. If this pillar gets moistened and inflamed it is called the uvula, and it then has a tendency to bring about suffocation.<sup>13</sup>

**12** · The neck is the part between the face and the trunk. [Of this the front [5] part is the larynx and the back part the gullet.]<sup>14</sup> The front part, composed of gristle, through which respiration and speech is effected, is termed the wind-pipe; the part that is fleshy is the gullet, inside just in front of the chine. The part to the back of the neck is the shoulder-point.

These then are the parts to be met with before you come to the thorax. [10]

To the trunk there is a front part and a back part. Next after the neck in the front part is the chest, with a pair of breasts. To each of the breasts is attached a nipple, through which in the case of females the milk percolates; and the breast is soft. Milk is found at times in the male; but with the male the flesh of the breast is [15] tough, with the female it is spongy and porous.

**13** · Next after the thorax and in front comes the stomach, and its root the navel. Underneath this root the bilateral part is the flank; the undivided part below the navel is the abdomen, the extremity of which is the region of the pubes; and above the navel the hypochondrium; the part common to the hypochondrium and [20] the flank is the gut-cavity.

Serving as a brace-girdle to the hinder parts is the pelvis, and hence it gets its name (ὀσφύς), for it is symmetrical (ἰσοφυές) in appearance; of the fundament the part for resting on is termed the buttock, and the part whereon the thigh pivots is termed the socket.

The womb is a part peculiar to the female; and the penis is peculiar to the male. [25] This latter organ is external and situated at the extremity of the trunk; it is composed of two separate parts: of which the extreme part is fleshy, hardly alters in size, and is called the glans; and round about it is a skin devoid of any specific title, which never grows together again if it is cut any more than does the jaw or the eyelid. And the connexion between the latter and the glans is called the frenum. The [30]

remaining part of the penis is composed of gristle; it is easily susceptible of enlargement; and it protrudes and recedes in the opposite way to that of the cat.<sup>15</sup> Underneath the penis are two testicles, and the integument of these is a skin that is termed the scrotum.

[493<sup>b</sup>1] Testicles are not identical with flesh, and are not altogether diverse from it. But by and by we shall treat in an accurate way regarding all such parts.

**14** · The privy part of the female is in character opposite to that of the male. In other words, the part under the pubes is hollow, and not, like the male organ, protruding. Further, there is an urethra outside the womb which serves as a passage [5] for the sperm of the male, and as an outlet for liquid excretion to both sexes.

The part common to the neck and chest is the throat; the armpit is common to side, arm, and shoulder; and the groin is common to thigh and abdomen. The part inside the thigh and buttocks is the perineum, and the part outside the thigh and [10] buttocks is the hypoglutis.

The front parts of the trunk have now been enumerated.

The part behind the chest is termed the back.

**15** · Parts of the back are a pair of shoulder-blades, the back-bone, and, underneath on a level with the stomach in the trunk, the loins. Common to the upper and lower part of the trunk are the ribs, eight on either side, for as to the so-called [15] seven-ribbed Ligyans we have not received any trustworthy evidence.

Man, then, has an upper and a lower part, a front and a back part, a right and a left side. Now the right and the left side are pretty well alike in their parts and [20] identical throughout, except that the left side is the weaker of the two; but the back parts do not resemble the front ones, neither do the lower ones the upper: only that these upper and lower parts may be said to resemble one another thus far, that, if the face be plump or meagre, the abdomen is plump or meagre to correspond; and that the legs correspond to the arms, and where the upper arm is short the thigh is [25] usually short also, and where the feet are small the hands are small correspondingly.

Of the limbs, one set, forming a pair, is arms. To the arm belong the shoulder, upper-arm, elbow, forearm, and hand. To the hand belong the

palm, and the five fingers. The part of the finger that bends is the knuckle, the part that is inflexible is the phalanx. The thumb is single-jointed, the other fingers are double-jointed. The [30] bending both of the arm and of the finger takes place inwards in all cases; and the arm bends at the elbow. The inner part of the hand is the palm, and is fleshy and divided by joints: in the case of long-lived people by one or two extending right [494a1] across, in the case of the short-lived by two, not so extending. The joint between hand and arm is the wrist. The outside or back of the hand is sinewy, and has no specific designation.

There is another two-parted limb, the leg. Of this limb the double-knobbed [5] part is the thigh, the sliding part is the knee-cap, the double-boned part is the lower leg; the front part of this latter is the shin, and the part behind it is the calf, wherein the flesh is sinewy and venous, in some cases drawn upwards towards the hollow behind the knee, as in the case of people with large hips, and in other cases drawn downwards. The lower extremity of the shin is the ankle, duplicate in either leg. The [10] part of the limb that contains a multiplicity of bones is the foot. The hinder part of the foot is the heel; at the front of it the divided part consists of toes, five in number; the fleshy part underneath is the ball; the upper part at the top is sinewy and has no particular appellation; of the toe, one portion is the nail and another the joint, and [15] the nail is in all cases at the extremity; and toes are without exception single-jointed. Men that have the inside of the foot thick and not arched, that is, that walk resting on the entire under-surface of their feet, are prone to roguery. The joint common to thigh and shin is the knee.

These, then, are the parts common to the male and the female sex. The relative position of the parts as to up and down, or to front and back, or to right and left, all [20] this as regards externals might safely be left to mere ordinary perception. But for all that, we must treat of them for the same reason as the one underlying our previous remarks; that is to say, we must refer to them in order that a due and regular sequence may be observed in our exposition, and in order that by their enumeration due attention may be subsequently given to those parts in men and other animals [25] that are diverse in any way from one another.

In man, above all other animals, the upper and lower parts are arranged in accordance with their natural positions; for in him, upper and lower are the same as in the case of the universe as a whole. In like manner the parts in front, behind, right [30] and left, are in accordance with nature. But in regard to other animals, in some cases these distinctions do not exist, and in others they do so, but in a vague way. For



instance, the head with all animals is up and above in respect to their bodies; but man alone, as has been said, has, in maturity, this part uppermost in respect to the universe. [494<sup>b</sup>1]

Next after the head comes the neck, and then the chest and the back: the one in front and the other behind. Next after these come the stomach, the loins, the sexual parts, and the haunches; then the thigh and shin; and, lastly, the feet.

The legs bend frontwards, in the direction of actual progression, and [5] frontwards also lies that part of the foot which is the most effective of motion, and its bending; but the heel lies at the back, and the ankle-bones lie laterally, earwise. The arms are situated to right and left, and bend inwards: so that the convexities [10] formed by bent arms and legs are practically face to face with one another in the case of man.

As for the senses and for the organs of sensation, the eyes, the nostrils, and the tongue, all alike are situated frontwards; the sense of hearing, and the organ of hearing, the ear, is situated sideways, on the same circumference with the eyes. The [15] eyes in man are, in proportion to his size, nearer to one another than in any other animal.

Of man's senses, touch is the most accurate; taste is second; in the others, man is surpassed by a great number of animals.

**16** · The parts, then, that are externally visible are arranged in the way [20] above stated, and as a rule have their special designations, and from use and wont are known familiarly to all; but this is not the case with the inner parts. For the fact is that the inner parts of man are to a very great extent unknown, and the consequence is that we must have recourse to an examination of the inner parts of other animals whose nature in any way resembles that of man.

[25] In the first place then, the brain lies in the front part of the head. And this holds alike with all animals possessed of a brain; and all blooded animals are possessed thereof, and molluscs as well. But, taking size for size of animal, the largest brain, and the moistest, is that of man. Two membranes enclose it: the [30] stronger one is nearer the bone; the one round the brain itself is finer. The brain in all cases is bilateral. Behind this, right at the back, comes what is termed the cerebellum, differing in form from the brain as we may both feel and see.

The back of the head is with all animals empty and hollow, whatever be its size [495<sup>a</sup>1] in the different animals. For some creatures have big heads while the face below is small in proportion, as is the case with

round-faced animals; some have little heads and long jaws, as is the case, without exception, among animals with bushy tails.

[5] The brain in all animals is bloodless, devoid of veins, and naturally cold to the touch; in the great majority of animals it has a small hollow in its centre. The caul around it is veined; and this brain-caul is that skin-like membrane which closely [10] surrounds the brain. Above the brain is the thinnest and weakest bone of the head, which is termed the sinciput.

From the eye there go three ducts to the brain: the largest and the medium-sized to the cerebellum, the least to the brain itself; and the least is the one situated [15] nearest to the nostril. The two largest ones, then, run side by side and do not meet; the medium-sized ones meet—and this is particularly visible in fishes,—for they lie nearer than the large ones to the brain; the smallest pair are the most widely separate from one another, and do not meet.

Inside the neck is what is termed the oesophagus (whose name, 'gullet' [20] (στόμαχος), is derived from its length and narrowness), and the windpipe. The windpipe is situated in front of the oesophagus in all animals that have a windpipe, and all animals have one that are furnished with lungs. The windpipe is made up of gristle, is sparingly supplied with blood, and is streaked all round with numerous [25] minute veins; it is situated, in its upper part, near the mouth, below the aperture formed by the nostrils into the mouth—an aperture through which, when men, in drinking, choke on any of the liquid, this liquid finds its way out through the nostrils. In betwixt the two openings comes the so-called epiglottis, an organ capable of being drawn over and covering the orifice of the windpipe communicating [30] with the mouth; the end of the tongue is attached to the epiglottis. In the other direction the windpipe extends to the interval between the lungs, and hereupon bifurcates into each of the two divisions of the lung; for the lung in all animals possessed of the organ has a tendency to be double. In viviparous animals, however, the duplication is not so plainly discernible as in other species, and the duplication is [495b1] least discernible in man. And in man the organ is not split into many parts, as is the case with some vivipara, neither is it smooth, but its surface is uneven.

In the case of the ovipara, such as birds and oviparous quadrupeds, the two parts of the organ are separated to a distance from one another, so that the creatures appear to be furnished with a pair of lungs; and from the windpipe, itself single, there branch off two separate parts extending to each of the two divisions of [5] the lung. It is attached also to the great

vein and to what is designated the aorta. When the windpipe is charged with air, the air passes on to the hollow parts of the lung. These parts have divisions, composed of gristle, which meet at an acute angle; from the divisions run passages through the entire lung, giving off smaller and [10] smaller ramifications. The heart also is attached to the windpipe, by connexions of fat, gristle, and sinew; and at the point of juncture there is a hollow. When the windpipe is charged with air, the entrance of the air into the heart, though imperceptible in some animals, is perceptible enough in the larger ones. Such are [15] the properties of the windpipe, and it takes in and throws out air only, and takes in nothing else either dry or liquid, or else it causes you pain until you shall have coughed up whatever may have gone down.

The gullet communicates at the top with the mouth, close to the windpipe, and [20] is attached to the backbone and the windpipe by membranous ligaments, and at last finds its way through the midriff into the belly. It is composed of flesh-like substance, and is elastic both lengthways and breadthways.

The stomach of man resembles that of a dog; for it is not much bigger than the bowel, but is somewhat like a bowel of more than usual width; then comes the [25] bowel, single, convoluted, moderately wide. The lower part of the gut is like that of a pig; for it is broad, and the part from it to the buttocks is thick and short. The caul is attached to the middle of the stomach, and consists of a fatty membrane, as is the [30] case with all other animals whose stomachs are single and which have teeth in both jaws.

The mesentery is over the bowels; this also is membranous and broad, and turns to fat. It is attached to the great vein and the aorta, and there run through it a number of veins closely packed together, extending towards the region of the [496<sup>a</sup>1] bowels, beginning above and ending below.

So much for the properties of the oesophagus, the windpipe, and the stomach.

**17** · The heart has three cavities, and is situated above the lung at the division of the windpipe, and is provided with a fatty and thick membrane where it [5] fastens on to the great vein and the aorta. It lies with its tapering portion upon the aorta, and this portion is similarly situated in relation to the chest in all animals that have a chest. In all animals alike, in those that have a chest and in those that have none, the

apex of the heart points forwards, although this fact might possibly escape [10] notice by a change of position under dissection. The rounded end of the heart is at the top. The apex is to a great extent fleshy and close in texture, and in the cavities of the heart are sinews. As a rule the heart is situated in the middle of the chest in animals that have a chest, and in man it is situated a little to the left-hand side, [15] leaning a little way from the division of the breasts towards the left breast in the upper part of the chest.

The heart is not large, and in its general shape it is not elongated; in fact, it is [20] somewhat round in form: only it is sharp-pointed at the bottom. It has three cavities, as has been said: the right-hand one the largest of the three, the left-hand one the least, and the middle one intermediate in size. All these cavities, even the two small ones, are connected by passages with the lung, and this fact is rendered quite plain in one of the cavities. And below, at the point of attachment, in the largest cavity [25] there is a connexion with the great vein near which the mesentery lies; and in the middle one there is a connexion with the aorta.<sup>16</sup>

Passages lead from the heart into the lung, and branch off just as the windpipe does, running all over the lung parallel with the passages from the windpipe. The canals from the heart are uppermost; and there is no common passage, but the passages through their having a common wall receive the breath and pass it on to [30] the heart; and one of the passages conveys it to the right cavity, and the other to the left.

With regard to the great vein and the aorta we shall, by and by, treat of them together in a discussion devoted to them alone.

In all animals that are furnished with a lung, and that are both internally and [496<sup>b</sup>1] externally viviparous, the lung is of all parts the most richly supplied with blood; for the lung is throughout spongy in texture, and along by every single pore in it go branches from the great vein. Those who imagine it to be empty are altogether mistaken; and they are led into their error by their observation of lungs removed [5] from animals under dissection, out of which organs the blood has all escaped immediately after death.

Of the other internal organs the heart alone contains blood. And the lung has blood not in itself but in its veins, but the heart has blood in itself; for in each of its [10] three cavities it has blood, but the thinnest blood is what it has in its central cavity.

Under the lung comes the thoracic diaphragm or midriff, attached to

the ribs, the hypochondria and the backbone, with a thin membrane in the middle of it. It has veins running through it; and the diaphragm in the case of man is thick in [15] proportion to the size of his frame.

Under the diaphragm on the right-hand side lies the liver, and on the left-hand side the spleen, alike in all animals that are provided with these organs in a natural and not a monstrous way; for in some quadrupeds these organs have been found in a transposed position. These organs are connected with the stomach by the [20] caul.

To outward view the spleen of man is narrow and long, resembling that of the pig. The liver for the most part and in most animals is provided with a gall-bladder; but the latter is absent in some. The liver of a man is round-shaped, and resembles that of the ox. This occurs in the case of sacrificial animals too; e.g. in a certain [25] district of the Chalcidic settlement in Euboea the sheep are devoid of gall-bladders; and in Naxos nearly all the quadrupeds have one so large that foreigners when they offer sacrifice are astounded, under the impression that this is not the animals' nature but a sign peculiar to themselves.

Again, the liver is attached to the great vein, but it has no communication with [30] the aorta; for the vein that goes off from the great vein goes right through the liver, at a point where are the so-called portals of the liver. The spleen also is connected only with the great vein, for a vein extends to the spleen off from it.

After these organs come the kidneys, and these are placed close to the backbone, and resemble in character the same organ in the ox. In all animals that are provided with this organ, the right kidney is situated higher up than the other. It [497<sup>a</sup>1] has also less fatty substance than the left-hand one and is less moist. And this is found in all the other animals alike.

Furthermore, passages lead into the kidneys both from the great vein and from the aorta, only not into the cavity. For there is a cavity in the middle of the kidney, [5] bigger in some creatures and less in others; but there is none in the case of the seal. This latter animal has kidneys resembling those of the ox, but more solid than in any other creature. The passages that lead into the kidneys lose themselves in the substance of the kidneys themselves; and a sign that they extend no farther rests on [10] the fact that they<sup>17</sup> contain no blood, nor is any clot found therein. The kidneys, however, have, as has been said, a small cavity.<sup>18</sup> From this cavity in the kidney there lead two considerable passages into the bladder; and others spring from the aorta, strong and continuous. And to the middle of each of the two kidneys is attached a hollow sinewy vein,

stretching right along the spine through the narrows; [15] by and by these veins are lost in either loin, and again become visible extending to the flank. And these off-branchings of the veins terminate in the bladder. For the bladder lies at the extremity, and is held in position by the ducts stretching from the kidneys, along the stalk that extends to the urethra; and pretty well all round it is [20] fastened by fine sinewy membranes, that resemble to some extent the thoracic diaphragm. The bladder in man is tolerably large.

To the stalk of the bladder the private part is attached, the endmost part of it [25] being a single united orifice; but a little lower down, one of the openings communicates with the testicles and the other with the bladder. The penis is gristly and sinewy. With it are connected the testicles in male animals, and the properties of these organs we shall discuss in our general account.

All these organs are similar in the female; for there is no difference in regard to [30] the internal organs, except in respect to the womb. The appearance of this organ can be investigated from the diagrams in the *Anatomies*; its position is over the bowel, and the bladder lies over the womb. But we must treat by and by of the womb of all female animals viewed generally. For the wombs of all female animals are not identical, neither do their local dispositions coincide.

These are the organs, internal and external, of man, and such is their nature [497<sup>b</sup>1] and such their local disposition.

## BOOK II

1 · With regard to animals in general, some parts or organs are common to all, as has been said, and some are common only to particular genera; the parts, moreover, are identical with or different from one another on the lines already repeatedly laid down. For as a general rule all animals that are generically distinct [10] have the majority of their parts different in form; and some of them they have only analogically similar and diverse in genus, while they have others that are alike in genus but specifically diverse; and many exist in some animals, but not in others.

For instance, viviparous quadrupeds have all a head and a neck, and all the [15] parts of the head, but they differ each from other in the shapes of the parts. The lion has its neck composed of one single bone instead of vertebrae; but, when opened up, the animal is found in all internal characteristics to resemble the dog.

The quadruped vivipara instead of arms have forelegs. This is true of all quadrupeds, but such of them as have toes have, practically speaking, organs [20] analogous to hands; at all events, they use these fore-limbs for many purposes as hands—except for the elephant.

This animal has its toes somewhat indistinctly defined, and its front legs are much bigger than its hinder ones; it is five-toed, and has short ankles to its hind feet. [25] But it has a nose of such a sort and size as to allow of its being used as a hand. For it eats and drinks by lifting up its food with the aid of this organ into its mouth, and it lifts up articles to its driver and it pulls up trees, and when walking through water it spouts the water up by means of it; and this organ bends but is not jointed, for it is [30] composed of gristle.

Of all animals man alone can learn to make equal use of both hands.

All animals have a part analogous to the chest in man, but not similar to his; for the chest in man is broad, but that of all other animals is narrow. Moreover, no other animal but man has breasts in front; the elephant, certainly, has two breasts, [498<sup>a</sup>1] not however in the chest, but near it.

Moreover, animals have the flexions of their fore and hind limbs in directions opposite to one another, and in directions opposite to the joints

in man; with the [5] exception of the elephant. For with the viviparous quadrupeds the front legs bend forwards and the hind ones backwards, and the concavities of the two pairs of limbs thus face one another.

The elephant is not as some used to assert, but it bends its legs and settles [10] down; only that in consequence of its weight it cannot bend its legs on both sides simultaneously, but falls into a recumbent position on one side or the other, and in this position it goes to sleep. And it bends its hind legs just as a man bends his legs.

In the case of ovipara, as the crocodile and the lizard and the like, both pairs of [15] legs, fore and hind, bend forwards, with a slight swerve to one side. The flexion is similar in the case of the multipeds; only that the legs in between the extreme ends always move in an intermediate manner and bend sideways rather. But man bends his arms and his legs towards the same point, and therefore in opposite ways: he bends his arms backwards, with just a slight inclination inwards, and his legs [20] frontwards. No animal bends both its fore-limbs and hind-limbs backwards; but in the case of all animals the flexion of the shoulders is in the opposite direction to that of the elbows or the joints of the forelegs, and, in the hind legs, the flexure in the [25] hips to that of the knees: so that since man differs from other animals in flexion, those animals that possess such parts as these move them contrariwise to man.

Birds have the flexions of their limbs like those of the quadrupeds; for, although bipeds, they bend their legs backwards, and instead of arms or front legs [30] have wings which bend frontwards.

The seal is a kind of imperfect quadruped; for just behind the shoulder-blade its front feet are placed, resembling hands, like the front paws of the bear; for they are furnished with five toes, and each of the toes has three flexions and a nail of inconsiderable size. The hind feet are also furnished with five toes, and in their [498<sup>b</sup>1] flexions and nails they resemble the front feet; but in shape they resemble a fish's tail.

The movements of animals, quadruped and multiped, are crosswise and they [5] stand in this way; and it is always the limb on the right-hand side that is the first to move. The lion, however, and the two species of camel, both the Bactrian and the Arabian, progress laterally; and in lateral progress sometimes<sup>1</sup> the right foot is not advanced before the left but follows it. [10]

Whatever parts men have in front, these parts quadrupeds have below, on the belly: and whatever parts men have behind, these parts quadrupeds have on their backs. Most quadrupeds have a tail; for even



the seal has a tiny one resembling that of the stag. Regarding the tails of the pithecoids we must give their distinctive [15] properties by and by.

All viviparous quadrupeds are hair-coated, whereas man has only a few short hairs excepting on the head, but, so far as the head is concerned, he is hairier than any other animal. Further, of the other hair-coated animals, the back is hairier and the belly is either entirely smooth or less hairy; but with man the reverse is the [20] case.

Man also has upper and lower eyelashes, and hair under the armpits and on the pubes. No other animal has hair in either of these localities, or has a lower eyelash; though in the case of some animals soft hairs grow below the eyelid. [25]

Of hair-coated quadrupeds some are hairy all over the body, as the pig, the bear, and the dog; others are especially hairy on the neck and all round about it, as is the case with animals that have a shaggy mane, such as the lion; others again are especially hairy on the upper surface of the neck from the head as far as the withers, [30] namely, such as have a crested mane, as is the case with the horse, the mule, and, among the undomesticated horned animals, the bison.

The so-called hippelaphus also has a mane on its withers, and the animal called pardion, in either case a thin mane extending from the head to the withers; the hippelaphus has, exceptionally, a beard by the larynx. Both these animals have [499<sup>a</sup>1] horns and are cloven-footed; the female, however, of the hippelaphus has no horns. This latter animal resembles the stag in size; it is found in the territory of the Arachotae, where the wild cattle also are found.

[5] Wild cattle differ from their domesticated congeners just as the wild boar differs from the domesticated one. That is to say they are black, strong looking, with a hook-nosed muzzle, and with horns lying more over the back. The horns of the hippelaphus resemble those of the gazelle.

The elephant is the least hairy of all quadrupeds. With animals, as a general [10] rule, the tail corresponds with the body as regards thickness or thinness of hair-coating; that is, with animals that have long tails, for some creatures have tails of altogether insignificant size.

Camels have an exceptional part wherein they differ from all other quadrupeds, and that is the so-called hump on their back. The Bactrian camel [15] differs from the Arabian; for the former has two humps and the latter only one, though it has a kind of a hump below like the one above, on which, when it kneels, the weight of the whole body rests. The camel has four teats like the cow, a tail like that of an ass, and the privy

parts of the male are directed backwards. It has one [20] knee in each leg, and not, as some say, several joints, although they appear to have several because of the constricted shape of the region of the belly. It has a huckle-bone like that of the ox, but meagre and small in proportion to its bulk. It is cloven-footed, and has not got teeth in both jaws; and it is cloven-footed in the [25] following way: at the back there is a slight cleft extending as far up as the second joint of the toes; and in front there is a long cleft, extending as far as the first joint of the toes, but superficial; and there is something actually between the clefts, as in geese. The foot is fleshy underneath, like that of the bear; so that, when the animal [30] goes to war, they protect its feet, when they get sore, with sandals.

The legs of all quadrupeds are bony, sinewy, and fleshless; and in point of fact such is the case with all animals that are furnished with feet, with the exception of [499<sup>b</sup>1] man. They are also unfurnished with buttocks; and this last point is plain in an especial degree in birds. It is the reverse with man; for there is scarcely any part of the body in which man is so fleshy as in the buttock, the thigh, and the lower leg; for [5] the part of the lower leg called the calf is fleshy.

Of blooded and viviparous quadrupeds some have the foot cloven into many parts, as is the case with the hands and feet of man (for some animals are many-toed, as the lion, the dog, and the leopard); others have feet cloven in two, and [10] instead of nails have hooves, as the sheep, the goat, the deer, and the hippopotamus; others are uncloven, such for instance as the solid-hooved animals, the horse and the mule. Swine may be either cloven-footed or uncloven-footed; for there are in Illyria and in Paeonia and elsewhere solid-hooved swine. The cloven-footed animals have [15] two clefts behind; in the solid-hooved this part is continuous.

Furthermore, of animals some are horned, and some are not so. The great majority of the horned animals are cloven-footed by nature, as the ox, the stag, the goat; and a solid-hooved animal with a pair of horns has never yet been met with. But a few animals are known to be single-horned and single-hooved, as the Indian ass; and the oryx is single-horned and cloven-hooved.

[20] Of all solid-hooved animals the Indian ass alone has a huckle-bone; for the pig, as was said above, is either solid-hooved or cloven-footed, and consequently has no well-formed huckle-bone. Of the cloven-footed many are provided with a hucklebone. Of those whose feet are cloven in many parts, none has been observed to have a huckle-bone, none of the others any more than man. The lynx, however, has one like a half huckle-bone, and the lion has one like the 'labyrinth' used in

sculpting. [25] All the animals that have a huckle-bone have it in the hind legs. They have also the bone placed straight up in the joint; the upper part, outside; the lower part, inside; the sides called Coa inside and turned towards one another, the sides called Chia outside, and the horns on the top. This, then, is the position of the huckle-bone in the [30] case of all animals provided with the part.

Some animals are, at one and the same time, furnished with a mane and furnished also with a pair of horns bent in towards one another, as is the bison, [500\*1] which is found in Paeonia and Maedica. But all animals that are horned are quadrupedal, except in cases where a creature is said metaphorically, or by a figure of speech, to have horns; just as the Egyptians describe the serpents found in the [5] neighbourhood of Thebes, which have protuberances sufficiently large to suggest such an epithet.

Of horned animals the deer alone has a horn hard and solid throughout. The horns of other animals are hollow for a certain distance, and solid towards the extremity. The hollow part is derived from the skin, but the core round which this is wrapped—the hard part—is derived from the bones; as is the case with the horns of oxen. The deer is the only animal that sheds its horns, and it does so annually, after [10] reaching the age of two years, and again renews them. All other animals retain their horns permanently, unless the horns be damaged by accident.

Again, with regard to the breasts and the generative organs, animals differ [15] widely from one another and from man. For instance, the breasts of some animals are situated in front, either on the chest or near to it, and there are in such cases two breasts and two teats, as is the case with man and the elephant, as previously stated. For the elephant has two breasts in the region of the axillae; and the female elephant has two breasts insignificant in size and in no way proportionate to the [20] bulk of the entire frame, in fact, so insignificant as to be invisible in a sideways view; the males also have breasts, like the females, exceedingly small. The she-bear has four breasts. Some animals have two breasts, but situated near the thighs, and teats, likewise two in number, as the sheep; others have four teats, as the cow. Some have [25] breasts neither on the chest nor at the thighs, but on the belly, as the dog and pig; and they have a considerable number of breasts, but not all of equal size. Thus the she-leopard has four on the belly, the lioness two, and others more. The she-camel, also, has two breasts and four teats, like the cow. Of solid-hooved animals the males [30] have no breasts, excepting in the case of males that take after the mother, which phenomenon is observable in horses.

Of male animals the genitals of some are external, as is the case with man, the horse, and many other creatures; some are internal, as with the dolphin. With those that have the organ externally placed, the organ in some cases is situated in front, as [500<sup>b</sup>1] in the cases already mentioned, and of these some have the organ hanging loose, both penis and testicles, as man; others have penis and testicles closely attached to [5] the belly, some more closely, some less; for this organ is not equally loose in the wild boar and in the horse.

The penis of the elephant resembles that of the horse; compared with the size of the animal it is disproportionately small; the testicles are not visible, but are inside in the vicinity of the kidneys; and for this reason the male speedily gives over [10] in the act of intercourse. The genitals of the female are situated where the udder is in sheep; when she is in heat, she draws the organ back and exposes it externally, to facilitate the act of intercourse for the male; and the organ opens out to a considerable extent.

With most animals the genitals have the position above assigned; but some [15] animals discharge their urine backwards, as the lynx, the lion, the camel, and the hare. Male animals differ from one another, as has been said, in this particular, but all female animals urinate backwards: even the female elephant, like other animals, though she has the privy part below the thighs.

[20] In the male organ itself there is a great diversity. For in some cases the organ is composed of flesh and gristle, as in man; in such cases, the fleshy part does not become inflated, but the gristly part is subject to enlargement. In other cases, the organ is sinewy, as with the camel and the deer; in other cases it is bony, as with the [25] fox, the wolf, the marten, and the weasel; for this organ in the weasel has a bone.

Furthermore, when man has arrived at maturity, his upper part is smaller than the lower one, but with all other blooded animals the reverse holds good. By the upper part we mean everything extending from the head down to the parts used for [30] excretion of residuum, and by the lower part all else. With animals that have feet the hind legs are to be rated as the lower part in our comparison of magnitudes, and with animals devoid of feet, the tail, and the like.

When animals arrive at maturity, their properties are as above stated; but they differ greatly from one another in their growth towards maturity. For instance, man, when young, has his upper part larger than the lower, but in course of growth [501<sup>a</sup>1] he comes to reverse this condition; and that is why man alone does not progress in early life as he

does at maturity, but in infancy creeps on all fours; but some animals, in growth, retain the relative proportion of the parts, as the dog. Some [5] animals at first have the upper part smaller and the lower part larger, and in course of growth the upper part gets to be the larger, as is the case with the bushy-tailed animals; for in their case there is never, subsequently to birth, any increase in the part extending from the hoof to the haunch.

Again, in respect to the teeth, animals differ greatly both from one another and from man. All animals that are quadrupedal, blooded, and viviparous, are furnished [10] with teeth; but, to begin with, some have teeth in both jaws, and some do not. For instance, horned quadrupeds do not; for they have not got the front teeth in the upper jaw; and some hornless animals, also, do not have teeth in both jaws, as the [15] camel. Some animals have tusks, like the boar, and some have not. Further, some animals are saw-toothed, such as the lion, the leopard, and the dog; and some have teeth that do not interlock, as the horse and the ox; and by 'saw-toothed' we mean such animals as interlock the sharp-pointed teeth. No animal possesses both tusks and horns, nor yet do either of these exist in any animal possessed of saw-teeth. The front teeth are usually sharp, and the back ones flat. The seal is saw-toothed [20] throughout, inasmuch as he is a sort of link with the class of fishes; for fishes are almost all saw-toothed.

No animal of these genera is provided with double rows of teeth. There is, however, an animal of the sort, if we are to believe Ctesias. He assures us that the [25] Indian beast called the 'martichoras' has a triple row of teeth in both upper and lower jaw; that it is as big as a lion and equally hairy, and that its feet resemble those of the lion; that it resembles man in its face and ears; that its eyes are blue, and its colour vermilion; that its tail is like that of the land-scorpion; that it has a sting in [30] the tail, and has the faculty of shooting off the spines that are attached to the tail; that the sound of its voice is a something between the sound of a pipe and that of a trumpet; that it can run as swiftly as a deer, and that it is savage and a man-eater.<sup>2</sup> [501<sup>b</sup>1]

Man sheds his teeth, and so do other animals, as the horse, the mule, and the ass. And man sheds his front teeth; but there is no instance of an animal that sheds its molars. The pig sheds none of its teeth at all.

2 · With regard to dogs some doubts are entertained, as some contend that [5] they shed no teeth whatever, and others that they shed

the canines only; but it has been observed that they do shed their teeth like man, but that the circumstance escapes notice, owing to the fact that they never shed them until equivalent teeth have grown up under them. We shall be justified in supposing that the case is similar with wild beasts in general; for they are said to shed their canines only. [10] Young can be distinguished from old by their teeth; for the teeth in young dogs are white and sharp-pointed; in old dogs, black and blunted.

**3** · In this particular, the horse differs from the other animals; for, generally [15] speaking, as animals grow older their teeth get blacker, but the horse's teeth grow whiter with age.

The so-called canines come in between the sharp teeth and the flat ones, partaking of the form of both kinds; for they are flat below and sharp above.

Males have more teeth than females in the case of men, sheep, goats, and [20] swine; in the case of other animals observations have not yet been made. Those that have more teeth are longer-lived as a rule; those with fewer teeth more thinly set are shorter-lived as a rule.

**4** · The last teeth to come in man are molars called wisdom-teeth, which [25] come at the age of twenty years, in the case of both sexes. Cases have been known in women of eighty years old where molars have come up at the ends of the jaw, causing great pain in their coming; and cases have been known of the like phenomenon in men too. This happens in the case of people whose wisdom-teeth have not come up in early years.

[30] **5** · The elephant has four teeth on either side, by which it munches its food, grinding it like so much barley-meal, and, quite apart from these, it has two great teeth. In the male these are comparatively large and curved upwards; in the female, [502<sup>a</sup>1] they are comparatively small and point in the opposite direction; that is, they look downwards. The elephant is furnished with teeth at birth, but the tusks are not then visible.

**6** · The tongue of the elephant is exceedingly small, and back in the mouth, so that it is difficult to get a sight of it.

[5] 7 · Furthermore, animals differ from one another in the size of their mouths. In some animals the mouth opens wide, as in the case with the dog, the lion, and with all the saw-toothed animals; other animals have small mouths, as man; and others have mouths of medium capacity, as the pig and his congeners.

[The Egyptian hippopotamus has a mane like a horse, is cloven-footed like an [10] ox, and is snub-nosed. It has a huckle-bone like cloven-footed animals, and tusks just visible; it has the tail of a pig, the neigh of a horse, and the dimensions of an ass. The hide is so thick that spears are made out of it. In its internal organs it resembles [15] the horse and the ass.]<sup>3</sup>

8 · Some animals share the properties of man and the quadrupeds, as the ape, the monkey, and the baboon. The monkey is a tailed ape. The baboon [20] resembles the ape in form, only that it is bigger and stronger, more like a dog in face, and is more savage in its habits, and its teeth are more dog-like and more powerful.

Apes are hairy on the back in keeping with their quadrupedal nature, and hairy on the belly in keeping with their human form—for, as was said above, this [25] characteristic is reversed in man and the quadruped—only that the hair is coarse, so that the ape is thickly coated both on the belly and on the back. Its face resembles that of man in many respects; for it has similar nostrils and ears, and teeth like those [30] of man, both front teeth and molars. Further, whereas quadrupeds in general are not furnished with lashes on one of the two eyelids, this creature has them on both, only very thinly set, especially the under ones and very short. The other quadrupeds have no under eyelash at all.

The ape has also in its chest two teats upon small breasts. It has also arms like [502<sup>b</sup>1] man, only covered with hair, and it bends both these and its legs like man, with the convexities of both limbs facing one another. In addition, it has hands and fingers and nails like man, only that all these parts are somewhat more beast-like in [5] appearance. Its feet are exceptional in kind. That is, they are like large hands, and the toes are like fingers, with the middle one the longest of all, and the under part of the foot is like a hand except for its length, and stretches out towards the extremities like the palm of the hand; and this palm at the after end is unusually hard, and in a rough obscure kind of way resembles a heel. The creature uses its feet either as hands or feet, and doubles them up as one doubles a fist. Its upper-arm and thigh [10] are short in

proportion to the forearm and the shin. It has no projecting navel, but only a hardness in the ordinary locality of the navel. Its upper part is much larger than its lower part, as is the case with quadrupeds; in fact, the proportion of the former to the latter is about five to three. Owing to this circumstance and to the fact [15] that its feet resemble hands and are composed in a manner of hand and of foot: of foot in the heel extremity, of the hand in all else—for even the toes have what is called a palm:—for these reasons the animal is oftener to be found on all fours than [20] upright. It has neither hips, inasmuch as it is a quadruped, nor yet a tail, inasmuch as it is a biped, except a very small one—a sort of hint of a tail. The genitals of the female resemble those of the female in the human species; those of the male are more like those of a dog than are those of a man.

9 · The monkey, as has been observed, is furnished with a tail. In all such creatures the internal organs are found under dissection to correspond to those of [25] man.

So much then for the properties of the parts of such animals as bring forth their young into the world alive.

10 · Oviparous and blooded quadrupeds—and no terrestrial blooded animal is oviparous unless it is quadrupedal or is devoid of feet altogether—are furnished with a head, a neck, a back, upper and under parts, the front legs and hind legs, and [30] the part analogous to the chest, all as in the case of viviparous quadrupeds, and with a tail, usually large, in a few cases small. And all these creatures are many-toed, and the several toes are cloven apart. Furthermore, they all have the ordinary organs of sensation, including a tongue, with the exception of the Egyptian crocodile. [503<sup>a</sup>1]

This latter animal resembles certain fishes. For, as a general rule, fishes have a prickly tongue, not free in its movements; though there are some fishes that present a smooth undifferentiated surface where the tongue should be, until you draw their lips right back.

Again, all these animals are unprovided with ears, but possess only the passage [5] for hearing; neither have they breasts, nor a copulatory organ, nor visible external testicles, but internal ones only; neither are they hair-coated, but are in all cases covered with horny tessellations. Moreover, they are all saw-toothed.



River crocodiles have pigs' eyes, large teeth and tusks, and strong nails, and an [10] impenetrable skin composed of horny tessellations. They see poorly under water, but above the surface of it with remarkable acuteness. As a rule, they pass the day-time on land and the night-time in the water; for it is warmer than the open air.

11 · The chameleon resembles the lizard in the general configuration of its [15] body, but the ribs stretch downwards and meet together under the belly as is the case with fishes, and the spike sticks up as with the fish. Its face resembles that of [20] the baboon. Its tail is exceedingly long, terminates in a fine point, and is for the most part coiled up, like a strap of leather. It stands higher off the ground than the lizard, but the flexure of the legs is the same in both creatures. Each of its feet is divided into two parts, which bear the same relation to one another that the thumb and the [25] rest of the hand bear to one another in man. Each of these parts is for a short distance divided after a fashion into toes; on the front feet the inside part is divided into three and the outside into two, on the hind feet the inside part into two and the outside into three; it has claws also on these parts resembling those of birds of prey. [30] Its body is rough all over, like that of the crocodile. Its eyes are situated in a hollow recess, and are very large and round, and are enveloped in a skin resembling that which covers the rest of its body; and in the middle a slight aperture is left for vision, through which the animal sees, for it never covers up this aperture with its skin. It [503<sup>b</sup>1] keeps twisting its eyes round and shifting its line of vision in every direction, and thus contrives to get a sight of any object that it wants to see. The change in its colour takes place when it is inflated with air; it is then black, not unlike the [5] crocodile, or green like the lizard but black-spotted like the leopard. This change of colour takes place over the whole body, for the eyes and tail come alike under its influence. In its movements it is very sluggish, like the tortoise. It assumes a [10] greenish hue in dying, and retains this hue after death. It resembles the lizard in the position of the gullet and the windpipe. It has no flesh anywhere except a few scraps of flesh on the head and on the jaws and near to the root of the tail. It has blood only [15] round about the heart, the eyes, the region above the heart, and in all the veins extending from these parts; and in all these there is but little blood after all. The brain is situated a little above the eyes, but connected with them. When the outer skin is drawn aside from off the eye, something is found surrounding the eye, that [20] gleams through like a thin ring of copper. Membranes extend pretty well over its

entire frame, numerous and strong, and surpassing those found in any other animal. After being cut open along its entire length it continues to breathe for a [25] considerable time; a very slight motion goes on in the region of the heart, and, while contraction is especially manifested in the neighbourhood of the ribs, a similar motion is more or less discernible over the whole body. It has no spleen visible. It hibernates, like the lizard.

12 · Birds also in some parts resemble the above-mentioned animals; that is [30] to say, they have in all cases a head, a neck, a back, a belly, and what is analogous to the chest. The bird is remarkable among animals as having two feet, like man; but it bends them backward as quadrupeds do, as was noticed previously. It has neither hands nor front feet, but wings which mark it off from other animals. Its [504<sup>a</sup>1] haunch-bone is long, like a thigh, and is attached to the body as far as the middle of the belly; so that when viewed separately it looks like a thigh, while a real thigh is a separate structure extending to the shin. Of all birds those that have crooked talons [5] have the biggest thighs and the strongest breasts. All birds are furnished with many claws, and all have the toes separated more or less; for in the greater part the toes are distinct from one another, and the swimming birds, although they are web-footed, have still their claws fully articulated and separated from one another. Birds that fly high are in all cases four toed; for the greater part have three toes in front and one behind in place of a heel; some few have two in front and two behind, [10] as the wryneck.

This latter bird is somewhat bigger than the chaffinch, and is mottled in appearance. It is peculiar in the arrangement of its toes, and resembles the snake in the structure of its tongue; for the creature can protrude its tongue to the extent of [15] four inches and then draw it back again. Moreover, it can twist its head backwards while keeping all the rest of its body still, like the serpent. It has big claws, somewhat resembling those of the woodpecker. Its note is a shrill chirp.

Birds are furnished with a mouth, but with an exceptional one, for they have [20] neither lips nor teeth, but a beak. Neither have they ears nor a nose, but only passages for the sensations connected with these organs: that for the nostrils in the beak, and that for hearing in the head. Like all other animals they all have two eyes, and these are devoid of lashes. The heavy-bodied birds close the eye by means of the [25] lower lid, and all birds blink by means of a skin extending over the eye from the inner corner; the owl and its congeners also close the eye by means of the

upper lid. The same phenomenon is observable in the animals that have horny tessellations, as in the lizard and its congeners; for they all close the eye with the lower lid, but they do not blink like birds.

Further, birds have neither tessellations nor hair, but feathers; and the feathers [30] are invariably furnished with quills. They have no tail, but a rump with tailfeathers, short in such as are long-legged and web-footed, large in others. These latter kinds of birds fly with their feet tucked up close to the belly; but the small-rumped birds fly with their legs stretched out at full length. All are furnished with a tongue, but the organ is variable, being long in some birds and broad in others. Certain species of birds above all other animals, and next after man, possess [504<sup>b</sup>1] the faculty of uttering articulate sounds; and this faculty is chiefly developed in broad-tongued birds. No oviparous creature has an epiglottis over the windpipe, but these animals so manage the opening and shutting of the windpipe as not to allow [5] any solid substance to get down into the lung.

Some species of birds are furnished additionally with spurs, but no bird with crooked talons is found so provided. The birds with talons are among those that fly well, but those that have spurs are among the heavy-bodied.

Again, some birds have a crest. In some the crest sticks up, and is composed of [10] feathers only; but the crest of the cock is exceptional in kind, for it is not flesh but something like flesh.

**13** · Of water animals the genus of fishes constitutes a single group apart from the rest, and including many diverse forms.

The fish has a head, a back, a belly, in the neighbourhood of which last are [15] placed the stomach and viscera; and behind it has a tail of continuous, undivided shape, but not in all cases alike. No fish has a neck, or any limb or testicles at all, within or without, or breasts. This is true not only of all non-viviparous animals: [20] viviparous animals are not in all cases provided with the organ, but only those which are directly viviparous without being first oviparous. Thus the dolphin is directly viviparous, and accordingly we find it furnished with two breasts, not situated high up, but in the neighborhood of the genitals. And this creature is not provided, like [25] quadrupeds, with visible teats, but has two vents, one on each flank, from which the milk flows; and its young have to follow after it to get suckled, and this phenomenon has been actually witnessed by some people.

Fishes, then, as has been observed, have no breasts and no passage for the genitals visible externally. But they have an exceptional organ in the gills, whereby, [30] after taking the water in by the mouth, they discharge it again; and in the fins, of which the greater part have four, and the lanky ones two, as, for instance, the eel, and these two situated near to the gills. In like manner the grey mullet—as, for instance, the mullet found in the lake at Siphæe—have only two fins; and the same is the case with the fish called Ribbon-fish. Some of the lanky fishes have no fins at all, such as the muraena, nor gills articulated like those of other fish.

[505<sup>a</sup>1] And of those fish that are provided with gills, some have coverings for this organ, whereas all the selachians have the organ unprotected by a cover. And those fishes that have coverings have in all cases their gills placed sideways; whereas, among selachians, the broad ones have the gills down below on the belly, as the torpedo and the ray, while the lanky ones have the organ placed sideways, as is the [5] case in all the dog-fish.

The fishing-frog has gills placed sideways, and covered not with a spiny cover, as in all but the selachian fishes, but with one of skin.

Moreover, with fishes furnished with gills, the gills in some cases are simple in other duplicate; and the last gill in the direction of the body is always simple. And, [10] again, some fishes have few gills, and others have a great number; but all alike have the same number on both sides. Those that have the least number have one gill on either side, and this one duplicate, like the boar-fish; others have two on either side, [15] one simple and the other duplicate, like the conger and the scarus; others have four on either side, simple, as the elops, the synagris, the muraena, and the eel; others have four, all, with the exception of the hindmost one, in double rows, as the wrasse, the perch, the sheat-fish and the carp. The dog-fish have all their gills double, five [20] on a side; and the sword-fish has eight double gills. So much for the number of gills as found in fishes.

Again, fishes differ from other animals in more ways than as regards the gills. For they are not covered with hairs as are viviparous land animals, nor, as is the case with certain oviparous quadrupeds, with tessellations, nor, like birds, with feathers; [25] but for the most part they are covered with scales. Some few are rough-skinned, while the smooth-skinned are very few indeed. Of the Selachia some are rough-skinned and some smooth-skinned; and among the smooth-skinned fishes are included the conger, the eel, and the tunny.

All fishes are saw-toothed except the scarus; and the teeth in all cases

are sharp and set in many rows, and in some cases are placed on the tongue. The tongue is hard and spiny, and so firmly attached that fishes in many instances seem to be [30] devoid of the organ altogether. The mouth in some cases is wide-stretched, as it is with some viviparous quadrupeds. . . .<sup>4</sup>

As to the sense-organs, except for eyes fish have none that are apparent—neither the organ itself nor its passages—either for hearing or for smelling; but all fishes are furnished with eyes, and the eyes devoid of lids, though the eyes are not [505<sup>b</sup>1] hard.

Fishes without exception are supplied with blood. Some of them are oviparous, and some viviparous; scaly fish are invariably oviparous, but the Selachia are all viviparous with the exception of the fishing-frog.

**14** · Of blooded animals there now remains the serpent genus. This genus is [5] common to both elements, for, while most species comprehended therein are land animals, a small minority, to wit the aquatic species, pass their lives in fresh water. There are also sea-serpents, in shape to a great extent resembling their congeners of the land, with this exception that the head in their case is somewhat like the head of the conger; and there are several kinds of sea-serpent, and they differ in colour; [10] these animals are not found in very deep water. Serpents, like fish, are devoid of feet.

There are also sea-millipedes resembling in shape their land congeners, but somewhat less in regard to magnitude. These creatures are found in the neighbourhood of rocks; as compared with their land congeners they are redder in colour, are [15] furnished with feet in greater numbers and with legs of more delicate structure. And the same remark applies to them as to the sea-serpents, that they are not found in very deep water.

Of fishes whose habitat is in the vicinity of rocks there is a tiny one, which some call the 'ship-holder', and which is by some people used as a charm to bring luck in affairs of law and love. The creature is unfit for eating. Some people assert [20] that it has feet, but this is not the case: it appears, however, to be furnished with feet from the fact that its fins resemble those organs.<sup>5</sup>

So much, then for the external parts of blooded animals, as regards their numbers, their properties, and their relative diversities.

**15** · As for the properties of the internal parts, these we must first

discuss in [25] the case of the animals that are supplied with blood. For the principal genera differ from the rest of animals, in that the former are supplied with blood and the latter are not; and the former are the oviparous and viviparous quadrupeds, birds, fishes, cetaceans,<sup>6</sup> and all the others that come under no general designation by reason of [30] their being no genus but a simple species covering the individual cases, e.g. man.<sup>7</sup>

All viviparous quadrupeds, then, are furnished with a gullet and a windpipe, situated as in man; the same statement is applicable to oviparous quadrupeds and to [506<sup>a</sup>1] birds, only that the latter present diversities in the shapes of these organs. As a general rule, all animals that take up air and breathe it in and out are furnished with a lung, a windpipe, and a gullet, with the windpipe and gullet not admitting of diversity in situation but admitting of diversity in properties, and with the lung [5] admitting of diversity in both these respects. Further, all blooded animals have a heart and a diaphragm or midriff; but in small animals the existence of the latter organ is not so obvious owing to its delicacy and minute size.

In regard to the heart<sup>8</sup> there is an exceptional phenomenon observable in oxen. For there is one species of ox where, though not in all cases, a bone is found inside [10] the heart. And the horse's heart also has a bone inside it.<sup>9</sup>

They are not in all cases furnished with a lung; for instance, the fish is devoid of the organ, as is also every animal furnished with gills. All blooded animals are furnished with a liver. As a general rule blooded animals are furnished with a spleen; but with the great majority of non-viviparous but oviparous animals the [15] spleen is so small as all but to escape observation; and this is the case with almost all birds, as with the pigeon, the kite, the falcon, the owl; and the aegocephalus is devoid of the organ altogether. With oviparous quadrupeds the case is much the same; that is to say, they also have the spleen exceedingly minute, as the tortoise, [20] the freshwater tortoise, the toad, the lizard, the crocodile, and the frog.

Some animals have a gallbladder close to the liver, and others have not. Of viviparous quadrupeds the deer is without the organ, as also the roe, the horse, the mule, the ass, the seal, and some kinds of pigs. Of deer those that are called Achainae appear to have gall in their tail, but what is so called does resemble gall in [25] colour, though it is not so completely fluid, and the organ internally resembles a spleen.

However, all deer have maggots living inside the head, and the

habitat of these creatures is in the hollow underneath the root of the tongue and in the neighbourhood of the vertebra to which the head is attached. These creatures are as large as [30] the largest grubs; they grow altogether in a cluster, and they are usually about twenty in number.<sup>10</sup>

Deer then, as has been observed, are without a gall-bladder; their gut, however, is so bitter that even hounds refuse to eat it unless the animal is [506<sup>b</sup>1] exceptionally fat. With the elephant also the liver is unfurnished with a gallbladder, but when the animal is cut in the region where the organ is found in animals furnished with it, there oozes out a fluid resembling gall, in greater or less quantities. Of animals that take in sea-water and are furnished with a lung, the [5] dolphin is unprovided with a gall-bladder. Birds and fishes all have the organ, as also oviparous quadrupeds, all to a greater or a lesser extent. But of fishes some have the organ close to the liver, as the dog-fishes, the sheat-fish, the angel-fish, the smooth skate, the torpedo, and the lanky fishes, the eel, the pipe-fish, and the hammer-headed shark. The callionymus, also, has the gall-bladder close to the [10] liver, and in no other fish does the organ attain so great a relative size. Other fishes have the organ close to the gut, attached to the liver by certain extremely fine ducts. The bonito has the gall-bladder stretched alongside the gut and equalling it in length, and often a double fold of it. Others have the organ in the region of the gut; [15] in some cases far off, in others near; as the fishing-frog, the elops, the synagris, the muraena, and the sword-fish. Often animals of the same genus show this diversity of position; as, for instance, some congers are found with the organ attached close to the liver, and others with it detached from and below it. The case is much the same with birds: that is, some have the gall-bladder close to the stomach, and others close [20] to the gut, as the pigeon, the raven, the quail, the swallow, and the sparrow; some have it near at once to the liver and to the stomach as the aegocephalus; others have it near at once to the liver and the gut, as the falcon and the kite.

16 · Again, all viviparous quadrupeds are furnished with kidneys and a [25] bladder. Of the ovipara that are not quadrupedal there is no instance of an animal, whether fish or bird, provided with these organs. Of the ovipara that are quadrupedal, the turtle alone is provided with these organs of a magnitude to correspond with the other organs of the animal. In the turtle the kidney resembles the same organ in the ox; that is to say, it looks like one single organ composed of a number of small

ones. [The bison also resembles the ox in all its internal [30] parts.]<sup>11</sup>

17 · With all animals that are furnished with these parts, the parts are similarly situated, and with the exception of man, the heart is in the middle; in man, [507<sup>a</sup>1] however, as has been observed, the heart is placed a little to the left-hand side. In all animals the pointed end of the heart turns frontwards; only in fish it would at first sight seem otherwise, for the pointed end is turned not towards the breast, but towards the head and the mouth. And the apex is attached to a tube just where the [5] right and left gills meet together. There are other ducts extending from the heart to each of the gills, greater in the greater fish, lesser in the lesser; but in the large fishes the duct at the pointed end of the heart is a tube, white-coloured and exceedingly thick.

Fishes in some few cases have a gullet, as the conger and the eel; and in these [10] the organ is small.

In fishes that are furnished with an undivided liver, the organ lies entirely on the right side; where the liver is cloven from the root, the larger half of the organ is on the right side; for in some fishes the two parts are detached from one another, without any coalescence at the root, as is the case with the dog-fish. And there is [15] also a species of hare in what is named the Fig district, near Lake Bolbe, and elsewhere, which might be taken to have two livers owing to the length of the connecting ducts, similar to the structure in the lung of birds.

[20] The spleen in all cases is by nature on the left-hand side, and the kidneys also lie in the same position in all creatures that possess them. There have been known instances of quadrupeds under dissection, where the spleen was on the right hand and the liver on the left; but all such cases are regarded as monstrosities.

In all animals the wind-pipe extends to the lung, and the manner how, we shall [25] discuss hereafter; and the gullet, in all that have the organ, extends through the diaphragm into the stomach. For, as has been observed, most fishes have no gullet, but the stomach is united directly with the mouth, so that in some cases when big [30] fish are pursuing little ones, the stomach tumbles forward into the mouth.

All the afore-mentioned animals have a stomach, and one similarly situated, that is to say, situated directly under the midriff; and they have a gut connected therewith and closing at the outlet of the food at what is termed the rectum. However, animals present diversities in the structure of their stomachs. In the first place, of the viviparous quadrupeds, such of



the horned animals as are not furnished [35] with teeth in both jaws are furnished with four such chambers. These animals are those that are said to chew the cud. In these animals the gullet extends from the [507<sup>b</sup>1] mouth downwards along the lung, from the midriff to the big stomach; and this stomach is rough inside and partitioned. And connected with it near to the entry of the gullet is what from its appearance is termed the hair-net; for outside it is like the [5] stomach, but inside it resembles a knotted hair-net; and the hair-net is a great deal smaller than the stomach. Connected with this is the many-plies, rough inside and laminated, and of about the same size as the hair-net. Next after this comes what is [10] called the abomasum, larger and longer than the many-plies, furnished inside with numerous folds, large and smooth. After all this comes the gut.

Such is the stomach of those quadrupeds that are horned and do not have teeth in both jaws; and these animals differ one from another in the shape and size of the parts, and in the fact of the gullet reaching the stomach centrally in some cases and [15] sideways in others. Animals that are furnished equally with teeth in both jaws have one stomach; as man, the pig, the dog, the bear, the lion, the wolf. The stoat has all its internal organs similar to the wolf's.

All these, then have a single stomach, and after that the gut; but the stomach in some is comparatively large, as in the pig and bear, and the stomach of the pig [20] has a few smooth folds; others have a much smaller stomach, not much bigger than the gut, as the lion, the dog, and man. In the other animals the shape of the stomach varies in the direction of one or other of those already mentioned; that is, the stomach in some animals resembles that of the pig; in others that of the dog, alike [25] with the larger animals and the smaller ones. In all these animals diversities occur in regard to the size, the shape, the thickness or the thinness of the stomach, and also in regard to the place where the gullet opens into it.<sup>12</sup>

There is also a difference in the nature of the gut of the two groups of animals above mentioned (those which have teeth in both jaws and those which do not) in size, in thickness, and in foldings. [30]

The intestines in those animals which do not have teeth in both jaws are in all cases the larger, for the animals themselves are larger than those in the other category; for few of them are small, and no single one of the horned animals is very small. And some possess appendages to the gut, but no animal that does not have teeth in both jaws has a straight gut.

The elephant has a constricted gut, so that the animal appears to have four [35] stomachs; in it the food is found, but there is no distinct and separate receptacle. Its viscera resemble those of the pig, only that the liver is four times the size of that of [508<sup>a</sup>1] the ox, and the other viscera in like proportion, while the spleen is comparatively small.

Much the same may be said of the stomach and the gut in oviparous quadrupeds, as in the land tortoise, the turtle, the lizard, both crocodiles, and in [5] fact, in all animals of the like kind; that is to say, their stomach is one and simple, resembling in some cases that of the pig and in other cases that of the dog.

The serpent genus is similar and in almost all respects furnished similarly to the lizards among oviparous land animals, if one were to increase their length and [10] remove their feet. That is to say, the serpent is coated with the tessellations, and resembles the lizard in its back and belly; but it has no testicles, but, like fishes, has two ducts converging into one, and an ovary long and bifurcate. The rest of its internal organs are identical with those of the lizard, except that, owing to the [15] narrowness and length of the animal, the viscera are correspondingly narrow and elongated, so that they are apt to escape recognition from the similarities in shape. Thus, the windpipe of the creature is exceptionally long, and the gullet is longer still, and the windpipe commences so close to the mouth that the tongue appears to [20] be underneath it; and the windpipe seems to project over the tongue, owing to the fact that the tongue draws back into a sheath and does not remain in its place as in other animals. The tongue, moreover, is thin and long and black, and can be protruded to a great distance. And both serpents and lizards have this altogether exceptional property in the tongue, that it is forked at the end, and this property is [25] the more marked in the serpent, for the tips of its tongue are as thin as hairs. The seal, also, has a split tongue.

The stomach of the serpent is more like a more spacious gut, resembling the stomach of the dog; then comes the gut, long, narrow, and single to the end. The [30] heart is situated close to the pharynx, small and kidney-shaped; and for this reason the organ might in some cases appear not to have the pointed end turned towards the breast. Then comes the lung, single, and articulated with a fibrous passage, very long, and quite detached from the heart. The liver is long and simple; the spleen is short and round: as in the case in both respects with the lizard. Its gall resembles that of the fish; the water-snakes have it beside the liver, and the other snakes have [508<sup>b</sup>1] it usually beside the gut. These

creatures are all saw-toothed. Their ribs are as numerous as the days of the month; in other words, they are thirty in number.

Some affirm that the same phenomenon is observable with serpents as with [5] swallow-chicks: they say that if you prick out a serpent's eyes they will grow again. And further, the tails of lizards and of serpents, if they be cut off, will grow again.<sup>13</sup>

With fishes the properties of the gut and stomach are similar; that is, they have [10] a stomach single and simple, but variable in shape. For in some cases the stomach is gut-shaped,<sup>14</sup> as with the scarus—which appears to be the only fish that chews the cud. And the whole length of the gut is simple, and if it has a reduplication it loosens out again into a simple form.

An exceptional property in fishes and in birds for the most part is the being [15] furnished with gut-appendages. Birds have them low down and few in number. Fishes have them high up about the stomach, and sometimes numerous, as in the goby, the burbot,<sup>15</sup> the perch, the scorpaena, the citharus, the red mullet, and the sparus; the grey mullet has several of them on one side of the belly, and on the other [20] side only one. Some fish possess these appendages but only in small numbers, as the hepatus and the glaucus; and they are few also in the dorado. These fishes differ also from one another, for in the dorado one individual has many and another few. Some fishes are entirely without the part, as the majority of the selachians. As for all the rest, some of them have a few and some a great many. And in all fish the [25] gut-appendages are found close up to the stomach.

In regard to their internal parts birds differ from other animals and from one another. Some birds, for instance, have a crop in front of the stomach, as the cock, the cushat, the pigeon, and the partridge; and the crop consists of a large hollow [30] skin, into which the food first enters and where it lies undigested. Just where the crop leaves the gullet it is somewhat narrow; by and by it broadens out but where it communicates with the stomach it narrows down again. The stomach in most birds is fleshy and hard, and inside is a strong skin which comes away from the fleshy part. Other birds have no crop, but instead of it a gullet wide and roomy, either all [509a1] the way or in the part leading to the stomach, as with the daw, the raven, and the carrion-crow. The quail also has the gullet widened out at the lower extremity, and in the aegocephalus and the owl the organ is slightly broader at the bottom. The duck, the goose, the gull, the catarrhactes, and the great bustard have the gullet [5] wide and roomy from one end to the other, and the same applies to a great

many other birds. In some birds there is a portion of the stomach that resembles a crop, as in the kestrel. In the case of small birds like the swallow and the sparrow neither the gullet nor the crop is wide, but the stomach is long. Some few have neither a crop [10] nor a dilated gullet, but the latter is exceedingly long, as in long-necked birds, such as the porphyrio; and in the case of all these birds the excrement is unusually moist. The quail is exceptional in regard to these organs, as compared with other birds; for [15] it has a crop, and at the same time its gullet is wide and spacious in front of the stomach, and the crop is at some distance, relatively to its size, from the gullet at that part.

Further, in most birds, the gut is thin, and simple, when loosened out. The gut-appendages in birds, as has been observed, are few in number, and are not situated high up, as in fishes, but low down towards the extremity of the gut. Not all [20] birds have them, but most do such as the cock, the partridge, the duck, the night-raven, the localus,<sup>16</sup> the ascalaphus, the goose, the swan, the great bustard, and the owl. Some of the little birds also have these appendages, but very small ones, as in the sparrow.

## BOOK III

1 · Now that we have stated the magnitudes, the properties, and the relative differences of the other internal organs, it remains for us to treat of the organs that contribute to generation. These organs in the female are in all cases internal; in the [30] male they present numerous diversities.

In the blooded animals some males are altogether devoid of testicles, and some have the organ but situated internally; and of those males that have the organ internally situated, some have it close to the loin in the neighbourhood of the kidney [509<sup>b</sup>1] and others close to the belly. Other males have the organ situated externally. In the case of these last, the penis is in some cases attached to the belly, whilst in others it is loosely suspended, as is the case also with the testicles; and, in the cases where the penis is attached to the belly, the attachment varies accordingly as the animal urinates forwards or backwards.

No fish is furnished with testicles, nor any other creature that has gills, nor any serpent whatever: nor, in short, any animal devoid of feet, save such only as are [5] viviparous within themselves. Birds are furnished with testicles, but these are internally situated, close to the loin. The case is similar with oviparous quadrupeds, such as the lizard, the tortoise and the crocodile; and among the viviparous animals this peculiarity is found in the hedgehog. Others among those creatures that have the organ internally situated have it close to the belly, as in the case with the dolphin [10] amongst animals devoid of feet, and with the elephant among viviparous quadrupeds. In other cases these organs are externally conspicuous.

We have already alluded to the diversities observed in the attachment of these organs to the belly and the adjacent region: in some cases the testicles are connected closely at the back and do not hang free, as in the pig, and in others they are freely suspended, as in man. [15]

Fishes, then, are devoid of testicles, as has been stated, and serpents also. They are furnished, however, with two ducts connected with the midriff and running on to either side of the backbone, coalescing into a single duct above the outlet of the residuum, and by 'above' the outlet I mean the region near to the spine. These ducts [20] in the rutting season get filled with the genital fluid, and, if the ducts be squeezed, the sperm oozes out white in colour. As to the differences observed in male fishes of diverse species, the reader should consult the *Anatomies*, and the subject

will be hereafter more accurately discussed when we describe the specific character in each case.

[25] The males of oviparous animals, whether biped or quadruped, are in all cases furnished with testicles close to the loin underneath the midriff. With some animals the organ is whitish, in others somewhat of a sallow hue; in all cases it is enveloped with minute and delicate veins. From each of the two testicles extends a duct, and, as in the case of fishes, the two ducts coalesce into one above the outlet of the [30] residuum. This constitutes the penis, which in the case of small ovipara is inconspicuous; but in the case of the larger ovipara, as in the goose and the like, the organ becomes quite visible just after copulation.

The ducts both in fishes and in these animals are attached to the loin under the stomach between the gut and the great vein, from which ducts extend, one to each of [510<sup>a</sup>1] the two testicles. And just as with fishes the genital fluid is found in the ducts, and the ducts become plainly visible at the rutting season and in some instances become invisible after the season is passed, so also is it with the testicles of birds; before copulation the organ is small in some birds and quite invisible in others, but during [5] copulation the organ is greatly enlarged. This phenomenon is remarkably illustrated in the ring-dove and the partridge, so much so that some people are actually of opinion that these birds are devoid of testicles in the winter-time.

Of male animals that have their testicles placed frontwards, some have them inside, close to the belly, as the dolphin; some have them outside, exposed to view, close to the lower extremity of the belly. These animals resemble one another thus [10] far in respect to this organ; but they differ from one another in the fact, that some of them have their testicles situated separately by themselves, while others, which have the organ situated externally, have them enveloped in what is termed the scrotum.<sup>1</sup>

In all viviparous animals furnished with feet the following properties are observed in the testicles themselves. From the aorta there extend vein-like ducts to [15] the head of each of the testicles, and another two from the kidneys; these two are supplied with blood, while the two from the aorta are devoid of it. From the head of the testicle alongside of the testicle itself is a duct, thicker and more sinewy than the others, that bends back again at the end of the testicle to its head; and from the head [20] of each of the two testicles the two ducts extend until they coalesce in front at the penis. The duct that bends back again and that which is in contact with the testicle are enveloped in one and the same membrane, so

that, until you draw aside the membrane, they seem to be a single duct. Further, the duct in contact with the [25] testicle has its moist content qualified by blood, but to a comparatively lesser extent than in the case of the ducts higher up which are connected with the aorta;<sup>2</sup> in the ducts that bend back towards the tube of the penis, the liquid is white-coloured. There also runs a duct from the bladder, opening into the upper part of the tube, around which lies, sheath-wise, what is called the penis.

[30] All this may be studied by the light of the accompanying diagram; wherein the letter A marks the starting-point of the ducts that extend from the aorta; the letters KK mark the heads of the testicles and the ducts descending to them; the ducts extending from these along the testicles are marked ΩΩ the ducts turning back, in which is the white fluid, are marked BB; the penis Δ; the bladder E; and the testicles ΨΨ.

If the testicles themselves are cut off or removed, the ducts draw upwards by [510<sup>b</sup>1] contraction. Moreover, when male animals are young, people sometimes destroy the testicles by rubbing; sometimes they castrate them at a later period. And I may here add, that a bull has been known to serve a cow immediately after castration, and actually to impregnate her.

So much then for the properties of testicles in animals. [5]

In animals furnished with a womb, the womb is not in all cases the same in form or endowed with the same properties, but both in the vivipara and the ovipara great diversities present themselves. In all creatures that have the womb close to the genitals, the womb is forked and one fork lies to the right-hand side and the other to [10] the left; its commencement, however, is single, and so is the orifice, resembling in the case of the most numerous and largest animals a tube composed of much flesh and gristle. Of these parts one is termed the *hystera* or *delphys*, whence is derived ὀδελφός, and the other part, the tube or orifice, is termed *metra*. In all biped or [15] quadruped vivipara the womb is in all cases below the midriff, as in man, the dog, the pig, the horse, and the ox; the same is the case also in all horned animals. At the extremity of the so-called horns, the wombs of most animals have a convolution.

In the case of those ovipara that lay eggs externally, the wombs are not in all [20] cases similarly situated. Thus the wombs of birds are close to the midriff, and the wombs of fishes down below, just like the wombs of biped and quadruped vivipara, only that, in the case of the fish, the wombs are delicately formed, membranous, and elongated; so much so that in extremely small fish, each of the two bifurcated parts [25] looks like a single egg, and those fishes whose egg is described as crumbling

would appear to have inside them a pair of eggs, whereas in reality each of the two sides consists not of one but of many eggs, and this accounts for their breaking up into so many particles.

The womb of birds has the lower and tubular portion fleshy and firm, and the part close to the midriff membranous and exceedingly fine: so fine that the eggs might seem to be outside the womb altogether. In the larger birds the membrane is [30] more distinctly visible, and, if inflated through the tube, lifts and swells out; in the smaller birds all these parts are more indistinct.

The properties of the womb are similar in oviparous quadrupeds, as the tortoise, the lizard, the frog and the like; for the tube below is single and fleshy, and [511<sup>a</sup>1] the cleft portion with the eggs is at the top close to the midriff. With animals devoid of feet that are internally oviparous and viviparous externally, as is the case with the dogfish and the other so-called Selachians (and by this title we designate such [5] creatures destitute of feet and furnished with gills as are viviparous), with these animals the womb is bifurcate, and beginning down below<sup>3</sup> it extends as far as the midriff, as in the case of birds. There is<sup>4</sup> also a narrow part between the two forks running up as far as the midriff,<sup>5</sup> and the eggs are engendered here and<sup>6</sup> above at the [10] origin of the midriff; afterwards they pass into the wider space and turn from eggs into young animals. However, the differences in respect to the wombs of these fishes as compared with one another and with fishes in general, would be more accurately studied in their various forms in the *Anatomies*.

The members of the serpent genus also present divergencies either when [15] compared with the above-mentioned creatures or with one another. Serpents as a rule are oviparous, the viper being the only viviparous member of the genus though it is first internally oviparous; and owing to this peculiarity the properties of the womb in the viper are similar to those of the womb in the selachians. The womb of the serpent is long, in keeping with the body, and starting below from a single duct [20] extends continuously on both sides of the spine, so as to give the impression of thus being a separate duct on each side of the spine, until it reaches the midriff, where the eggs are engendered in a row; and these eggs are laid not one by one, but all strung together. [And all animals that are viviparous both internally and externally have the womb situated above the stomach, and all the ovipara underneath, near to [25] the loin. Animals that are viviparous externally and internally oviparous present an intermediate arrangement; for the underneath portion of the womb, in which the eggs are, is placed near to the loin, but the part about the



orifice is above the gut.]"<sup>7</sup>

Further, there is the following diversity observable in wombs as compared with one another: namely that the females of horned animals which do not have teeth in [30] both jaws are furnished with cotyledons in the womb when they are pregnant, and such is the case, among animals with teeth in both jaws, with the hare, the mouse, and the bat; whereas all other animals that have teeth in both jaws, and are viviparous and furnished with feet, have the womb quite smooth, and in their case the attachment of the embryo is to the womb itself and not to any cotyledon.

The parts, then, in animals that are not uniform, both parts external and parts internal, have the properties above assigned to them.

[511<sup>b</sup>1] **2** · In sanguineous animals the uniform part most universally found is the blood, and its habitat the vein; next in degree of universality, their analogues, lymph [5] and fibre, and, that which chiefly constitutes the body of animals, flesh and whatsoever in the several parts is analogous to flesh; then bone, and parts that are analogous to bone, as fish-bone and gristle; and then, again, skin, membrane, sinew, hair, nails, and whatever corresponds to these; and, furthermore, fat, suet, and the [10] excretions—dung, phlegm, yellow bile, and black bile.

Now, as the nature of blood and the nature of the veins have all the appearance of being fundamental, we must discuss their properties first of all, and all the more as some previous writers have treated them very unsatisfactorily. And the cause of the ignorance is the extreme difficulty experienced in the way of observation. For in [15] the dead bodies of animals the nature of the chief veins is undiscoverable, owing to the fact that they in particular collapse at once when the blood leaves them; for the blood pours out of them in a stream, like liquid out of a vessel, since there is no blood separately situated by itself, except a little in the heart, but it is all lodged in the veins. In *living* animals it is impossible to inspect these parts, for of their very nature [20] they are internal. For this reason those who have carried on their investigations on dead and dissected bodies have failed to discover the chief sources of the veins, while those who have narrowly inspected bodies of living men reduced to extreme attenuation have arrived at conclusions regarding the origin of the veins from the manifestations then visible externally. Syennesis, the physician of Cyprus, writes as follows:— [25]

‘The big veins run thus:—from the eye, across the eyebrow, along the

back, past the lung, in under the breasts; one from right to left, and the other from left to right; that from the left, through the liver to the kidney and the testicle, that from the right, to the spleen and kidney and testicle, and thence to the penis’.

Diogenes of Apollonia writes thus:— [30]

‘The veins in man are as follows:—There are two veins pre-eminent in magnitude. These extend through the belly along the backbone, one to right, one to left; either one to the leg on its own side, and upwards to the head, past the collar bones, through the throat. From these, veins extend all over the body, from that on [512<sup>a</sup>1] the right hand to the right side and from that on the left hand to the left side; the most important ones, two in number, to the heart in the region of the backbone; others a little higher up through the chest in underneath the armpit, each to the hand on its own side, one being termed the splenetic, and the other the hepatic. [5] Each of the pair splits at its extremity; the one branches in the direction of the thumb and the other in the direction of the palm; and from these run off a number of minute veins branching off to the fingers and to all parts of the hand. Other veins, more minute, extend from the main veins; from that on the right towards the liver, [10] from that on the left towards the spleen and the kidneys. The veins that run to the legs split at the juncture of the legs with the trunk and extend right down the thigh. The largest of these goes down the thigh at the back of it, and can be discerned as a big one; the second one runs inside the thigh, not quite as big as the one just [15] mentioned. After this they pass on along the knee to the shin and the foot, like those which lead towards the hands<sup>8</sup> and arrive at the sole of the foot, and from thence continue to the toes. Moreover, many delicate veins separate off from the great veins towards the stomach and the ribs. [20]

‘The veins that run through the throat to the head can be discerned in the neck as large ones; and from each one of the two, where it terminates, there branch off a number of veins to the head those from the right side towards the left, and those from the left side towards the right; and the two veins terminate near to the ears. There is another vein in the neck running along the big vein on either side, slightly [25] less in size than it, and with these the greater part of the veins in the head are connected. They run through the throat inside; and from either one of the two there extend veins in underneath the shoulder blade and towards the hands; and these appear alongside the splenetic and hepatic veins as another pair of veins smaller in [30] size. When there is a pain near the surface of the body, the physician lances these two latter veins; but when the pain is

in the region of the stomach he lances the splenetic and hepatic veins. And from these, other veins depart to run below the breasts.

[512<sup>b</sup>1] 'There is also another pair running on each side through the spinal marrow to the testicles, thin and delicate. There is, further, a pair running beneath the skin through the flesh to the kidneys, and these with men terminate at the testicle, and with women at the womb. These are termed the spermatic veins.<sup>9</sup> The veins that [5] leave the stomach are comparatively broad just as they leave; but they become thinner, until they change over from right to left and from left to right.

'Blood is thickest when it is imbibed by the fleshy parts; when it is transmitted [10] to the regions above-mentioned, it becomes thin, warm, and frothy'.

3 · Such are the accounts given by Syennesis and Diogenes. Polybus writes to the following effect:—

'There are four pairs of veins. The first extends from the back of the head, [15] through the neck on the outside, past the backbone on either side, until it reaches the loins and passes on to the legs, after which it goes on through the shins to the outer side of the ankles and on to the feet. And it is on this account that surgeons, for pains in the back and loin, bleed in the ham and in the outer side of the ankle. [20] Another pair of veins runs from the head, past the ears, through the neck: they are termed the jugular veins. This pair goes on inside along the backbone, past the muscles of the loins, on to the testicles, and onwards to the thighs, and through the inside of the hams and through the shins down to the inside of the ankles and to the [25] feet; and for this reason, surgeons, for pains in the muscles of the loins and in the testicles, bleed on the hams and the inner side of the ankles. The third pair extends from the temples, through the neck, in underneath the shoulder-blades, into the lung; the one running from right to left in underneath the breast and on to the spleen [30] and the kidney; the other from left to right from the lung in underneath the breast and into the liver and the kidney; and both terminate in the rectum. The fourth pair [513<sup>a</sup>1] extend from the front part of the head and the eyes in underneath the neck and the collar-bones; from thence they stretch on through the upper part of the upper arms to the elbows and then through the fore-arms on to the wrists and the jointings of [5] the fingers, and also through the lower part of the upper-arms to the armpits, and so on, keeping above the ribs, until one of the pair reaches the spleen and the other reaches the liver; and after this

they both pass over the stomach and terminate at the penis'.

That, pretty well, is what others have said. There are also some writers on [10] nature who have not dealt in such precise terms with the veins, but who all alike agree in assigning the head and the brain as the starting-point of the veins. And in this opinion they are mistaken.

The investigation of such a subject, as has been remarked, is one fraught with difficulties; but, if any one is keenly interested in the matter, he will get an adequate grasp of it only if he studies strangled animals which have been previously emaciated. [15]

The nature of the veins is as follows. There are two veins in the thorax by the backbone, and lying to its inner side; and of these two the larger one is situated to the front, and the lesser one is to the rear of it; and the larger is situated rather to the right-hand side of the body, and the lesser one to the left; and by some this vein is termed the aorta, from the fact that even in dead bodies they have observed the [20] sinewy part of it. These have their origins in the heart, for they traverse the other viscera, in whatever direction they happen to run, without in any way losing their distinctive characteristic as veins, whereas the heart is as it were a part of them (and that too more in respect to the frontward and larger one of the two), owing to the [25] fact that these two veins are above and below, with the heart lying midway.

The heart in all animals has cavities inside it. In the case of the very small animals the largest of the chambers is scarcely discernible; the second larger is scarcely discernible in animals of medium size; but in the largest animals all three [30] chambers are distinctly seen. In the heart then (with its pointed end directed frontwards, as has been observed) the largest of the three chambers is on the right-hand side and highest up; the least one is on the left-hand side; and the medium-sized one lies between the other two; and the largest one of the three chambers is a great deal larger than either of the two others. All three, however, are [35] connected with passages leading in the direction of the lung, but all these communications are indistinctly discernible by reason of their minuteness, except [513<sup>b</sup>1] one.

The great vein, then, is attached to the biggest of the three chambers, the one that lies uppermost and on the right-hand side; it then extends right through the chamber, coming out as a vein again; just as though the cavity were a part of the vessel, in which the blood forms a lake. The aorta is attached to the middle [5] chamber; but the arrangement is dissimilar, and it is connected with it by a much narrower pipe.

The vein then passes through the heart and a passage runs from the heart into the aorta. The great vein looks as though made of membrane or skin, while the aorta is narrower than it, and is very sinewy; and as it stretches away to the head and to [10] the lower parts it becomes exceedingly narrow and sinewy.

First of all, then, upwards from the heart there stretches a part of the great vein towards the lung and the attachment of the aorta, a large undivided vessel. But there split off from it two parts; one towards the lung and the other towards the [15] backbone and the last vertebra of the neck.

The vein that extends to the lung, as the lung itself is duplicate, divides at first into two; and then extends along by every pipe and every perforation, greater along the greater ones, lesser along the less, so that it is impossible to discern a single part [20] wherein there is not both perforation and vein; for the extremities are indistinguishable from their minuteness, and the whole lung appears to be filled with blood. The passages from the vein lie above the tubes that extend from the windpipe. And the vein which extends to the vertebra of the neck and the backbone, stretches back [25] again along the backbone; as Homer represents in the lines:—

He cut through all that vein  
which runs along the back right to the neck.<sup>10</sup>

[30] From this vessel there extend small veins past each rib and each vertebra; and at the vertebra above the kidneys the vessel bifurcates. And in the above way the parts branch off from the great blood-vessel.

But up above all these, from that part which is connected with the heart, the entire vein branches off in two directions. The one set extend to the sides and to the collar-bones, and then pass on through the armpits, in men to the arms, in [514<sup>a</sup>1] quadrupeds to the forelegs, in birds to the wings, and in fishes to the upper fins. The origins of these veins, where they first branch off, are called the jugular veins; and [5] where they branch off to the neck they run alongside the windpipe; and, occasionally, if these veins are pressed externally, men, though not actually choked, become insensible, shut their eyes, and fall to the ground. Extending in the way described and keeping the windpipe in between them, they pass on until they reach the ears at [10] the junction of the lower jaw with the skull. Hence again they branch off into four veins, of which one bends back and descends through the neck and the shoulder, and meets the

previous branching off of the vein at the bend of the arm, while the rest of it terminates at the hand and fingers.

[15] Each vein of the other pair stretches from the region of the ear to the brain, and branches off in a number of fine and delicate veins into the so-called meninx which surrounds the brain. The brain itself in all animals is destitute of blood, and no vein, [20] great or small terminates there. But of the remaining veins that branch off from the last-mentioned vein some encircle the head, others end their courses in the organs of sense and at the teeth in exceedingly fine small veins.

4 · And in like manner the parts of the lesser vein, designated the aorta, [25] branch off, accompanying the branches from the big vein; only that, in regard to the aorta, the passages are less in size, and the branches very considerably less than are those of the great vein. So much for the veins as observed in the regions above the heart.

[30] The part of the great vein that lies underneath the heart extends, freely suspended, right through the midriff, and is united both to the aorta and the backbone by slack membranous passages. From it one vein, short and wide, extends through the liver, and from it a number of minute veins branch off into the liver and [35] disappear. From the vein that passes through the liver two branches separate off, of which one terminates in the diaphragm or so-called midriff, and the other runs up [514<sup>b</sup>1] again through the armpit into the right arm and unites with the other veins at the inside of the bend of the arm; and that is why when the surgeon opens this vein, the patient is relieved of certain pains in the liver; and from the left-hand side of it there extends a short but thick vein to the spleen and the little veins branching off it [5] disappear in that organ. Another part branches off from the left-hand side of the great vein, and ascends in the same way into the left arm; only that in the one case it is the vein that traverses the liver, while in this case it is distinct from the vein that runs into the spleen.

Again, other veins branch off from the big vein; one to the omentum, and [10] another to the pancreas, from which vein run a number of veins through the mesentery. All these veins terminate in a single large vein, which extends along the entire gut and stomach to the oesophagus; about these parts many veins branch off. [15]

As far as the kidneys, each of the two remaining undivided, the aorta and the big vein extend; and here they get more closely attached to the backbone, and branch off, each of the two, into a  $\Lambda$  shape, and the big

vein gets to the rear of the aorta. But the chief attachment of the aorta to the backbone takes place in the [20] region of the heart; and the attachment is effected by means of minute and sinewy vessels. The aorta, just as it draws off from the heart, is a tube of considerable volume, but, as it advances in its course, it gets narrower and more sinewy. And from the aorta there extend veins to the mesentery just like the veins from the big vein, only that they are considerably less in magnitude; they are, indeed, narrow and [25] fibrous, and they end in delicate and complex fibre-like veinlets.

There is no vessel that runs from the aorta into the liver or the spleen.

From each of the two great blood-vessels there extend branches to each of the two flanks, and both branches fasten on to the bone. Vessels also extend to the [30] kidneys from the big vein and the aorta; only that they do not open into the cavity but into the body of the kidney. From the aorta run two other ducts to the bladder, firm and continuous; and there are other ducts from the hollow of the kidneys, in no way communicating with the big vein. From the centre of each of the two kidneys [35] springs a hollow sinewy vein, running along the backbone right through the narrow parts; by and by each of the two veins first disappears in its own flank, and soon [515<sup>a</sup>1] afterwards reappears stretching in the direction of the flank.<sup>11</sup> The extremities of these attach to the bladder,<sup>12</sup> and also in the male to the penis and in the female to the womb. From the big vein no vein extends to the womb, but the organ is [5] connected with the aorta by veins numerous and closely packed.

Furthermore, from the aorta and the great vein at the points of branching there come other veins. Some of these run first to the groins—large hollow veins—and then pass on down through the legs and terminate in the feet and toes. And, again, another set run through the groins and the thighs, from right to left and [10] from left to right, and unite in the hams with the other veins.

In the above description we have thrown light upon the course of the veins and their points of departure.

In all sanguineous animals the case stands as here set forth in regard to the points of departure and the chief veins. But the description does not hold equally [15] good for the entire vein-system in all these animals. For, in point of fact, the parts are not identically situated in them all, nor do all animals have the same parts. Furthermore, things are not equally clear in all cases—they are clearest in the case of animals of considerable magnitude and supplied abundantly with blood. For in [20] little animals and those scantily supplied with blood, either from natural causes or from

a prevalence of fat in the body, it is less easy to discover the arrangement; for in the latter of these creatures the passages get clogged, like water-channels choked [25] with mud; and the others have a few minute fibres instead of veins. But in all cases the big vein is plainly discernible, even in creatures of insignificant size.

5 · The sinews of animals are arranged as follows. For these also the point of origin is the heart; for the heart has sinews within itself in the largest of its three [30] chambers, and the aorta is a sinew-like vein; in fact, at its extremity it is actually a sinew, for it is there no longer hollow, and is stretched like the sinews where they terminate at the jointings of the bones. Nevertheless, the sinews do not proceed in unbroken sequence from one point of origin, as do the blood-vessels.

For the veins have the shape of the entire body, like a sketch of a mannikin; in [515<sup>b</sup>1] such a way that the whole frame seems to be filled up with little veins in very attenuated subjects—for the space occupied by flesh in fat individuals is filled with little veins in thin ones—whereas the sinews are distributed about the joints and the [5] flexures of the bones. Now, if the sinews were continuous, this continuity would be discernible in attenuated specimens.

In the ham, or the part which controls the act of jumping, is an important system of sinews; and another sinew, a double one, is that called the tendon, and others are those brought into play when a great effort of physical strength is required; that is to say, the epitonos and the shoulder-sinews. Other sinews, devoid [10] of specific designation, are situated in the region of the flexures of the bones; for all the bones that are attached to one another are bound together by sinews, and a great quantity of sinews are placed in the neighbourhood of all the bones. But in the head there is no sinew; but the head is held together by the sutures of the bones.

[15] Sinew is fissile lengthwise, but crosswise it is not easily broken, but admits of a considerable amount of tension. Around the sinews a liquid mucus is developed, white and glutinous, and they are sustained by it and appear to be composed of it. Now, vein may be cauterized, but sinew, when cauterized, is completely destroyed; [20] and, if sinews be cut asunder, the severed parts will not again cohere. A feeling of numbness is incidental only to parts of the frame where sinew is situated.

There is a very extensive system of sinews connected severally with the feet, the hands, the ribs, the shoulder-blades, the neck, and the arms.



All animals supplied with blood are furnished with sinews; but in the case of animals that have no flexures to their limbs, but are destitute of feet and hands, the [25] sinews are fine and inconspicuous; and so the sinews in the fish are chiefly discernible.

6 · Fibres are intermediate between sinew and vein. Some of them are supplied with fluid, the lymph; and they pass from sinew to vein and from vein to [30] sinew. There is another kind of fibre that is found in blood, but not in the blood of all animals alike. If this fibre be left in the blood, the blood will coagulate; if it be removed, the blood does not coagulate. While, however, this fibrous matter is found in the blood of the great majority of animals, it is not found in the blood of the deer, the roe, the antelope, and some other animals; and so the blood of these animals does not coagulate to the extent observed in the blood of other animals. The blood of the [516<sup>a</sup>1] deer coagulates to about the same extent as that of the hare: that is to say, the blood in either case coagulates, but not into a stiff substance, like the blood of ordinary animals, but only into a flaccid consistency like that of milk which is not subjected to the action of rennet. The blood of the antelope admits of a firmer consistency in [5] coagulation; for in this respect it resembles, or only comes a little short of, the blood of sheep. Such are the properties of vein, sinew, and fibrous tissue.

7 · The bones in animals are all connected with one single bone, and are continuous with one another, like the veins and there is no instance of a bone standing apart by itself.

In all animals furnished with bones, the backbone is the point of origin. The [10] spine is composed of vertebrae, and it extends from the head down to the loins. The vertebrae are all perforated, and, above, the bony portion of the head is connected with the topmost vertebrae, and is designated the skull. And the serrated lines on the skull are termed sutures. [15]

The skull is not formed alike in all animals. In some animals the skull consists of one single bone, as in the case of the dog; in others it is composite in structure, as in man; and in the human species the suture is circular in the female, while in the male it is made up of three separate sutures, uniting above in three-corner fashion; and instances have been known of a man's skull being devoid of suture altogether. [20] The skull is composed not of four bones, but of six; two of these are in the region of

the ears, small in comparison with the other four. From the skull extend the jaws, constituted of bone. [Animals in general move the lower jaw; the river-crocodile is [25] the only animal that moves the upper one.]<sup>13</sup> In the jaws is the tooth-system; and the teeth are constituted of bone, and are partly perforated, partly not; and this is the only kind of bone which it is impossible to grave with a graving tool.

On the upper part of the course of the backbone<sup>14</sup> are the collar-bones and the ribs. The chest rests on ribs; and these ribs meet together, whereas the others do not; [30] for no animal has bone in the region of the stomach. Then come the shoulder-bones, or blade-bones, and the arm-bones connected with these, and the bones in the hands connected with the bones of the arms. With animals that have forelegs, the bones of the foreleg resemble those of the arm in man.

At the lower end of the backbone, after the haunch-bone, comes the hip-socket; [35] then the leg-bones, those in the thighs and those in the shins, which are termed limb-bones, a part of which is the ankle, while a part of the same is the so-called [516<sup>b</sup>1] plectrum in those creatures that have an ankle;<sup>15</sup> and connected with these bones are the bones in the feet.

Now, with all animals that are supplied with blood and furnished with feet, and are at the same time viviparous, the bones do not differ greatly one from another, but only in the way of relative hardness, softness, or magnitude. Again, in [5] one and the same animal certain bones are supplied with marrow, while others are destitute of it. Some animals might appear to have no marrow whatsoever in their bones—e.g. the lion—since they have marrow only in small amount, poor and thin, and in very few bones; for marrow is found in the thigh and arm-bones. The bones of [10] the lion are exceptionally hard; so hard, in fact, that if they are rubbed against one another they emit sparks like flint-stones. The dolphin has bones, and not fish-spine.

Of the other animals supplied with blood, some differ but little, as is the case [15] with birds; others have systems analogous, as fishes; for viviparous fishes, such as the Selachia, are gristle-spined, while the ovipara have a spine which corresponds to the backbone in quadrupeds. This exceptional property has been observed in fishes, that in some of them there are found delicate spines scattered here and there throughout the fleshy parts. The serpent is similarly constructed to the fish; in other [20] words, his backbone is spinous. With oviparous quadrupeds, the skeleton of the larger ones is more osseous; of the smaller ones, more spinous. But all sanguineous animals have a backbone of either one kind or other: that is, composed either of bone or of spine.

The other portions of the skeleton are found in some animals and not found in [25] others, but the presence or the absence of this and that part carries with it, as a matter of course, the presence or the absence of the bones. For animals that are destitute of arms and legs cannot be furnished with limb-bones; and in like manner with animals that have the same parts, but yet have them unlike in form; for in these animals the bones differ in the way of excess or defect, or in the way of analogy. So [30] much for the osseous systems in animals.

8 · Gristle is of the same nature as bone, but differs from it in the way of excess or defect. And just like bone, cartilage also, if cut, does not grow again. In [35] terrestrial viviparous sanguinea the gristle formations are unperforated, and there is no marrow in them as there is in bones; in the selachia, however—for they are [517<sup>a</sup>1] gristle-spined—there is found<sup>16</sup> in region of the backbone, a gristle-like substance analogous to bone, and in this there is a liquid resembling marrow. In viviparous animals furnished with feet, gristle formations are found in the region of the ears, in [5] the nostrils, and around certain extremities of the bones.

9 · Furthermore, there are parts of other kinds, neither identical with, nor altogether diverse from, the parts above enumerated: such as nails, hooves, claws, and horns; and also, beaks, such as birds are furnished with—all in the several [10] animals that are furnished therewith. All these parts are flexible and fissile; but bone is neither flexible nor fissile, but frangible.

And the colours of horns and nails and claw and hoof follow the colour of the skin and the hair. For according as the skin of an animal is black, or white, or of [15] medium hue, so are the horns, the claws, or the hooves, as the case may be, of hue to match. And it is the same with nails. The teeth, however, follow after the bones. Thus in black men, such as the Aethiopians and the like, the teeth and bones are white, but the nails are black, like the whole of the skin. [20]

Horns in general are hollow at their point of attachment to the bone which juts out from the head inside the horn, but they have a solid portion at the tip, and they are simple in structure. In the case of the stag alone of all animals the horns are solid throughout, and ramify into branches. And, whereas no other animal is known to shed its horns, the deer sheds its horns annually, unless it has been castrated; and [25] with

regard to the effects of castration in animals we shall speak hereafter. Horns attach rather to the skin than to the bone; which will account for the fact that there are found in Phrygia and elsewhere cattle that can move their horns as freely as their ears.

Of animals furnished with nails—and all animals have nails that have toes, [30] and toes that have feet,<sup>17</sup> except the elephant; and the elephant has toes undivided and slightly articulated, but has no nails whatsoever—of animals furnished with nails, some are straight-nailed, like man; others are crooked-nailed, as the lion [517<sup>b</sup>1] among animals that walk, and the eagle among animals that fly.

**10** · The following are the properties of hair and of parts analogous to hair, and of skin. All viviparous animals furnished with feet have hair; all oviparous animals furnished with feet have horn-like tessellates; fishes, and fishes only, have [5] scales—that is, such oviparous fishes as have the crumbling egg. For the lanky fishes, the conger has no such egg, nor the muraena, and the eel has no egg at all.

The hair differs in the way of thickness and fineness, and of length, according to the locality of the part in which it is found, and according to the quality of skin on [10] which it grows. For, as a general rule, the thicker the hide, the harder and the thicker is the hair; and the hair is inclined to grow in abundance and to a great length in localities of the bodies hollow and moist, if the localities be fitted for the growth of hair at all. The facts are similar in the case of animals coated with scales or with tessellates. With soft-haired animals the hair gets harder with good feeding, [15] and with bristly animals it gets softer and scantier from the same cause. Hair differs in quality also according to the heat or coldness of the locality: just as the hair in man is hard in warm places and soft in cold ones. Again, straight hair is inclined to be soft, and curly hair to be bristly. [20]

**11** · Hair is naturally fissile, and in this respect it differs in degree in diverse animals. In some animals the hair goes on gradually hardening into bristle until it no longer resembles hair but spine, as in the case of the hedgehog. And in like manner with the nails; for in some animals the nail differs as regards hardness in no [25] way from bone.

Of all animals man has the most delicate skin: that is, if we take into consideration his relative size. In the skin of all animals there is a mucous

liquid, scanty in some animals and plentiful in others, as, for instance, in the hide of the ox; [30] for men manufacture glue out of it. (In some places glue is manufactured from fishes also.)<sup>18</sup> The skin, when cut, is in itself devoid of sensation; and this is especially the case with the skin on the head, owing to there being no flesh between [518<sup>a</sup>1] it and the skull. And wherever the skin is quite by itself, if it be cut asunder, it does not grow together again, as is seen in the thin part of the jaw, in the prepuce, and the eyelid. In all animals the skin is one of the parts that extends continuous and unbroken, and it comes to a stop only where the natural ducts pour out their contents, and at the mouth and nails.

[5] All sanguineous animals, then, have skin; but not all such animals have hair, save only under the circumstances described above. The hair changes its colour as animals grow old, and in man it turns white. With animals, in general, the change takes place, but not very obviously except in the case of the horse. Hair turns grey from the point backwards to the roots. But, in the majority of cases, grey hairs are [10] white from the beginning; and this is a proof that greyness of hair does not, as some believe to be the case, imply withering; for no part is brought into existence in a withered condition.

In the eruptive malady called the white-sickness all the hairs get grey; and instances have been known where the hair became grey while the patients were ill of the malady, whereas the grey hairs shed off and black ones replaced them on their [15] recovery. [Hair is more apt to turn grey when it is kept covered than when exposed to the action of the outer air.]<sup>19</sup> In men, the hair over the temples is the first to turn grey, and the hair in the front grows grey sooner than the hair at the back; and the hair on the pubes is the last to change colour.

Some hairs are congenital, others grow after the maturity of the animal; but [20] this occurs in man only. The congenital hairs are on the head, the eyelids, and the eyebrows; of the later growths the hairs on the pubes are the first to come, then those under the armpits, and, thirdly, those on the chin; for the regions where congenital growths and the subsequent growths are found are equal in number. The [25] hair on the head grows scanty and sheds out to a greater extent and sooner than all the rest. But this remark applies only to hair in front; for no man ever gets bald at the back of his head. Smoothness on the top of the head is termed baldness, but smoothness on the eyebrows is called *anaphalanthiasis*; and neither of these conditions of baldness supervenes in a man until he has entered upon sexual activity. [30] For no boy ever gets bald, no woman, and no castrated man. In fact, if a man be castrated

before reaching puberty, the later growths of hair never come at all; and, if the operation take place subsequently, the after-growths, and these only, shed off, except that on the pubes.

Women do not grow hairs on the chin; except that a scanty beard grows on some women after the monthly periods have stopped; and a similar phenomenon is observed at times in priestesses in Caria, but these cases are looked upon as portentous with regard to coming events. The other after-growths are found in [518<sup>b</sup>1] women, but more scanty and sparse. Men and women are at times born incapable of the after-growths; and of them, those who are destitute even of the growth upon the pubes are constitutionally impotent.

Hair as a rule grows more or less in length as the wearer grows in age; chiefly [5] the hair on the head, then that in the beard, and fine hair grows longest of all. With some people as they grow old the eyebrows grow thicker, to such an extent that they have to be cut off; and this growth is owing to the fact that the eyebrows are situated at a conjuncture of bones, and these bones, as age comes on, draw apart and exude a gradual increase of moisture. The eyelashes do not grow in size, but they shed when [10] the wearer enters on sexual activity, and shed all the quicker as this activity is the more powerful; and these are the last hairs to grow grey.

Hairs if plucked out before maturity grow again; but they do not grow again if plucked out afterwards. Every hair is supplied with a mucous moisture at its root, and immediately after being plucked out it can lift light articles if it touch them with this mucus.

Animals that admit of diversity of colour in the hair admit of a similar [15] diversity to start with in the skin and in the cuticle of the tongue.

In some cases the upper lip and the chin is thickly covered with hair, and in other cases these parts are smooth and the cheeks are hairy; and smooth-chinned men are less inclined to baldness.

The hair is inclined to grow in certain diseases, especially in consumption, and [20] in old age, and after death; and under these circumstances the hair hardens, and the same phenomenon is observable in respect of the nails.

In the case of men of strong sexual passions the congenital hairs shed the sooner, while the hairs of the aftergrowths are the quicker to come. When men are [25] afflicted with varicose veins they are less inclined to take on baldness; and if they be bald when they become thus afflicted,

some get their hair again.

If a hair be cut, it does not grow at the point of section; but it gets longer by growing upward from below. In fishes the scales grow harder and thicker, and when the animal gets emaciated or is growing old the scales grow harder. In quadrupeds [30] as they grow old the hair in some and the wool in others gets deeper but scantier in amount: and the hooves or claws get larger in size; and the same is the case with the beaks of birds. The claws also increase in size, as do also the nails.

12 · With regard to winged animals, such as birds, no creature is liable to [519<sup>a</sup>1] change of colour by reason of age, excepting the crane. The wings of this bird are ash-coloured at first, but as it grows old the wings get black. Again, owing to special climatic influences, as when unusual frost prevails, a change is sometimes observed to take place in birds whose plumage is of one uniform colour; thus, birds that have dark or black plumage turn white, as the raven, the sparrow, and the swallow; but [5] no case has been known of a change of colour from white to black. [Further, most birds change the colour of their plumage at different seasons of the year, so much so that a man ignorant of their habits might be mistaken as to their identity.]<sup>20</sup>

[10] Some animals change the colour of their hair with a change in their drinking-water, for the same species of animal is found white in one district and black in another. And in regard to the commerce of the sexes, water in many places is of such peculiar quality that rams, if they have intercourse with the female after drinking it, beget black lambs, as is the case with the water of the Psychrus, a river [15] in the district of Assyritis in the Chalcidic Peninsula, on the coast of Thrace; and in Antandria there are two rivers of which one makes the lambs white and the other black. The river Scamander also has the reputation of making lambs yellow, and that is the reason, they say, why Homer designates it the Yellow River instead of the Scamander.<sup>21</sup>

[20] Animals as a general rule have no hair on their internal surfaces, and, in regard to their extremities, they have hair on the upper, but not on the lower side.

The hare is the only animal to have hair inside its mouth and underneath its feet. Further, the moustache-whale<sup>22</sup> instead of teeth has hairs in its mouth resembling pigs' bristles.

[25] Hairs after being cut grow at the bottom but not at the top; if feathers be cut off, they grow neither at top nor bottom, but shed and fall

out. Further, the bee's wing will not grow again after being plucked off, nor will the wing of any creature that has undivided wings. Neither will the sting grow again if the bee lose it, but the creature will die of the loss.

[30] **13** · In all sanguineous animals membranes are found. And membrane resembles a thin close-textured skin, but its qualities are different, as it admits neither of cleavage nor of extension. Membrane envelops each one of the bones and each one of the viscera, both in the larger and the smaller animals; though in the [519<sup>b</sup>1] smaller animals the membranes are indiscernible from their extreme tenuity and minuteness. The largest of all the membranes are the two that surround the brain, and of these two the one that lines the bony skull is stronger and thicker than the one that envelops the brain; next in order of magnitude comes the membrane that [5] encloses the heart. If membrane be bared and cut asunder it will not grow together again, and the bone thus stripped of its membrane mortifies.

**14** · The omentum is membrane. All sanguineous animals are furnished with this organ; but in some animals it is supplied with fat, and in others it is devoid of it. The omentum has both its starting-point and its attachment, with ambidental [10] vivipara, in the centre of the stomach, where the stomach has a kind of suture; in non-ambidental vivipara it has its starting-point and attachment in the chief of the stomachs.

**15** · The bladder also is of the nature of membrane, but of membrane peculiar in kind, for it is extensile. The organ is not common to all animals, but, while it is found in all the vivipara, the tortoise is the only oviparous animal that is [15] furnished therewith. The bladder if cut asunder will not grow together again, unless the section be just at the commencement of the urethra: except indeed in very rare cases, for instances of healing have been known to occur. After death, the organ passes no liquid excretion; but in life it passes at times dry excretion also, which turns into stones in the case of sufferers from that malady. Indeed, instances have [20] been known of concretions in the bladder indistinguishable from cockle-shells.

Such are the properties, then, of vein, sinew and skin, of fibre and membrane, of hair, nail, claw and hoof, of horns, of teeth, of beak, of gristle, of bones, and of parts that are analogous to these. [25]



16 · Flesh, and that which is by nature akin to it in sanguineous animals, is in all cases situated in between the skin and the bone, or the substance analogous to bone; for just as spine is a counterpart of bone, so is the flesh-like substance to flesh, in the case of animals that have bones and spine. [30]

Flesh can be divided asunder in any direction, not lengthwise only as is the case with sinew and vein. When animals are subjected to emaciation the flesh disappears, and the creatures become a mass of veins and fibres; when they are over fed, fat takes the place of flesh. Where the flesh is abundant in an animal, its veins are somewhat small and the blood abnormally red; the viscera also and the stomach [520<sup>a</sup>1] are diminutive; whereas with animals whose veins are large the blood is somewhat black, the viscera and the stomach are large, and the flesh is somewhat scanty. And animals with small stomachs are disposed to take on flesh. [5]

17 · Again, fat and suet differ from one another. Suet is frangible in all directions and congeals if subjected to extreme cold, whereas fat can melt but cannot congeal; and soups made of the flesh of animals supplied with fat do not congeal, as is found with horse-flesh and pork; but soups made from the flesh of animals supplied with suet do coagulate, as is seen with mutton and goat's flesh. [10] Further, fat and suet differ as to their localities; for fat is found between the skin and flesh, but suet is found only at the limit of the fleshy parts. Also, in animals supplied with fat the omentum is supplied with fat, and it is supplied with suet in animals supplied with suet. Moreover, ambidental animals are supplied with fat, and non-ambidentals with suet. [15]

Of the viscera the liver in some animals becomes fatty, as, among fishes, is the case with the selachia, by the melting of whose livers an oil is manufactured. The selachia themselves have no free fat at all in connexion with the flesh or with the stomach. The suet in fish is fatty, and does not congeal. All animals are furnished [20] with fat, either intermingled with their flesh, or apart. Such as have no free fat are less fat than others in stomach and omentum, as the eel; for it has only a scanty supply of suet about the omentum. Most animals take on fat in the belly, especially [25] such animals as are little in motion.

The brains of animals supplied with fat are oily, as in the pig; of animals supplied with suet, dry. But it is about the kidneys more than any other viscera that animals are inclined to take on fat; and the right kidney

is always less supplied with [30] fat, and, be the two kidneys ever so fat, there is always a space devoid of fat in between the two. Animals supplied with suet are specially apt to have it about the kidneys, and especially the sheep; for this animal is apt to die from its kidneys being entirely enveloped. Fat about the kidney is induced by overfeeding, as is found at [520<sup>b</sup>1] Leontini in Sicily; and consequently in this district they defer driving out sheep to pasture until the day is well on, to reduce the amount they eat.

**18** · The part around the pupil of the eye is fatty in all animals, and this part [5] resembles suet in all animals that possess such a part and that are not furnished with hard eyes.

Fat animals, whether male or female, are poor breeders. Animals are disposed to take on fat more when old than when young, and especially when they have attained their full breadth and their full length and are beginning to grow depth-ways.

[10] **19** · And now to proceed to the consideration of the blood. In sanguineous animals blood is the most universal and the most indispensable part; and it is not an acquired part, but it belongs to all animals that are not moribund. All blood is contained in a vascular system, to wit, the veins, and is found nowhere else, excepting in the heart. Blood is not sensitive to touch in any animal, any more than [15] the excretions of the stomach; and the case is similar with the brain and the marrow. When flesh is lacerated, blood exudes, if the animal be alive and unless the flesh be gangrened. Blood in a healthy condition is naturally sweet to the taste, and red in [20] colour; blood that deteriorates from natural decay or from disease is more or less black. Blood at its best, before it undergoes deterioration from either natural decay or disease, is neither very thick nor very thin. In the living animal it is always liquid and warm, but, on issuing from the body, it coagulates in all cases except in the case [25] of the deer, the roe, and the like animals; for, as a general rule, blood coagulates unless the fibres be extracted. Bull's blood is the quickest to coagulate.

Animals that are internally and externally viviparous are more abundantly supplied with blood than the sanguineous ovipara. Animals that are in good condition, either from natural causes or from their health having been attended to, [30] have the blood neither too abundant—as it is in creatures that have recently taken a drink—nor again very scanty, as

is the case with animals when exceedingly fat. For animals in this condition have pure blood, but very little of it, and the fatter an animal gets the less becomes its supply of blood; for whatsoever is fat is destitute of [521<sup>a</sup>1] blood.

A fat substance is incorruptible, but blood and all things containing it corrupt rapidly, and this property characterizes especially all parts connected with the bones. Blood is finest and purest in man; and thickest and blackest in the bull and [5] the ass, of all vivipara. In the lower and the higher parts of the body blood is thicker and blacker.

Blood palpitates in the veins of all animals alike all over their bodies, and blood is the only liquid that permeates the entire frames of living animals, without exception and at all times, as long as life lasts. Blood is developed first of all in the heart of animals before the body is differentiated as a whole. If blood be removed or [10] if it escape in any considerable quantity, animals fall into a faint; if it be removed in an exceedingly large quantity they die. If the blood get exceedingly liquid, animals fall sick; for the blood then turns into something like ichor, and gets so thin that it at times has been known to exude through the pores like sweat. In some cases blood, when issuing from the veins, does not coagulate at all, or only here and there. Whilst [15] animals are sleeping the blood is less abundantly supplied near the exterior surfaces, so that, if the sleeping creature be pricked with a pin, the blood does not issue as copiously. Blood is developed out of ichor by concoction, and fat in like manner out of blood. If the blood get diseased, haemorrhoids may ensue in the [20] nostril or at the anus, or the veins may become varicose. Blood, if it corrupt in the body, has a tendency to turn into pus, and pus may turn into a solid concretion.

Blood in the female differs from that in the male, for, supposing the male and female to be on a par as regards age and health, the blood in the female is thicker and blacker than in the male; and with the female there is less on the surface and [25] more internally. Of all female animals the female in man is the most richly supplied with blood, and of all animals the menstruous discharges are the most copious in woman. The blood of these discharges under disease turns into flux. Women are less subject to other diseases. Women are seldom afflicted with varicose veins, with [30] haemorrhoids, or with bleeding at the nose, and, if any of these maladies supervene, the menses are imperfectly discharged.

Blood differs in quantity and appearance according to age; in very young animals it resembles ichor and is abundant, in the old it is thick and black and scarce, and in middle-aged animals its qualities are

intermediate. In old animals the [521<sup>b</sup>1] blood coagulates rapidly, even blood at the surface of the body; but this is not the case with young animals. Ichor is unconcocted blood: either blood that has not yet been concocted, or that has become fluid again.

20 · We now proceed to marrow; for this is one of the liquids found in certain sanguineous animals. All the natural liquids of the body are contained in vessels: as [5] blood in veins, marrow in bones [and other moistures in membranous structures of the skin or gut].<sup>23</sup>

In young animals the marrow is exceedingly sanguineous, but, as animals grow old, it becomes fatty in animals supplied with fat, and suet-like in animals with suet. [10] All bones, however, are not supplied with marrow, but only the hollow ones, and not all of these. For of the bones in the lion some contain no marrow at all, and some are only scantily supplied therewith; and that accounts, as was previously observed, for the statement made by certain writers that the lion is marrowless. In the bones of pigs it is found in small quantities; and in the bones of certain animals of this species [15] it is not found at all.

These liquids, then, are nearly always congenital in animals, but milk and sperm come at a later time. Of these latter, that which, whensoever it is present, is secreted in all cases ready-made, is the milk; sperm, on the other hand, is not like [20] that in all cases, but in some only, as in the case of what are designated *thori* in fishes.

Whatever animals have milk, have it in their breasts. All animals have breasts that are internally and externally viviparous, as for instance all animals that have hair, as man and the horse; and the cetaceans, as the dolphin, the porpoise, and the whale—for these animals have breasts and are supplied with milk. Animals that are [25] oviparous or only externally viviparous have neither breasts nor milk, as the fish and the bird.

All milk is composed of a watery serum called whey, and a consistent substance called curd; and the thicker the milk, the more abundant the curd. The milk, then, of non-ambidentals coagulates, and that is why cheese is made of the [30] milk of such animals under domestication; but the milk of ambidentals does not coagulate, nor their fat either, and the milk is thin and sweet. Now the camel's milk is the thinnest, and that of the horse next after it, and that of the ass next again, but cow's milk is the thickest. Milk does not coagulate under the influence of cold, but [522<sup>a</sup>1] rather runs to whey; but under the influence of heat it coagulates and

thickens. As a general rule milk only comes to animals in pregnancy. When the animal is pregnant milk is found, but at first—and then again later—it is unfit for use. In the case of female animals not pregnant a small quantity of milk has been procured by the [5] employment of special food, and cases have been actually known where women advanced in years on being submitted to the process of milking have produced milk, and in some cases have produced it in sufficient quantities to enable them to suckle an infant.

The people that live on and about Mount Oeta take such she-goats as decline the male and rub their udders hard with nettles to cause pain; hereupon they milk [10] the animals, procuring at first a liquid resembling blood, then a liquid mixed with purulent matter, and eventually milk, as freely as from females submitting to the male.

As a general rule, milk is not found in the male of man or of any other animal, though from time to time it has been found in a male; for instance, once in Lemnos a [15] he-goat was milked by its dugs (for it has two dugs close to the penis), and was milked to such effect that cheese was made of the produce, and the same phenomenon was repeated in a male of its own begetting. Such occurrences, however, are regarded as portents, and in point of fact when the Lemnian owner of the animal inquired of the oracle, the god informed him that the portent foreshadowed the acquisition of a fortune. With some men, after puberty, a [20] little milk can be produced by squeezing the breasts; cases have been known where on their being subjected to a prolonged milking process a considerable quantity of milk has been educed.

In milk there is a fatty element, which in clotted milk gets to resemble oil. Goat's milk is mixed with sheep's milk in Sicily, and wherever sheep's milk is fat. The best milk for clotting is not only that where the curd is most abundant, but that also where it is driest. [25]

Now some animals produce more than enough milk to rear their young, and this is useful for cheese-making and for storage. This is especially the case with the sheep and the goat, and next in degree with the cow. Mare's milk and milk of the she-ass are mixed in with Phrygian cheese. And there is more curd in cow's milk than in goat's milk; for graziers tell us that from nine gallons of goat's milk they can [30] get nineteen cheeses at an obol apiece, and from the same amount of cow's milk, thirty. Other animals give only enough of milk to rear their young, and no superfluous amount and none fitted for cheese-making, as is the case with all animals that have more than two breasts; for with none of such animals is milk [522<sup>b</sup>1] produced in superabundance or used for the

manufacture of cheese.

The juice of the fig and rennet are employed to curdle milk. The fig-juice is first squeezed out into wool; the wool is then rinsed into a little milk, and if this be mixed with other milk it curdles it. Rennet is a kind of milk; for it is found in the [5] stomach of the animal while it is yet suckling.

**21** · Rennet then consists of milk with an admixture of fire,<sup>24</sup> which comes from the natural heat of the animal, as the milk is concocted. All ruminating animals produce rennet, and, of ambidentals, the hare. Rennet improves in quality [10] the longer it is kept; and this sort, and also hare's rennet, is good for diarrhoea, and the best of all rennet is that of the young deer.

In milk-producing animals the comparative amount of the yield varies with the size of the animal and the diversities of pasturage. For instance, there are in Phasis [15] small cattle that in all cases give a copious supply of milk, and the large cows in Epirus yield each one daily some nine gallons of milk, and half of this from each pair of teats, and the milker has to stand erect, stooping forward a little, as otherwise, if he were seated, he would be unable to reach up to the teats. But, with the exception [20] of the ass, all the quadrupeds in Epirus are of large size, and the cattle and the dogs are the largest. Now large animals require abundant pasture, and this country supplies just such pasturage, and also supplies pasture grounds to suit the diverse seasons of the year. The cattle are particularly large, and likewise the sheep of the so-called Pyrrhic breed, the name being given in honour of King Pyrrhus. [25]

Some pasture quenches milk, as lucerne, and that especially in ruminants; other feeding renders it copious, as cytissus and vetch; but cytissus in flower is not recommended, as it has burning properties, and vetch is not good for pregnant cattle, as it causes increased difficulty in parturition. However, beasts that can eat [30] plentifully, as they are benefited thereby in regard to pregnancy, so also being well nourished produce milk in plenty. Some of the plants that cause flatulence bring milk, as for instance, a large feed of beans with the ewe, the she-goat, the cow, and the young she-goat; for this feeding makes them drop their udders. And the pointing [523<sup>a</sup>1] of the udder to the ground before parturition is a sign of there being plenty of milk.

Milk remains for a long time in the female, if she be kept from the male and be properly fed, and, of quadrupeds, this is especially true of

the ewe; for the ewe can [5] be milked for eight months. As a general rule, ruminating animals give milk in abundance, and milk fitted for cheese manufacture. In the neighbourhood of Torone cows run dry for a few days before calving, and have milk all the rest of the time. In women, milk of a livid colour is better than white for nursing purposes; and [10] dark women give healthier milk than fair ones. Milk that is richest in curd is the most nutritious, but milk with a scanty supply of curd is the more wholesome for children.

22 · All sanguineous animals eject sperm. As to what, and how, it contributes to generation, these questions will be discussed in another treatise. Taking the [15] size of his body into account, man emits more sperm than any other animal. In hairy-coated animals the sperm is sticky, but in other animals it is not so. It is white in all cases, and Herodotus is under a misapprehension when he states that the Aethiopians eject black sperm.<sup>25</sup>

Sperm issues from the body white and consistent, if it be healthy, and after [20] quitting the body becomes thin and black. In frosty weather it does not coagulate, but gets exceedingly thin and watery both in colour and consistency; but it coagulates and thickens under the influence of heat. If it be long in the womb before issuing out, it comes more than usually thick; and sometimes it comes out dry and [25] compact. Fertile sperm sinks in water; infertile sperm dissolves away. There is no truth in what Ctesias has written about the sperm of the elephant.





## BOOK IV

1 · We have now treated, in regard to blooded animals, of the parts they have in common and of the parts peculiar to this genus or that, both the uniform and the [523<sup>b</sup>1] non-uniform parts, both the external and the internal. We now proceed to treat of animals devoid of blood. These animals are divided into several genera.

One genus consists of so-called molluscs: these are animals that, being devoid of blood, have flesh-like substance outside, and any hard structure they may happen to have, inside—in this respect resembling the red-blooded animals,—such as the genus of the cuttlefish.

[5] Another genus is that of the crustaceans. These are animals that have their hard structure outside, and their soft or flesh-like substance inside, and the hard substance belonging to them has to be crushed rather than shattered; and to this genus belongs the crayfish and the crab.

A third genus is that of the testaceans. These are animals that have their hard substance outside and their flesh-like substance within, and their hard substance [10] can be shattered but not crushed; and to this genus belong the snail and the oyster.

The fourth genus is that of insects; and this genus comprehends numerous and dissimilar species. Insects are creatures that, as the name implies, have nicks either on the belly or on the back, or on both belly and back, and have no one part [15] distinctly osseous and no one part distinctly fleshy, but are something intermediate between bone and flesh; that is to say, their body is hard all through, inside and outside. Some insects are wingless, such as the *iulus* and the centipede; some are winged, as the bee, the cockchafer, and the wasp; and the same genus is in some [20] cases both winged and wingless, as the ant and the glow-worm.

In molluscs the external parts are as follows: in the first place, the so-called feet; secondly, and attached to these, the head; thirdly, the sac, containing the internal parts, and incorrectly designated by some writers the head; and, fourthly, [25] fins round about the sac. In all molluscs the head is found to be between the feet and the belly. All molluscs are furnished with eight feet, and in all cases these feet are severally furnished with a double row of suckers, with the exception of one single

species of octopus. The cuttlefish, the small calamary and the large calamary have [30] an exceptional organ in a pair of long tentacles, having at their extremities a portion rendered rough by the presence of two rows of suckers; and with these they apprehend their food and draw it into their mouths, and in stormy weather they cling by them to a rock like anchors and ride out the storm. They swim by the aid of [524<sup>a</sup>1] the fins<sup>1</sup> that they have about the sac. In all cases their feet are furnished with suckers.

The octopus uses his feelers either as feet or hands; with the two which stand over his mouth he draws in food, and the last of his feelers he employs in the act of [5] copulation—it is extremely sharp, is exceptional as being of a whitish colour, and at its extremity is bifurcate (it is like that on the rachis, and by rachis is meant the smooth surface on the far side from the suckers).

In front of the sac and over the feelers they have a hollow tube, by means of [10] which they discharge any sea-water that they may have taken into the sac of the body in the act of receiving food by the mouth. They can shift the tube from side to side, and by means of it they discharge their ink.

Stretching out its feet, it swims obliquely in the direction of the so-called head, and by this mode of swimming it can see in front, for its eyes are at the top, and in [15] this attitude it has its mouth at the rear. The head, while the creature is alive, is hard, and looks as though it were inflated. It apprehends and retains objects by means of the under-surface of its arms, and the membrane in between its feet is kept at full tension; if the animal get on to the sand it can no longer retain its hold. [20]

There is a difference between the octopus and the molluscs above mentioned: the sac of the octopus is small, and his feet are long, whereas in the others the sac is large and the feet short; so short, in fact, that they cannot walk on them. Compared [25] with one another, the calamary is long-shaped and the cuttlefish flat-shaped; and of the calamaries the so-called teuthus is much bigger than the teuthis; for teuthi have been found as much as five ells long. Some cuttlefish attain a length of two ells, and the feelers of the octopus are sometimes as long, or even longer. The species teuthus [30] is not a numerous one; the teuthus differs from the teuthis in shape; that is, the sharp extremity of the teuthus is broader and, further, the encircling fin goes all round the sac, whereas it is in part lacking in the teuthis; both animals are sea-creatures.

In all cases the head comes after the feet, in the middle of the feet that are [524<sup>b</sup>1] called feelers. There is here situated a mouth, and two

teeth in the mouth; and above these two large eyes, and between the eyes a small cartilage enclosing a small brain; and within the mouth it has a minute organ of a fleshy nature, and this it uses as a [5] tongue—for none of them has a tongue. Next after this, on the outside, is what looks like a sac; the flesh of which it is made is divisible, not in long straight strips, but in rings; and all molluscs have a cuticle around this flesh. Next after or at the back of [10] the mouth comes a long and narrow oesophagus, and close after that a crop, large and spherical, like that of a bird; then comes the stomach, like the fourth stomach in ruminants; and the shape of it resembles the spiral convolution in the trumpet-shell; from the stomach there goes back again, in the direction of the mouth, a thin gut, and the gut is thicker than the oesophagus.

[15] Molluscs have no viscera, but they have what is called a mytis, and on it the ink-sac; in the cuttlefish this vessel is the largest, and this juice is most abundant. All molluscs, when frightened, discharge such a juice, but the discharge is most copious in the cuttlefish. The mytis, then, is situated under the mouth, and the oesophagus runs through it; and down below at the point to which the gut extends is [20] the ink-sac which is enveloped in one and the same membrane as the gut; and it discharges both the ink and the excreta by the same orifice. The animals have also certain hair-like growths in their bodies.

In the cuttlefish, the teuthis, and the teuthus the hard parts are within, towards the back of the body; those parts are called in one the sepium, and in the other the [25] 'sword' They differ from one another; for the sepium is hard and flat, being a substance intermediate between bone and spine, with (in part) a crumbling, spongy texture, but in the teuthis the part is thin and somewhat gristly. These parts differ from one another in shape, as do also the sacs of the animals. The octopus has [30] nothing hard of this kind in its interior, but it has a gristly substance round the head, which, if the animal grows old, becomes hard.

The females differ from the males. The males have a duct in under the oesophagus, extending from the brain to the lower portion of the sac, and there is an organ to which it attaches, resembling a breast; in the female there are two of these [525<sup>a</sup>1] organs, situated higher up; with both sexes there are underneath these organs certain red formations. The egg of the octopus is single, uneven on its surface, and of large size; the fluid substance within is all uniform in colour, smooth, and in colour [5] white; the mass of the egg is so great as to fill a vessel larger than the creature's head. The cuttlefish has two sacs, and inside them a number of eggs, like white hailstones. For the disposition of these parts I must refer

to my anatomical diagrams.

The males of all these animals differ from the females and the difference is most marked in the cuttlefish; for the back of the sac, which is blacker than the [10] belly, is rougher in the male than in the female, and in the male the back is striped, and the rump is more sharply pointed.

There are several species of the octopus. One keeps close to the surface, and is the largest of them all, and near the shore the size is larger than in deep water; and [15] there are others, small, variegated in colour, which are not articles of food. There are two others, one called the *heledone*, which differs in the length of its legs and in having one row of suckers—all the rest of the molluscs having two,—and the other called the *bolitaina* or the *ozolis*.

There are two others found in shells. One of them is called by some the [20] *nautilus* or the *pontilus* (it is a sort of octopus);<sup>2</sup> and the shell of this creature is something like a separate valve of a deep scallop-shell.<sup>3</sup> This lives very often near to the shore, and is apt to be thrown up high and dry on the beach; and when its shell falls away it is caught or dies on the land. These polypods are small, and are shaped [25] like the *bolitaina*. There is another that is placed within a shell like a snail; it never comes out of the shell, but lives inside it like the snail, and from time to time protrudes its feelers.

So much for molluscs.

2 · With regard to the crustaceans, one species is that of the crayfish, and a [30] second, resembling the first, is that of the lobster; the lobster differing from the crayfish in having large claws, and in a few other respects as well. Another species is that of the carid, and another is that of the crab, and there are many kinds both of [525<sup>b</sup>1] carid and of crab.

Of carids there are the prawns, the squillae, and the little kind, (the little kind do not develop into a larger kind).

Of the crab, the varieties are indefinite and incalculable. The largest of all crabs is one called *maia*, a second variety is the *pagurus* and the crab of [5] Heracleotis, and a third variety is the fresh-water crab; the other varieties are smaller in size and have no special designations. In Phoenicia there are found on the beach certain crabs that are called 'horses' from their running with such speed that it is difficult to overtake them; these crabs, when opened, are found empty, because of insufficiency of nutriment. [There is another variety, small like the crab, but [10] resembling in shape the lobster.]<sup>4</sup>

All these animals, as has been stated, have their hard and shelly part outside, where the skin is in other animals, and the fleshy part inside; and the belly is more or less laminated, and the female here deposits her spawn.

The crayfishes have five feet on either side, including the claws at the end; and [15] in like manner the crabs have ten feet in all, including the claws. Of the carids, the prawns have five feet on either side, which are sharp-pointed—those towards the [20] head; and five others on either side in the region of the belly, with their extremities flat; they are devoid of flaps on the under side, but on the back they resemble the crayfish. It is very different with the squilla; it has four front legs which are flat on either side, then three thin ones close behind on either side, and the rest of the body [25] is for the most part devoid of feet. Of all these animals the feet bend out obliquely, as is the case with insects; and the claws, where claws are found, turn inwards. The crayfish has a tail, and five fins on it; and the prawn has a tail and four fins; the squilla also has fins at the tail on either side. In the case of both the middle part of [30] the tail is spinous: only that in the squilla the part is flattened and in the prawn it is sharp-pointed. Of all animals of this genus the crab is the only one devoid of a rump; and, while the body of the carid and the crayfish is elongated, that of the crab is rotund.

[526<sup>a1</sup>] In the crayfish the male differs from the female: in the female the first foot is bifurcate, in the male it is undivided; the belly-fins in the female are large and overlapping on the neck, while in the male they are smaller and do not overlap; and, [5] further, on the last feet of the male there are spur-like projections, large and sharp, which in the female are small and smooth. Both male and female have two antennae in front of the eyes, large and rough, and other antennae underneath, small and [10] smooth. The eyes of all these creatures are hard, and can move either to the inner or to the outer side. The eyes of most crabs can do the same, to an even greater degree.

The lobster is all over grey-coloured, with a mottling of black. Its under feet, up to the big feet, are eight in number; then come the big feet, far larger and flatter [15] at the tips than the same organs in the crayfish; and these are irregular: the right claw has the extreme flat surface long and thin, while the left claw has the corresponding surface thick and round. Each of the two claws, divided at the end like a pair of jaws, has both below and above a set of teeth: only that in the right [20] claw they are small and saw-shaped, while in the left claw those at the apex are saw-shaped and those within are molar-shaped, these latter being, in the

under part, four teeth close together, and in the upper part three teeth, not close together. Both right and left claws have the upper part mobile, and bring it to bear against the [25] lower one, and both are curved, being thereby naturally adapted for apprehension and constriction. Above the two large claws come two others, covered with hair, a little underneath the mouth; and underneath these the gill-like formations in the region of the mouth, hairy and numerous. These organs the animal keeps in perpetual motion; and the two hairy feet it bends and draws in towards its mouth. [30] The feet near the mouth are furnished also with delicate appendages. Like the crayfish, the lobster has two teeth, and above these teeth are its antennae, long, but shorter and finer by far than those of the crayfish, and then four other antennae similar in shape, but shorter and finer than the others. Over these antennae come [526<sup>b</sup>1] the eyes, small and short, not large like the eyes of the crayfish. Over the eyes is a peaky rough projection like a forehead, larger than the same part in the crayfish; in fact, the frontal part is more pointed and the thorax is much broader in the lobster than in the crayfish, and the body in general is smoother and more full of flesh. Of [5] the eight feet, four are bifurcate at the extremities, and four are undivided. The region of the so-called neck is outwardly divided into five divisions, and sixthly comes the flattened portion at the end, and this portion has five flaps; and the inner parts, into which the female drops her spawn, are four in number and hairy, and on [10] each of the aforesaid parts is a spine turned outwards, short and straight. The body in general and the region of the thorax in particular are smooth, not rough as in the crayfish; but on the large claws the outer portion has larger spines. There is no apparent difference between the male and female; for they both have one claw, [15] whichever it may be, larger than the other, and neither male nor female is ever found with both claws of the same size.

All crustaceans take in water close by the mouth. The crab discharges it, closing up, as it does so, a small portion of the same, and the crayfish discharges it [20] by way of the gills; and the gill-shaped organs in the crayfish are very numerous.

The following properties are common to all crustaceans: they have in all cases two teeth (for the front teeth in the crayfish are two in number), and in all cases there is in the mouth a small fleshy structure serving for a tongue; and the stomach is close to the mouth (except that the crayfish has a little oesophagus in front of the [25] stomach),<sup>5</sup> and there is a straight gut attached to it. This gut, in the crayfish and its congeners, and in the carids, extends in a straight line to the tail, and terminates where

the animal discharges the residuum, and where the female deposits her eggs; in the crab it terminates where the flap is situated, and in the centre of the flap. And in all these animals the eggs are deposited outside.<sup>6</sup> Further, the female has the [30] place for the eggs running along the gut. And, again, all these animals have an organ, larger or smaller, termed the *mytis* or poppy.

We must now proceed to review their several differentiae.

The crayfish then, as has been said, has two teeth, large and hollow, in which is [527<sup>a</sup>1] contained a juice resembling the *mytis*, and in between the teeth is a fleshy substance, shaped like a tongue. After the mouth comes a short oesophagus, and then a membranous stomach attached to the oesophagus, and at the orifice of the stomach are three teeth, two facing one another and a third standing by itself [5] underneath. Coming off obliquely from the stomach is a gut, simple and of equal thickness throughout the entire length of the body until it reaches the anal vent.

These are all common properties of the crayfish, the carid, and the crab; for the crab too has two teeth.<sup>7</sup> [10]

Again, the crayfish has a duct attached all the way from the chest to the anal vent; and this duct serves as the ovary in the female, and as the seminal duct in the male. This passage is attached to the concave surface of the flesh in such a way that the flesh is in between; for the gut is related to the convexity and this duct to the [15] concavity, pretty much as is observed in quadrupeds. And the duct is identical in both the sexes; that is to say, the duct in both is thin and white, and charged with a sallow-coloured moisture, and is attached to the chest.

[20] These are the properties of the egg and of the convolutes in the carid as well.

The male differs from the female in regard to its flesh, in having in connexion with the chest two separate and distinct white substances, resembling in colour and conformation the tentacles of the cuttlefish, and they are convoluted like the 'poppy' [25] of the trumpet-shell. These organs have their starting-point in cotyledons which are situated under the hindmost feet; and hereabouts the flesh is red and blood-coloured, but is slippery to the touch and in so far unlike flesh. Off from the convolute<sup>8</sup> organ at the chest branches another coil about as thick as twine; and [30] underneath there are two granular seminal bodies in juxtaposition with the gut. These are the organs of the male. The female has red-coloured eggs, which are adjacent to the stomach and to each side of the gut all

along to the fleshy parts, being enveloped in a thin membrane.

Such are the parts, internal and external, of these animals.

[527<sup>b</sup>1] **3** · The inner parts of sanguineous animals happen to have specific designations; for these animals have in all cases the inner viscera, but this is not the case with the bloodless animals, but what they have in common with red-blooded animals is the stomach, the oesophagus, and the gut.<sup>9</sup>

[5] With regard to the crab, it has already been stated that it has claws and feet, and their position has been set forth; furthermore, for the most part they have the right claw bigger and stronger than the left. It has also been stated that in general the eyes of the crab look sideways. Further, the trunk of the crab's body is single and [10] undivided, including its head<sup>10</sup> and any other part it may possess. Some crabs have eyes placed sideways on the upper part, immediately under the back, and standing a long way apart, and some have their eyes in the centre and close together, like the crabs of *Heracleotis* and the *maia*. The mouth lies underneath the eyes, and inside it there are two teeth, as is the case with the crayfish, only that in the crab the teeth [15] are not rounded but long; and over the teeth are two lids, and in between them are structures such as the crayfish has beside its teeth. The crab takes in water by the mouth, using the lids as a strainer,<sup>11</sup> and discharges the water by two passages above the mouth, closing by means of the lids the way by which it entered; and the two [20] passage-ways are just underneath the eyes. [When it has taken in water it closes its mouth by means of both lids, and ejects the water in the way above described.]<sup>12</sup> Next after the teeth comes the oesophagus, very short, so short in fact that the stomach seems to come straightway after the mouth. Next after the oesophagus comes the stomach, which is bifurcated, to the centre of which is attached a simple [25] and delicate gut; and the gut terminates outwards, at the lid, as has been previously stated. [Between the lids the crab has parts like those near the teeth in the crayfish.]<sup>13</sup> Inside the trunk is a sallow juice and some few little bodies, long and white, and others spotted red. The male differs from the female in size and breadth, [30] and in respect of the lid; for this is larger in the female and stands out further, and is more hairy, as is the case also with the female in the crayfish.

So much, then, for the organs of the Crustacea.



4 · With the testaceans such as the land-snails and the sea-snails, and all the shellfish and also with the sea-urchin genus, the fleshy part, in such as have flesh, is [528<sup>a</sup>1] similarly situated to the fleshy part in the crustaceans; in other words, it is inside the animal, and the shell is outside, and there is no hard substance in the interior. As compared with one another the testaceans present many diversities, both in regard to their shells and to the flesh within. Some of them have no flesh at all, as the [5] sea-urchin; others have flesh, but it is inside and wholly hidden, except for the head, as in the land-snails, and the so-called *cocalia*, and, among sea animals, in the purple murex, the trumpet-shell, the sea-snail, and the spiral-shaped testaceans in [10] general. Of the rest, some are bivalved and some univalved; and by bivalves I mean such as are enclosed within two shells, and by univalved such as are enclosed within a single shell, and in these last the fleshy part is exposed, as in the case of the limpet. Of the bivalves, some can open out, like the scallop and the mussel; for all such [15] shells are grown together on one side and are separate on the other, so as to open and shut. Other bivalves are closed on both sides alike, like the razor-fish. Some testaceans there are, that are entirely enveloped in shell and expose no portion of their flesh outside, as the ascidians.

Again, in regard to the shells themselves, the testaceans present differences [20] when compared with one another. Some are smooth-shelled, like the razor-fish, the mussel, and some clams, viz. those which some call milk-shells, while others are rough-shelled, such as the pool-oyster, the pinna, and certain species of clam, and the trumpet-shells; and of these some are ribbed, such as the scallop and a certain [25] kind of clam, and some are devoid of ribs, as the pinna and another species of clam. Testaceans also differ from one another in regard to the thickness or thinness of their shell, both as regards the shell in its entirety and as regards specific parts of the shell, for instance, the lips; for some have thin-lipped shells, like the mussel, and others have thick-lipped shells, like the pool-oyster. Some also are capable of [30] motion, like the scallop, and indeed some aver that scallops can actually fly, owing to the circumstance that they often jump right out of the apparatus by means of which they are caught; others are incapable of motion and are attached fast to some external object, as is the case with the pinna. All the spiral-shaped testaceans can move and creep, and even the limpet relaxes its hold to go in quest of food. Common [528<sup>b</sup>1] to these and to all hard-shelled creatures is the smoothness of the inside of the shell. In the case of the univalves and the bivalves, the fleshy substance adheres to the

shell so tenaciously that it can only be removed by an effort; in the case of those that [5] are spiral-shaped, it is more loosely attached. And a peculiarity of all of these is the spiral twist of the shell in the part farthest away from the head; they are also furnished from birth with an operculum. And, further, all spiral-shaped testaceans have their shells on the right-hand side, and move not in the direction of the spire, [10] but the opposite way.<sup>14</sup> Such are the diversities observed in the external parts of these animals.

The internal structure is almost the same in all these creatures, and in the spiral-shaped ones especially; for it is in size that these latter differ from one another, and in excess or defect of their characteristics. And there is not much [15] difference between most of the univalves and bivalves; but while they differ from one another but slightly, they differ considerably from such as are incapable of motion. And this will be illustrated more satisfactorily hereafter.

The spiral-shaped testaceans are all similarly constructed, but differ from one another, as has been said, in the way of excess or defect (for the larger species have [20] larger and more conspicuous parts, and the smaller have smaller and less conspicuous), and, furthermore, in relative hardness or softness, and in other such properties. All of them have the flesh that extrudes from the mouth of the shell, hard and stiff; some more, and some less. From the middle of this protrudes the head and two horns, and these horns are large in the large species, but exceedingly [25] minute in the smaller ones. The head protrudes from them all in the same way; and, if the animal be alarmed, the head draws in again. Some of these creatures have a mouth and teeth, as the snail; teeth sharp, and small, and delicate. They have also a proboscis just like that of the fly; and the proboscis is tongue-shaped. The [30] trumpet-shell and the purple murex have this organ firm and solid; and just as the horse-fly and the gadfly can pierce the skin of a quadruped, so is this proboscis proportionately stronger in these testaceans; for they bore right through the shells [529a1] of their prey. The stomach follows close upon the mouth, and this organ in the snail resembles a bird's crop. Underneath come two white firm formations, like breasts; and similar formations are found in the cuttlefish also, only that they are of a firmer consistency in the cuttle-fish. After the stomach comes an oesophagus, simple and [5] long, extending to the poppy, which is in the innermost recess of the shell. These are clear in the case of the purple murex and the trumpet-shell, within the whorl of the shell. What comes next to the oesophagus is the gut; in fact, the gut is continuous with the oesophagus,<sup>15</sup> and runs its

whole length uncomplicated to the [10] outlet of the residuum. The gut has its point of origin in the region of the coil of the poppy, and is wider hereabouts [for the poppy is for the most part a sort of excretion in all testaceans];<sup>16</sup> it then takes a bend and runs up again towards the fleshy part, and terminates by the side of the head, where the animal discharges its residuum; [15] and this holds good in the case of all spiral-shaped testaceans, whether terrestrial or marine. From the stomach there is drawn in a parallel direction with the oesophagus, in the larger snails, a long white duct enveloped in a membrane, resembling in colour the breast-like formations higher up; and in it are nicks, as in [20] the egg-mass of the crayfish, except that it is white in colour whereas the egg is red. This formation has no outlet nor duct, but is enveloped in a thin membrane with a narrow cavity in its interior. And from the gut downward extend black and rough formations, in close connexion, something like the formations in the tortoise, only not so black. Marine snails, also, have these formations, and the white ones, only that the formations are smaller in the smaller species. [25]

The univalves and bivalves are in some respects similar in construction, and in some respects dissimilar, to the spiral testaceans. They all have a head and horns, and a mouth, and the organ resembling a tongue; but these organs, in the smaller species, are indiscernible owing to the minuteness of these animals, and some are indiscernible even when the animals are dead or motionless. They all have the poppy, but not all in the same place, nor of equal size, nor similarly open to [30] observation; thus, the limpets have this organ deep down in the bottom of the shell, and the bivalves at the hinge connecting the two valves. They also have in all cases the hairy growths in a circular form, as in the scallops. And, with regard to the [529<sup>b</sup>1] so-called egg, in those that have it, when they have it, it is situated in one of the semi-circles of the periphery, as is the case with the white formation in the snail; for this white formation in the snail corresponds to the so-called egg. But all these parts, as has been stated, are clear in the larger species, while in the small ones they are [5] almost or altogether indiscernible. Hence they are most plainly visible in the large scallops; and these are the bivalves that have one valve flat-shaped, like the lid of a pot. The outlet of the excretion is in sea-creatures<sup>17</sup> on one side; for there is a passage whereby the excretion passes out. [And the poppy, as has been stated, is an [10] excretion in all these animals—an excretion enveloped in a membrane.]<sup>18</sup> The so-called egg has no outlet in any of these creatures, but is merely an excrescence in the fleshy mass; and it is not situated in the same region

with the gut, but the egg is situated on the right-hand side, and the gut on the left. Such are the relations of the anal vent in most of these animals; but in the case of the wild limpet (called by some [15] the sea-ear), the residuum issues beneath the shell; for the shell is perforated. In this particular limpet the stomach is seen coming after the mouth, and the egg-shaped formations are discernible. But for the relative positions of these parts you are referred to the *Anatomies*.

The so-called hermit crab is in a way intermediate between the crustaceans [20] and the testaceans. In its nature it resembles the crayfish kind, and it is born simple of itself, but by its habit of introducing itself into a shell and living there it resembles the testaceans, and so appears to partake of the characters of both kinds. In shape, to put it simply, it resembles a spider, only that the part below the head and thorax [25] is larger in this creature than in the spider. It has two thin red horns, and underneath these horns two long eyes, not retreating inwards, nor turning sideways like the eyes of the crab, but protruding straight out; and underneath these eyes the mouth, and round about the mouth several hair-like growths, and next after these [30] two bifurcate legs, whereby it draws in objects towards itself, and two other legs on either side, and a third small pair. All below the thorax is soft, and when opened is found to be sallow-coloured within. From the mouth there runs a single passage [530<sup>a</sup>1] right on to the stomach, but the passage for the excretions is not discernible. The legs and the thorax are hard, but not so hard as those of the crab. It does not adhere [5] to its shell like the purple murex and the trumpet-shell, but can easily be loosened. It is longer when found in spiral shells than when found in the shell of the neritae.

The<sup>19</sup> animal found in the shell of the neritae is a separate species, like the other in most respects; but of its bifurcate feet or claws, the right-hand one is small and the left-hand one is large, and it progresses chiefly by the aid of this latter one. [10] In the shells<sup>20</sup> of these animals, and in certain others, there is found a parasite whose mode of attachment is similar. The particular one which we have just described is named the *cyllarus*.

The nerites has a smooth large round shell, and resembles the trumpet-shell in [15] shape, only the poppy is, in its case, not black but red. It clings with great force near the middle. In calm weather, then, they go free afield, but when the wind blows the hermit-crabs take shelter against the rocks: the neritae themselves cling fast like limpets; and the same is the case with the haemorrhoid and all others of the like [20] kind. And they cling to the rock, when they turn back their operculum;

for this operculum seems like a lid; in fact this structure represents the one part, in those with spiral shells, of that which in the bivalves is a duplicate shell. The interior of the animal is fleshy, and the mouth is inside. And it is the same with the haemorrhoid, the purple murex, and all suchlike animals.

[25] Such of the crabs as have the left foot the bigger of the two are found in the neritae, but not in spiral shells. There are some snail-shells which have inside them creatures resembling those little lobsters that are also found in fresh water. These [30] creatures, however, differ in having the part inside the shell soft. But as to their characters, you are referred to the *Anatomies*.

5 · The urchins are devoid of flesh, and this is a character peculiar to them; and while they are in all cases empty and devoid of any flesh within,<sup>21</sup> they are in all cases furnished with the black formations. There are several species of the urchin, [530<sup>b</sup>1] and one of these is that which is made use of for food; this is the kind in which are found the so-called eggs, large and edible, in the larger and smaller specimens alike; for even when as yet very small they are provided with them. There are two other [5] species, the *spatangus*, and the so-called *bryssus*; these are sea-creatures and scarce. Further, there are the ‘mother-urchins’, the largest in size of all the species. In addition to these there is another species, small in size, but furnished with large hard spines; it lives in the sea at a depth of several fathoms; and is used by some [10] people as a specific for cases of strangury. In the neighbourhood of Torone there are sea-urchins of a white colour, shells, spines, eggs and all, and that are longer than the ordinary sea-urchin. The spine in this species is not large nor strong, but rather limp; and the black formations in connexion with the mouth are more than usually numerous, and communicate with the external duct, but not with one another; in [15] point of fact, the animal is in a manner divided up by them. The edible urchin moves with greatest freedom and most often; and this is indicated by the fact that these urchins have always something or other on their spines.

All urchins are supplied with eggs, but in some of the species the eggs are exceedingly small and unfit for food. The urchin has what we may call its head and its mouth down below, and a place for the issue of the residuum up above; [and this [20] same property is common to all spiral-shells and to limpets].<sup>22</sup> For the food on which the creature lives lies down below; consequently the mouth is near the food, and the excretion

is above, near to the back of the shell. The urchin has five hollow teeth inside, and in the middle of these teeth a fleshy substance serving the office of a [25] tongue. Next to this comes the oesophagus, and then the stomach, divided into five parts, and filled with excretion, all the five parts uniting at the anal vent, where the shell is perforated. Underneath the stomach, in another membrane, are the so-called eggs, identical in number in all cases, and that number is always an odd [30] number, to wit five. Up above, the black formations are attached to the starting-point of the teeth, and they are bitter to the taste, and unfit for food. A similar or at least an analogous formation is found in many animals; as, for instance, in the tortoise, the toad, the frog, the spiral shells and in the molluscs; but the formation [531<sup>a1</sup>] varies here and there in colour, and in all cases is altogether uneatable, or more or less unpalatable. In reality the body<sup>23</sup> of the urchin is continuous from one end to the other, but to outward appearance it is not so, but looks like a lantern with its surrounding skin missing. The urchin uses its spines as feet; for it rests its weight on [5] these, and then by moving them shifts from place to place.

6 · The so-called ascidian has of all these animals the most remarkable characteristics. It is the only mollusc that has its entire body concealed within its [10] shell, and the shell is a substance intermediate between hide and shell, so that it cuts like a piece of hard leather. It is attached to rocks by its shell, and is provided with two passages placed at a distance from one another, very minute and hard to see, whereby it admits and discharges the sea-water; for it has no visible excretion—just [15] as of shell fish in general some resemble the urchin in this matter of excretion, and others are provided with the so-called mecon. If the animal be opened, it is found to have, in the first place, a sinewy membrane running round inside the shell-like substance, and within this membrane is the flesh-like substance of the ascidian, not resembling that in other molluscs; but this flesh is the same in all ascidia. And this [20] substance is attached in two places to the membrane and the skin, obliquely; and at the point of attachment the space is narrowed at each side, where the fleshy substance stretches towards the passages that lead outwards through the shell; and here it discharges and admits food and liquid matter, just as it would if one of the passages were a mouth and the other an anal vent; and one of the passages is [25] somewhat wider than the other one. Inside it has a pair of cavities, one on either side, a small partition separating them; and one of these two cavities contains the liquid. The creature has no other part whether instrumental or sensory,

nor, as was [30] said in the case of the others, is it furnished with any organ connected with excretion. The colour of the ascidian is in some cases sallow, and in other cases red.

There is, furthermore, the genus of the sea-anemones, peculiar in its way. The sea-anemone clings to rocks like certain of the testaceans, but at times relaxes its [531<sup>b</sup>1] hold. It has no shell, but its entire body is fleshy. It has the faculty of perception, and, if you put your hand to it, it will seize and cling to it, as the octopus would do with its feelers, and in such a way as to make the flesh of your hand swell up. Its mouth is in the centre of its body, and it lives adhering to the rock as an oyster to its [5] shell. Just as it clings to your hand, so it does to little fish and to anything edible that comes in its way; and it feeds upon sea-urchins and scallops. Another species of the sea-anemone roams freely abroad. The sea-anemone appears to be devoid altogether of excretion, and in this respect it resembles a plant. Of sea-anemones [10] there are two species, the lesser and more edible, and the large hard ones, such as are found in the neighbourhood of Chalcis. In winter time their flesh is firm, and accordingly they are sought after as articles of food, but in summer weather they go off, for they become thin and watery, and if you catch at them they break at once [15] into bits, and cannot be taken off the rocks entire; and being oppressed by the heat they tend to slip back into the crevices of the rocks.

So much for the external and the internal parts of molluscs, crustaceans, and testaceans.

7 · We now proceed to treat of insects in like manner. This genus comprises [20] many species, and, though several kinds are clearly related to one another, these are not classified under one common designation, as in the case of the bee, the hornet, the wasp, and all such insects, and again as in the case of those that have their wings in a sheath, like the cockchafer, the stag-beetle, the blister-beetle, and the like.

[25] Insects have three parts common to them all; the head, the trunk containing the stomach, and a third part in between these two, corresponding to what in other creatures embraces chest and back. In the majority of insects this intermediate part is single; but in the long and many-footed insects it has practically the same number of segments as of nicks.

[30] All insects when cut in two continue to live, excepting such as

are extremely cold, or such as from their minute size chill rapidly; though wasps continue living after severance. In conjunction with the middle portion either the head or the [532<sup>a</sup>1] stomach can live, but the head cannot live by itself. Insects that are long in shape and many-footed can live for a long while after being cut in two, and the severed portions can move in either direction: they can move either in the direction of the section or in the direction of the tail, as is observed in the millipedes.

[5] All insects have eyes, but no other organ of sense discernible, except that some insects have a kind of a tongue corresponding to a similar organ common to all testaceans; and by this organ such insects taste and imbibe their food. In some insects this organ is soft; in other insects it is firm; as it is in the purple-fish. In the [10] horsefly and the gadfly this organ is hard, and indeed it is hard in most insects. In point of fact, such insects as have no sting in the rear use this organ as a weapon (and such insects as are provided with this organ are unprovided with teeth, with the exception of a few insects); the fly by a touch can draw blood with this organ, and the gnat can prick with it.

Certain insects are furnished with stings. Some insects have the sting inside, as [15] the bee and the wasp, others outside, as the scorpion; and this is the only insect furnished with a long tail. And, further, the scorpion is furnished with claws, as is also the creature resembling a scorpion found within the pages of books.

In addition to their other organs, flying insects are furnished with wings. Some insects are double-winged, as the fly; others are furnished with four wings, as the [20] bee; and no insect with only two wings has a sting in the rear. Again, some winged insects have a sheath for their wings, as the cockchafer; whereas in others the wings are unsheathed, as in the bee. But in the case of all alike, flight is in no way modified by the rump, and the wing is devoid of quill-structure or division of any kind. [25]

Again, some insects have antennae in front of their eyes, as the butterfly and the stag-beetle. Of those that have the power of jumping, some have the hinder legs the longer; and others have 'paddles' which bend backwards like the hind-legs of quadrupeds. All insects have the belly different from the back; as, in fact, is the case [30] with all animals. The flesh of an insect's body is neither shell-like nor is it flesh-like in the way of the internal substance of shell-covered animals; but it is something intermediate in quality. That is why they have neither spine, nor bone, nor anything [532<sup>b</sup>1] like sepia-bone, nor enveloping shell; but their body by its hardness is its own protection and requires no extraneous support.



However, insects have a skin; but the skin is exceedingly thin. These and such-like are the external parts of insects. [5]

Internally, next after the mouth, comes a gut, in the majority of cases straight and simple down to the outlet of the residuum; but in a few cases the gut is coiled. No insect is provided with any viscera, or is supplied with fat; and these statements apply to all animals devoid of blood. Some have a stomach also, and attached to this the rest of the gut, either simple or convoluted as in the case of the grasshopper. [10]

The cicada, alone of such creatures (and, in fact, alone of all creatures), is unprovided with a mouth, but it is provided with the tongue-like formation found in insects furnished with frontward stings; and this formation in the cicada is long, continuous, and devoid of any split; and by the aid of this the creature feeds on dew, and on dew only, and in its stomach no excretion is ever found. Of the cicada there [15] are several kinds, and they differ from one another in relative magnitude, and in this respect that the chirper is provided with a cleft under the *hypozoma* and has in it a membrane quite discernible, while the cicadelle does not.

Furthermore, there are some strange creatures to be found in the sea, which from their rarity we are unable to classify. Some experienced fishermen affirm that [20] they have at times seen in the sea animals like sticks, black, rounded, and of the same thickness throughout; and others resembling shields, red in colour, and furnished with fins packed close together; and others resembling the male organ in shape and size, with a pair of fins in the place of the testicles, and they aver that on [25] one occasion a creature of this description was brought up on the end of a nightline.

So much then for the parts, external and internal, exceptional and common, of all animals.

8 · We now proceed to treat of the senses; for there are diversities in animals [30] with regard to the senses, seeing that some animals have the use of all the senses, and others the use of a limited number of them. The total number of the senses (for we have no experience of any special sense not here included), is five: sight, hearing, smell, taste, and touch.

Man, then, and all vivipara that have feet, and, further, all red-blooded [533<sup>a</sup>1] ovipara, plainly have the use of all the five senses, except where some isolated species has been subjected to mutilation, as in the case of the mole. For this animal is deprived of sight; it has no eyes

visible, but if the skin—a thick one—be stripped [5] off the head, about the place in the exterior where eyes usually are, the eyes are found inside in a stunted condition, furnished with all the parts found in ordinary eyes; that is to say, we find there the black part, the part inside it called the pupil, and the fatty part surrounding it; but all these parts are smaller than the same parts [10] in visible eyes. There is no external sign of the existence of these organs owing to the thickness of the skin, so that it would seem that its nature was stunted in the course of development; [for extending from the brain at its junction with the marrow are two strong sinewy ducts running past the sockets of the eyes, and terminating at the [15] upper eye teeth].<sup>24</sup> All the other animals have a perception of colour and of sound, and the senses of smell and taste; the fifth sense, that, namely, of touch, is common to all animals whatsoever.

In some animals the organs of sense are plainly discernible; and this is [20] especially the case with the eyes. For animals have a special locality for the eyes, and also a special locality for hearing: that is to say, some animals have ears, while others have the passage for sound discernible. It is the same with the sense of smell; that is to say, some animals have nostrils, and others have the passages for smell, [25] such as birds. It is the same also with the organ of taste, the tongue. Of aquatic red-blooded animals, fishes possess the organ of taste, namely the tongue, but it is in an imperfect form, in other words it is osseous and undetached. In some fish the palate is fleshy, as in the fresh-water carp, so that by an inattentive observer it [30] might be mistaken for a tongue.

There is no doubt but that fishes have the sense of taste, for a great number of them delight in special flavours; and fishes freely take the hook if it be baited with a piece of flesh from a tunny or from any fat fish, obviously enjoying the taste and the [533<sup>b</sup>1] eating of bait of this kind. Fishes have no visible organs for hearing or for smell; for what might appear to indicate an organ for smell in the region of the nostril has no communication with the brain—in some cases these are blind alleys, and in other cases lead only to the gills; but for all this fishes undoubtedly hear and smell. For [5] they are observed to run away from any loud noise, such as would be made by the rowing of a galley, so as to become easy of capture in their holes; for though a sound be very slight in the open air, it has a loud and alarming resonance to creatures that hear under water. And this is shown in the capture of the dolphin; for when the [10] hunters have enclosed a shoal with their canoes, they set up from inside the canoes a loud splashing in the water, and by so doing induce the creatures to run in a shoal high and dry up on the beach, and

so capture them while stupefied with the noise. And yet, for all this, the dolphin has no organ of hearing discernible. Furthermore, when engaged in their craft, fishermen are particularly careful to make no noise [15] with oar or net; and after they have spied a shoal, they let down their nets at a spot so far off that they count upon no noise being likely to reach the shoal, occasioned either by oar or by the surging of their boats through the water; and the crews are [20] strictly enjoined to preserve silence until the shoal has been surrounded. And, at times, when they want the fish to crowd together, they adopt the stratagem of the dolphin-hunter; in other words they clatter stones together, that the fish may, in their fright, gather close into one spot, and so they envelop them within their nets. [Before surrounding them, then, they preserve silence, as was said; but, after [25] hemming the shoal in, they call on every man to shout aloud and make any kind of noise; for on hearing the noise and hubbub the fish are sure to tumble into the nets from sheer fright.]<sup>25</sup> Further, when fishermen see a shoal of fish feeding at a distance, disporting themselves in calm bright weather on the surface of the water, [30] if they are anxious to descry the size of the fish and to learn what kind of a fish it is, they may succeed in coming upon the shoal whilst yet basking at the surface if they sail up without the slightest noise, but if any man make a noise previously, the shoal will be seen to scurry away in alarm. Again, there is a small river-fish called the [534<sup>a</sup>1] *cottus*; this creature burrows under a rock, and fishers hunt it by clattering stones against the rock, and the fish bewildered at the noise, darts out of its hiding-place. From these facts it is quite obvious that fishes can hear; and indeed some people, [5] from living near the sea and frequently witnessing such phenomena, affirm that of all living creatures the fish is the quickest of hearing. And of all fishes the quickest of hearing are the mullet, the basse, the *salpe*, the *chromis* and such like. Other fishes are less quick of hearing, and thus are more apt to be found living at the [10] bottom of the sea.

The case is similar in regard to the sense of smell. Thus, as a rule, fishes will not touch a bait that is not fresh, neither are they all caught by one and the same bait, but by special ones which they distinguish by their sense of smell; for some fishes are attracted by malodorous baits, as the saupe, for instance, is attracted by [15] excrement. Again, a number of fishes live in caves; and accordingly fishermen, when they want to entice them out, smear the mouth of a cave with strong-smelling pickles, and the fish are soon attracted to the smell. And the eel is caught in a [20] similar way; for the fisherman lays down an earthen pot that has held

pickles, after inserting a strainer in its neck. As a general rule, fishes are more quickly attracted by savoury smells. For this reason, fishermen roast the fleshy parts of the cuttlefish and use it as bait on account of its smell; for fish are peculiarly attracted by it; they [25] also bake the octopus and bait their weels with it, entirely, as they say, on account of its smell. Furthermore, gregarious fishes, if fish-washings or bilge-water be thrown overboard, are observed to scud off to a distance, from apparent dislike of the smell. [534<sup>b</sup>1] And it is asserted that they can at once detect by smell the presence of their own blood; and this faculty is manifested by their hurrying off to a great distance whenever fish-blood is spilt in the sea. And, as a general rule, if you bait your weel with a stinking bait, the fish refuse to enter the weel or even to draw near; but if you [5] bait the weel with a fresh and savoury bait, they come at once from long distances and swim into it. [And all this is particularly manifest in the dolphin; for, as was stated, it has no visible organ of hearing, and yet it is captured when stupefied with noise; and so, while it has no visible organ for smell, it has the sense of smell [10] remarkably keen.]<sup>26</sup> It is manifest, then, that the animals above mentioned are in possession of all the five senses.

All other animals may, with very few exceptions, be comprehended within four [15] genera: to wit, molluscs, crustaceans, testaceans, and insects. Of these, the mollusc, the crustacean, and the insect have all the senses; for they have both<sup>27</sup> smell and taste. As for insects, both winged and wingless, they can detect the presence of scented objects afar off, as for instance bees and cnipes detect the presence of honey [20] at a distance; and they do so recognizing it by smell. Many insects are killed by the smell of brimstone; ants leave their ant-hills if powdered origanum and brimstone is scattered round them; and most insects may be banished with burnt hart's horn, or [25] better still by the burning of the gum styrax. The cuttle-fish, the octopus, and the crayfish may be caught by bait. The octopus, in fact, clings so tightly to the rocks that it cannot be pulled off, but remains attached even when being cut; and yet, if you apply fleabane to the creature, it drops off at the very smell of it. The facts are [535<sup>a</sup>1] similar in regard to taste. For the food that insects go in quest of is of diverse kinds, and they do not all delight in the same flavours; for instance, the bee never settles on anything rotten, but on things sweet; and the gnat settles only on acid substances [5] and not on sweet. The sense of touch, as has been remarked, is common to all animals. Testaceans have the senses of smell and taste—as is plain from the use of baits, e.g. in the case of the purple-fish; for this creature is enticed by putrefying baits, which it perceives and is attracted to from a

great distance. The proof that it [10] possesses a sense of taste is the same; for whenever an animal is attracted to a thing by perceiving its smell, it is sure to like the taste of it. Further, all animals furnished with a mouth derive pleasure or pain from the touch of sapid juices.

With regard to sight and hearing, we cannot make statements with thorough [15] confidence or on clear evidence. However, the razor-fish, if you make a noise, appears to burrow in the sand, and to hide himself deeper when he hears the approach of the iron rod (for the animal juts a little out of its hole, while the greater part of the body remains within),—and scallops, if you present your finger near their open valves, close them tight again as though they could see what you were [20] doing. Furthermore, when fishermen are laying bait for neritæ, they always get to leeward of them, and never speak a word while so engaged, believing that the animal can smell and hear; and they assure us that, if any one speaks aloud, the creature makes efforts to escape. With regard to testaceans, of the walking species the urchin appears to have the least developed sense of smell; and, of the stationary species, the ascidian and the barnacle. [25]

So much for the organs of sense in the general run of animals. We now proceed to treat of voice.

9 · Voice and sound are different from one another; and language differs from voice and sound. The fact is that no animal can give utterance to voice except [30] by the action of the pharynx, and consequently such animals as are devoid of lung have no voice; and language is the articulation of voice by the tongue. Thus, the voice and larynx can emit vowel sounds; consonantal sounds are made by the tongue and the lips; and out of these language is composed. Consequently, animals that [535<sup>a</sup>1] have no tongue at all or that have a tongue not freely detached, have no language; although they may be enabled to make sounds by other organs than the tongue.

Insects, for instance, have no voice and no language, but they can emit sound by internal air, though not by the emission of air; for no insects are capable of respiration. But some of them make a humming noise, like the bee and the other [5] winged insects; and others are said to sing, as the cicada. And all these latter insects make their sounds by means of the membrane that is underneath the hypozoma—those insects, that is to say, whose body is thus divided; as for instance, one species of cicada, which makes the sound by means of the friction of the air. Flies

and bees, and the like, produce their special noise by opening and shutting their wings in the act of flying; for the noise made is by the friction of the internal air. The noise made [10] by grasshoppers is produced by rubbing with their 'paddles'.

No mollusc or crustacean can produce any natural voice or sound. Fishes can produce no voice, for they have no lungs, nor windpipe and pharynx; but they emit [15] certain sounds and squeaks, which is what is called their 'voice', as the gurnard, and the sciaena (for these fishes make a grunting kind of noise) and the *caprus* in the river Achelous, and the *chalcis* and the cuckoo-fish; for the *chalcis* makes a sort of piping sound, and the cuckoo-fish makes a sound greatly like the cry of the cuckoo, and is named from the circumstance. The apparent voice in all these fishes is a [20] sound caused in some cases by a rubbing motion of their gills, which are prickly, or in other cases by internal parts about their bellies; for they all have air inside them, by rubbing and moving which they produce the sounds. Some of the selachia seem to squeak.

But in these cases the term 'voice' is inappropriate; the more correct expression [25] would be 'sound'. For the scallop, when it goes along supporting itself on the water, which is called 'flying', makes a whizzing sound; and so does the sea-swallow; for this fish flies in the air, clean out of the water, being furnished with fins broad and long. Just then as in the flight of birds the sound made by their wings is not voice, so [30] is it in the case of all these other creatures.

The dolphin, when taken out of the water, gives a squeak and moans in the air, [536<sup>a</sup>1] but these noises do not resemble those above mentioned. For this creature has a voice, for it is furnished with a lung and a windpipe; but its tongue is not loose, nor has it lips, so as to give utterance to an articulate sound.

[5] Of animals which are furnished with tongue and lung, the oviparous quadrupeds<sup>28</sup> produce a voice, but a feeble one; in some cases, a shrill piping sound, like the serpent; in others, a thin faint cry;<sup>29</sup> in others, a low hiss, like the tortoise. The formation of the tongue in the frog is exceptional. The front part of the tongue, which in other animals is detached, is tightly fixed in the frog as it is in all fishes; but [10] the part towards the pharynx is freely detached and folded and it is with this that it makes its peculiar croak. The croaking that goes on in the water is the call of the males to the females at rutting time; for all animals have a special cry for mating [15] and copulation as is observed in the case of goats, swine, and sheep. [The frog makes its croaking noise by putting its under jaw on a level with the surface of the water and extending its upper

jaw. The tension is so great that the upper jaw becomes transparent, and the animal's eyes shine through the jaw like lamps; for the commerce of the sexes takes place usually in the night time.][<sup>30</sup>

[20] Birds can utter voiced sounds; and such of them can articulate best as have the tongue flat, and also such as have thin delicate tongues. In some cases, the male and the female utter the same note; in other cases, different notes. The smaller birds are more vocal and given to chirping than the larger ones; but in the pairing season [25] every species of bird becomes particularly vocal. Some of them call when fighting, as the quail, others cry when challenging to combat, as the partridge, or when victorious, as the cock. In some cases males and females sing alike, as is observed in [30] the nightingale, only that the female stops singing when brooding or rearing her young; in other birds, the males sing alone; in fact, with fowls and quails, the female does not sing.

[536<sup>b</sup>1] Viviparous quadrupeds utter voiced sounds of different kinds, but they have no language. In fact, this is peculiar to man. For while whatever has language has voice, not everything that has voice has language. Men that are born deaf are in all [5] cases also dumb; that is, they can make vocal sounds, but they cannot speak. Children, just as they have no control over other parts, so have no control, at first, over the tongue; but it is so far imperfect, and only detaches itself by degrees, so that in the interval children for the most part lisp and stutter.

Vocal sounds and modes of language differ according to locality. Vocal sounds [10] are characterized chiefly by their pitch, whether high or low, and the kinds of sound do not differ within the same genus; but articulate sound, that one might reasonably designate language, differs both in various animals, and also in the same species according to diversity of locality; as for instance, some partridges cackle, and some [15] make a shrill twittering noise. Of little birds, some sing a different note from the parent birds, if they have been removed from the nest and have heard other birds singing; and a mother-nightingale has been observed to give lessons in singing to a young bird, thus suggesting that language is not natural in the same way as voice [20] but can be artificially trained. Men have the same voice, but they differ from one another in language.

The elephant makes a vocal sound of a wind-like sort by the mouth alone, unaided by the trunk, just like the sound of a man panting or sighing; but, if it employ the trunk as well, the sound produced is like that of a hoarse trumpet.

10 · With regard to the sleeping and waking of animals, all creatures that [25] are red-blooded and provided with legs give sensible proof that they go to sleep and that they waken up from sleep; for all animals that are furnished with eyelids shut them up when they go to sleep. Furthermore, it would appear that not only do men dream, but horses also, and dogs, and oxen, and sheep, and goats, and all [30] viviparous quadrupeds; and dogs show their dreaming by barking in their sleep. With regard to oviparous animals we cannot be sure that they dream, but most undoubtedly they sleep. And the same may be said of water animals, such as fishes, molluscs, crustaceans, to wit crayfish and the like. These animals sleep without [537<sup>a</sup>1] doubt, although their sleep is of very short duration. The proof of their sleeping cannot be got from the condition of their eyes—for none of these creatures are furnished with eyelids—but can be obtained only from their motionless repose.

[Apart from the irritation caused by lice and what are called fleas, fish are met [5] with in a state so motionless that one might easily catch them by hand; and, as a matter of fact, these little creatures, if the fish remain long in one position, will attack them in myriads and devour them. For they are found in the depths of the sea, and are so numerous that they devour any bait made of fish's flesh if it be left [10] long on the ground at the bottom; and fishermen often draw up a sort of ball of them, all clinging on to the bait.]<sup>31</sup>

But it is from the following facts that we may more reasonably infer that fishes sleep. Very often it is possible to take a fish off its guard so far as to catch hold of it or to give it a blow unawares; and all the while the fish is quite still but for a slight [15] motion of the tail. And it is quite obvious that the animal is sleeping, from its movements if any disturbance be made during its repose; for it moves just as you would expect in a creature suddenly awakened. Further, owing to their being asleep, fish may be captured by torchlight. The watchmen in the tunny-fishery often take [20] advantage of the fish being asleep to envelop them in a circle of nets; and it is quite obvious that they were thus sleeping by their lying still and allowing the glistening under-parts of their bodies to become visible, while the capture is taking place. They sleep in the night-time more than during the day; and so soundly at night that you may cast the net without making them stir. Fish, as a general rule, sleep close to the ground, or to the sand or to a stone at the bottom, or after concealing themselves [25] under a rock or the ground. Flat fish go to sleep in the sand; and they can be distinguished by the outlines of their shapes in the



sand, and are caught in this position by being speared with pronged instruments. The basse, the gilthead, the mullet, and fish of the like sort are often caught in the daytime by the prong owing to their having been surprised when sleeping; for it is scarcely probable that such [30] fish could be pronged while awake. The selachia sleep at times so soundly that they may be caught by hand. The dolphin and the whale, and all such as are furnished [537<sup>b</sup>1] with a blow-hole, sleep with the blow-hole over the surface of the water, and breathe through the blow-hole while they keep up a quiet flapping of their fins; indeed, some have actually heard the dolphin snoring.

[5] Molluscs sleep like fishes, and crustaceans also. It is plain also that insects sleep; for there can be no mistaking their condition of motionless repose. In the bee the fact of its being asleep is very obvious; for at night-time bees are at rest and cease to hum. But the fact that insects sleep may be very well seen in the case of [10] common everyday creatures; for not only do they rest at night-time from dimness of vision (for all hard-eyed creatures see but indistinctly), but even if a lighted candle be presented they continue sleeping quite as soundly.

[15] Of all animals man is most given to dreaming. Children and infants do not dream, but in most cases dreaming comes on at the age of four or five years. Instances have been known of men and women that have never dreamed at all; in cases of this kind, it has been observed that when a dream occurs in advanced life it [20] is followed by bodily change leading to death for some and to debility for others.

So much then for sensation and for the phenomena of sleeping and awakening.

**11** · Some animals are divided into male and female, but others are not so [25] divided, but can only be said in a comparative way to bring forth young and to be pregnant. In animals that live confined to one spot there is no duality of sex; nor is there such, in fact, in any testaceans. In molluscs and in crustaceans we find male and female: and, indeed, in all animals furnished with feet and blood, whether biped [30] or quadruped; in short, in all such as by copulation engender either live young or egg or grub. In the several genera, with however certain exceptions, there either absolutely is or absolutely is not a duality of sex. Thus, in quadrupeds the duality is universal, while the absence of such duality is universal in testaceans, and of these [538<sup>a</sup>1] creatures, as with plants, some individuals are fruitful and some are not.

But among insects and fishes, some cases are found wholly devoid of this duality of sex. For instance, the eel is neither male nor female, and can engender nothing. In fact, those who assert that eels are at times found with hair-like or [5] worm-like or seaweed-like objects within them, make only random assertions from not having carefully noticed the locality of such attachments. For no animal of this kind is ever viviparous unless previously oviparous; and none was ever yet seen with an egg. And animals that are viviparous have their young in the womb and closely attached, and not in the belly; for, if the embryo were kept in the belly, it would be [10] subjected to the process of digestion like ordinary food. When people rest duality of sex in the eel on the assertion that the head of the male is bigger and longer, and the head of the female smaller and more snubbed, they are taking diversity of species for diversity of sex.

There are certain fish that are named capon-fish, and fish of this description [15] are found in fresh water, as the carp and the *balagrus*. This sort of fish never has either roe or milt; but they are hard and fat all over, and are furnished with a small gut; and these fish are regarded as of excellent quality.

Again, just as in testaceans and in plants there is what bears and engenders, but not what impregnates, so is it, among fishes, with the *psetta*, the *erythrinus*, and [20] the *channe*; for these fish are in all cases found furnished with eggs.

As a general rule, in red-blooded animals furnished with feet and not oviparous, the male is larger and longer-lived than the female (except with the mule, where the female is longer-lived and bigger than the male); whereas in [25] oviparous and vermiparous creatures, as in fishes and in insects, the female is larger than the male; as for instance, with the serpent, the venom-spider, the gecko, and the frog. The same difference in size of the sexes is found in fishes, as, for instance, in the smaller selachia, in the greater part of the gregarious species, and in all that live in and about rocks. The fact that the female is longer-lived than the male is [538<sup>b</sup>1] clear from the fact that female fishes are caught older than males. Furthermore, in all animals the upper and front parts are better, stronger, and more thoroughly equipped in the male than in the female, whereas the hinder and underparts are [5] more delicate than those of the females. And this statement is applicable to man and to all vivipara that have feet. Again, the female is less muscular and less compactly jointed, and more thin and delicate in the hair—that is, where hair is found; and, where there is no hair, less strongly furnished in some analogous substance. And the female is more flaccid in texture of flesh,

and more knock-kneed, [10] and the shin-bones are thinner; and the feet are more delicate in such animals as are furnished with feet. And with regard to voice, the female in all animals that are vocal has a thinner and sharper voice than the male; except with cattle, for the lowing of the cow has a deeper note than that of the bull. With regard [15] to organs of defence and offence, such as teeth, tusks, horns, spurs, and the like, these in some species the male possesses and the female does not; as, for instance, the hind has no horns, and where the cock-bird has a spur the hen is entirely destitute of the organ; and in like manner the sow is devoid of tusks. In other species [20] such organs are found in both sexes, but are more perfectly developed in the male; as, for instance, the horn of the bull is more powerful than the horn of the cow.

# BOOK V

1 · As to the parts internal and external that all animals are furnished with, [25] and further as to the senses, to voice, and sleep, and the duality of sex, all these topics have now been touched upon. It now remains for us to discuss, duly and in order, their several modes of propagation. [539<sup>a</sup>1]

These modes are many and diverse, and in some respects are like, and in other respects are unlike to one another. As the genera have already been divided, we must attempt to follow the same divisions in our present argument; only that [5] whereas in the former case we started with a consideration of the parts of man, in the present case it behoves us to treat of man last of all because he involves most discussion. We shall commence, then, with testaceans, and then proceed to [10] crustaceans, and then to the other genera in due order; and these other genera are molluscs, and insects, then fishes viviparous and fishes oviparous, and next birds; and afterwards we shall treat of animals provided with feet, both such as are oviparous and such as are viviparous; and we may observe that some quadrupeds are [15] viviparous, but that the only viviparous biped is man.

Now there is one property that animals are found to have in common with plants. For some plants are generated from the seed of plants, whilst other plants are self-generated through the formation of some principle similar to a seed; and of [20] these some derive their nutriment from the ground, whilst others grow inside other plants, as is mentioned in my treatise on *Plants*. So with animals some spring from parent animals according to their kind, whilst others grow spontaneously and not from kindred stock; and of these some come from putrefying earth or vegetable matter, as is the case with a number of insects, while others are spontaneously [25] generated in the inside of animals out of the secretions of their several organs.

In animals where generation takes place from animals of the same kind, wherever there is duality of sex generation is due to copulation. In the group of fishes, however, there are some that are neither male nor female, and these, while they are identical generically with other fish, differ from them specifically; but [30] there are others that stand altogether isolated and apart by themselves. Other fishes there are that are always female and never male, and from them are produced eggs like the wind-eggs in birds. Such eggs in birds are all unfruitful; but it is their

nature to be independently capable of generation up to the egg-stage, unless indeed there [539<sup>b</sup>1] be some other mode than the one familiar to us of intercourse with the male; but concerning these topics we shall treat more precisely later on. In the case of certain fishes, however, after they have spontaneously generated eggs, these eggs develop into living animals; only that in certain of these cases development is spontaneous, [5] and in others is not independent of the male; and the method of proceeding in regard to these matters will be set forth by and by, for the method is somewhat like to the method followed in the case of birds. But whenever creatures are spontaneously generated, either in other animals, in the soil, or on plants, or in the parts of these, and when such are generated male and female, then from the copulation of such spontaneously generated males and females there is generated a something—a [10] something never identical in shape with the parents, but a something imperfect. For instance, the issue of copulation in lice is nits; in flies, grubs; in fleas, grubs egg-like in shape; and from these issues the parent-species is never reproduced, nor is any animal produced at all, but the like things only.

First, then, we must proceed to treat of copulation in regard to such animals as [15] copulate; and then after this to treat in due order of other matters, both the exceptional and those of general occurrence.

2 · Those animals, then, copulate in which there is a duality of sex, and the modes of covering in such animals are not in all cases similar nor analogous. For the red-blooded animals that are viviparous and furnished with feet have in all cases organs adapted for procreation, but the sexes do not in all cases come together in [20] like manner. Thus, retromingent animals copulate with a rearward presentment, as is the case with the lion, the hare, and the lynx; though in the case of the hare, the female often first mounts the male.

The case is similar in most other such animals; that is to say, the majority of quadrupeds copulate as best they can, the male mounting the female; and this is the [25] only method of copulating adopted by birds, though there are certain diversities of method observed even in birds. For in some cases the female squats on the ground and the male mounts on top of her, as is the case with the bustard, and the domestic [30] fowl; in other cases, the male mounts without the female squatting, as with the crane; for, with these birds, the male mounts on to the back of the female and covers her, and like the cock-sparrow consumes but very little time in

the operation. Of quadrupeds, bears perform the operation lying prone on one another, in the same [540<sup>a</sup>1] way as other quadrupeds do while standing up; that is to say, with the belly of the male pressed to the back of the female. Hedgehogs copulate erect, belly to belly.

With regard to large-sized vivipara, the hind only very rarely allows the stag to complete the act and the same is the case with the cow as regards the bull, owing to [5] the rigidity of the penis of the bull. In point of fact, the females elicit the sperm in the act of withdrawing from underneath him; and this phenomenon has been observed in the case of the hind, domesticated, of course. Covering with the wolf is the same as with the dog. Cats do not copulate with a rearward presentment, but the male stands erect and the female puts herself underneath him; and the female cat is [10] naturally lecherous, and wheedles the male on to sexual commerce, and caterwauls during the operation. Camels copulate with the female in a sitting posture, and the male straddles over and covers her, not with the hinder presentment but like the [15] other quadrupeds, and they pass the whole day long in the operation; when thus engaged they retire to lonely spots, and none but their keeper dare approach them. And the penis of the camel is so sinewy that bow-strings are manufactured out of it. Elephants, also, copulate in lonely places, and especially by river-sides in their usual [20] haunts; the female squats down, and straddles with her legs, and the male mounts and covers her. The seal covers like all retromingent animals, and in this species the copulation extends over a lengthened time, as is the case with the dog and bitch; and [25] the penis in the male seal is exceptionally large.

**3** · Oviparous quadrupeds cover one another in the same way. That is to say, in some cases the male mounts the female precisely as in the viviparous animals, as is observed in both the land and the sea tortoise. . .<sup>1</sup> And these creatures have an [30] organ in which the ducts converge, and with which they perform the act of copulation, as is also observed in the toad,<sup>2</sup> the frog, and all other animals of the same group.<sup>3</sup>

[540<sup>b</sup>1] **4** · Long animals devoid of feet, like serpents and muraenae, intertwine in coition, belly to belly. And, in fact, serpents coil round one another so tightly as to present the appearance of a single serpent with a pair of heads. The same mode is followed by the saurians; that is to say, they coil round one another in the act of [5] coition.

5 · All fishes, with the exception of the flat selachians, lie side by side, and copulate belly to belly. Fishes, however, that are flat and furnished with tails—as the ray, the sting-ray and the like—copulate not only in this way, but also, where [10] the tail from its thickness is no impediment, by mounting of the male upon the female, belly to back. But the angel-fish, and other like fishes where the tail is large, copulate only by rubbing against one another sideways, belly to belly. Some men assure us that they have seen some of the selachia copulating hindways, like dog and [15] bitch. In all the selachian species the female is larger than the male; and the same is the case with other fishes for the most part. And among selachia are included, besides those already named, the ox-fish, the lamia, the aetos, the torpedo, the fishing-frog, and all the dogfish. Selachia, then, of all kinds, have in many instances [20] been observed copulating in the way above mentioned; for in all viviparous animals the process of copulation is of longer duration than in the ovipara.

It is the same with the dolphin and with all cetaceans; that is to say, they come side by side, male and female, and copulate, and the act extends over a time which is neither short nor very long.

[25] Again, in selachian fishes the male, in some species, differs from the female in the fact that he is furnished with two appendages hanging down from about the exit of the residuum, and that the female is not so furnished—this is observed in e.g. the dog-fish.

Now neither fishes nor any animals devoid of feet are furnished with testicles, [30] but male serpents and male fishes have a pair of ducts which fill with milt at the rutting season, and discharge, in all cases, a milk-like juice. These ducts unite, as in [541<sup>a</sup>1] birds; for birds have their testicles in their interior, and so have all ovipara that are furnished with feet. And this union of the ducts is so far continued<sup>4</sup> and of such extension as to enter the receptive organ in the female.

In viviparous animals furnished with feet there is outwardly one and the same [5] duct for the sperm and the liquid residuum; but there are separate ducts internally, as has been observed before in the differentiation of the organs. And with such animals as are not viviparous the same passage serves externally for the discharge also of the solid residuum; although, internally, there are two passages near to one another. And these remarks apply to both male and female; for these animals are [10] unprovided with a bladder except in the case of the tortoise; and the she-tortoise, though furnished with a bladder, has only one passage; and tortoises belong to the ovipara.

In the case of oviparous fishes the process of coition is less open to observation. That is why most people suppose that the female becomes impregnated by swallowing the milt of the male. And there can be no doubt that this proceeding is [15] often witnessed; for at the rutting season the females follow the males and perform this operation, and strike the males with their mouths under the belly, and the males are thereby induced to part with the sperm sooner and more plentifully. And, further, at the spawning season the males go in pursuit of the females, and, as the female spawns, the males swallow the eggs; and the species is continued in existence by the spawn that survives this process. On the coast of Phoenicia they catch them [20] by means of one another: that is to say, by using the male of the grey mullet as a decoy they collect and net the female, and by using the female, the male.

The repeated observation of this phenomenon has led to the notion that the process was equivalent to coition, but the fact is that a similar phenomenon is observable in quadrupeds. For at the rutting seasons both the males and the females [25] spray, and the two sexes take to smelling each other's genitals.

[With partridges, if the female gets to leeward of the male, she becomes thereby impregnated. And often when they happen to be in heat she is affected in this way by the voice of the male, or by his breathing down on her as he flies [30] overhead; and both the male and the female partridge keep the mouth wide open and protrude the tongue in the process of coition.]<sup>5</sup>

The actual process of copulation on the part of oviparous fishes is seldom accurately observed, owing to the fact that, having come alongside, they very soon part. But, for all that, the process has been observed in these cases too to take place in the manner above described.

6 · Cephalopods, such as the octopus, the cuttlefish, and the calamary, have [541<sup>b1</sup>] sexual intercourse all in the same way; that is to say, they unite at the mouth, by an interlacing of their tentacles. When, then, the octopus rests its so-called head against the ground and spreads abroad its tentacles, the other fits into the [5] outspreading of these tentacles, and the two then bring their suckers into mutual connexion.

Some assert that the male has a kind of penis in one of his tentacles, the one in which are the two largest suckers; and they further assert that the organ is sinewy in [10] character, growing attached right up to the middle of the tentacle, which is admitted into the nostril of the female.



Now cuttlefish and calamaries swim about closely intertwined, with mouths and tentacles facing one another and fitting closely together; and they fit their so-called nostrils into one another, and the one sex swims backwards and the other [15] frontwards during the operation. And the female lays its spawn by the so-called 'blow-hole'; and some declare that it is at this organ that the coition really takes place.

7 · Crustaceans copulate, as the crayfish, the lobster, the carid<sup>6</sup> and the like, just like the retromingent quadrupeds, when the one animal turns up its tail and the [20] other puts his tail on the other's tail. Copulation takes place in the early spring, near to the shore; and, in fact, the process has often been observed in the case of all these animals. Sometimes it takes place about the time when the figs begin to ripen. [25] Lobsters and carids copulate in like manner.

Crabs copulate at the front parts of one another, throwing their overlapping opercula to meet one another: first the smaller crab mounts the larger at the rear; after he has mounted, the larger one turns on one side. Now, the female differs in no [30] respect from the male except in the circumstance that its operculum is larger, more elevated, and more hairy, and into this operculum it spawns its eggs and in the same neighbourhood is the outlet of the residuum. In the copulative process of these animals there is no protrusion of a member from one animal into the other.

[542<sup>a</sup>1] 8 · Insects copulate at the hinder end, and the smaller individuals mount the larger; and the smaller individual is the male. The female pushes from underneath her sexual organ into the body of the male above, not the male into the female, as in other creatures; and this organ in the case of some insects appears to be [5] disproportionately large when compared to the size of the body, and that too in very minute creatures; in some insects the disproportion is not so striking. This phenomenon may be witnessed if any one will pull asunder flies that are copulating—but they are hard to separate; for the intercourse of the sexes in their case is of long duration, as may be observed with common everyday insects, such as the fly [10] and the cantharis. They all copulate in the manner above described, the fly, the cantharis, the sphondyle, [the phalangium spider],<sup>7</sup> and any others of the kind that copulate at all. The phalangia—that is to say, such of the species as spin webs—perform the operation in the following way: the female takes hold of the suspended

web at the middle and gives a pull, and the male gives a counter pull; this [15] operation they repeat until they are drawn in together and interlaced at the hinder ends; for this mode of copulation suits them in consequence of the rotundity of their stomachs.

So much for the mode of sexual intercourse in all animals; but, for each kind of animal, there are definite seasons and ages for copulation.

[20] Animals in general seem naturally disposed to this intercourse at about the same period of the year, and that is when winter is changing into summer. And this is the season of spring, in which almost all things that fly or walk or swim take to [25] pairing. Some animals pair and breed in autumn also and in winter, as is the case with certain aquatic animals and certain birds. Man pairs and breeds at all seasons, as is the case also with domesticated animals, owing to the shelter and good feeding they enjoy: that is to say, with those whose period of gestation is also comparatively brief, as the sow and the bitch, and with those birds that breed frequently. Many [30] animals time the season of intercourse with a view to the right nurture subsequently of their young. In the human species, the male is more under sexual excitement in [542<sup>b</sup>1] winter, and the female in summer.

With birds the far greater part, as has been said, pair and breed during the spring and early summer, with the exception of the halcyon.

The halcyon breeds at the season of the winter solstice. Accordingly, when this season is marked with calm weather, the name of 'halcyon days' is given to the seven [5] days preceding, as to as many following, the solstice; as Simonides the poet says:—

God lulls for fourteen days the winds to sleep

In winter; and this temperate interlude

Men call the Holy Season, when the deep [10]

Cradles the mother Halcyon and her brood.

And these days are calm, when southerly winds prevail at the solstice, northerly ones having been the accompaniment of the Pleiads. The halcyon is said to take seven days for building her nest, and the other seven for laying and hatching her eggs. In our country there are not always halcyon days about the time of the solstice, [15] but in the Sicilian seas this season of calm is pretty regular. The bird lays about five eggs.

9 · The shearwater and the gull lay their eggs on rocks bordering on

the sea, [20] two or three at a time; but the gull lays in the summer, and the shearwater at the beginning of spring, just after the solstice, and it broods over its eggs as birds do in general. And neither of these birds resorts to a hiding-place.

The halcyon is the most rarely seen of all birds. It is seen only about the time of the setting of the Pleiads and the solstice. When ships are lying at anchor, it will [25] hover about a vessel and then disappear in a moment, and Stesichorus alludes to this peculiarity. The nightingale also breeds at the beginning of summer, and lays five or six eggs; from autumn until spring it retires to a hiding-place. [30]

Insects copulate and breed in winter also, when the weather is fine and south winds prevail; such, I mean, as do not hibernate, as the fly and the ant. The greater part of wild animals bring forth once and once only in the year, except in the case of animals like the hare, where the female can become superfoetally impregnated.

In like manner the great majority of fishes breed only once a year, like the shoal-fishes (or, in other words, such as are caught in nets), the tunny, the pelamys, [543<sup>a</sup>1] the grey mullet, the chalcis, the mackerel, the sciaena, the psetta and the like, with the exception of the basse; for this fish (alone amongst those mentioned) breeds twice a year, and the second brood is the weaker of the two. The trichias and the rock-fishes breed twice a year; the red mullet alone breeds thrice—this is inferred [5] from the spawn; for the spawn of the fish may be seen in certain places at three different times of the year. The scorpaena breeds twice a year. The sargue breeds twice, in the spring and in the autumn. The saupe breeds once a year only, in the autumn. The female tunny breeds only once a year, but owing to the fact that the fish in some cases spawn early and in others late, it looks as though the fish bred [10] twice over. The first spawning takes place in Posideon before the solstice, and the latter spawning in the spring. The male tunny differs from the female in being unprovided with the fin beneath the belly which is called *aphareus*.

10 · Of selachia, the angel-fish is the only one that breeds twice; for it breeds [15] at the beginning of autumn, and at the setting of the Pleiads; and it is in better condition in the autumn. It engenders at a birth seven or eight young. Certain of the dog-fishes, for example the spotted dog, seem to breed twice a month, and this results from the circumstance that the eggs do not all reach maturity at the same time.

[20] Some fishes breed at all seasons, as the muraena. This animal

lays a great number of eggs at a time; and the young when hatched are very small but grow with great rapidity, like the young of the hippurus; for these fishes from being diminutive at the outset grow with exceptional rapidity to an exceptional size. But whereas the muraena breeds at all seasons, the hippurus breeds only in the spring. The smyrus [25] differs from the muraena; for the muraena is mottled and weakly, whereas the smyrus is strong and of one uniform colour, and the colour resembles that of the pine-tree, and the animal has teeth inside and out. They say that in this case, as in other similar ones, the one is the male, and the other the female. They come out on to the land, and are frequently caught.

[30] Fishes, then, as a general rule, attain their full growth with great rapidity, but this is especially the case, among small fishes, with the crow-fish: it spawns near the [543<sup>b</sup>1] shore, in weedy and tangled spots. The sea-perch, too, is small at first, and rapidly attains a great size. The pelamys and the tunny breed in the Euxine, and nowhere else. The mullet, the gilt-head, and the basse, breed best where rivers run into the [5] sea. The orcys, the mackerel, and many other species spawn in the open sea.

11 · Fish for the most part breed during the three months of Munichion, Thargelion and Scirrophorion. Some few breed in autumn: as, for instance, the saupe and the sargus, and such others of this sort as breed shortly before the autumn equinox; likewise the electric ray and the angel-fish. Other fishes breed even in [10] winter and in summer, as was previously observed: as, for instance, in winter-time the basse, the grey mullet, and the pipe-fish; and in summer time, in the month of Hecatombaion, the female tunny, about the time of the summer solstice; and the tunny lays a sac-like enclosure in which are contained a number of small eggs. The shoal-fishes breed in summer.

[15] Of the grey mullets, the chelon begins to be in roe in Posideon; as also the sargue, and the myxon, and the cephalus; and their period of gestation is thirty days. And some of the grey mullet species are not produced from copulation, but grow from mud and sand.

As a general rule, then, fishes are in roe in the springtime; while some, as has [20] been said, are so in summer, in autumn, or in winter. But it does not occur in the same way for all—neither in general nor among members of the same genus—as it does for most of those that breed in the spring; and, further, conception in these variant seasons is not so prolific. And, indeed, we must bear this in mind, that just as [25]

with plants and quadrupeds diversity of locality has much to do not only with general physical health but also with the comparative frequency of sexual intercourse and generation, so also with regard to fishes locality of itself has much to do not only in regard to the size and vigour of the creature, but also in regard to its parturition and its copulations, causing the same species to breed oftener in one [30] place and seldomer in another.

12 · The cephalopods also breed in spring. Of the marine cephalopods one of [544<sup>a</sup>1] the first to breed is the cuttlefish. It spawns at all times of the day and its period of gestation is fifteen days. After the female has laid her eggs, the male comes and discharges the milt over the eggs, and the eggs thereupon harden. And they go about in pairs; and the male is more mottled and more black on the back than the [5] female.

The octopus pairs in winter and breeds in spring, lying hidden for about two months. Its spawn is shaped like a vine-tendrill, and resembles the fruit of the white poplar; the creature is extraordinarily prolific, for the number of individuals that come from the spawn is something incalculable. The male differs from the female in [10] the fact that its head is longer, and that the organ called by the fishermen its penis, in the tentacle, is white. The female, after laying her eggs, broods over them, and in consequence gets out of condition, by reason of not going in quest of food during the hatching period.

The purple murex breeds about spring-time, and the trumpet-shell at the close [15] of the winter. And, as a general rule, the testaceans are found to be furnished with their so-called eggs in springtime and in autumn, with the exception of the edible urchin; for this animal has the so-called eggs in most abundance in these seasons, but at no season is unfurnished with them; and it is furnished with them in especial abundance in warm weather or when a full moon is in the sky—except for the [20] sea-urchin found in the Pyrrhaean Straits, for this urchin is at its best in the winter; and these urchins are small but full of eggs.

Snails are found by observation to become in all cases impregnated about the same season.

13 · Of birds the wild species, as has been stated, as a general rule pair and [25] breed only once a year. The swallow, however, and the blackbird breed twice. With regard to the blackbird, however, its first

brood is killed by inclemency of weather (for it is the earliest of all birds to breed), but the second brood it usually succeeds in rearing.

Birds that are domesticated or that are capable of domestication breed frequently, just as the common pigeon breeds all through the summer, and as is seen [30] in the fowl; for the cock and hen have intercourse, and the hen breeds, at all seasons except during the days about the winter solstice.

[Of the pigeon family there are many kinds; for the common pigeon is not [544<sup>b</sup>1] identical with the rock-pigeon: the rock-pigeon is smaller than the common pigeon, and is less easily domesticated; it is also black, and small, red-footed and rough-footed; and in consequence of these peculiarities it is neglected by the [5] pigeon-fancier. The largest of all the pigeon species is the ring-dove; and the next in size is the stock-dove; and the stock-dove is a little larger than the common pigeon. The smallest of all the species is the turtle-dove. Pigeons breed and hatch at all seasons, if they are furnished with a sunny place and all requisites; unless they are [10] so furnished, they breed only in the summer. The spring brood is the best, or the autumn brood. The summer brood and those produced in hot periods are the worst.]<sup>8</sup>

**14** · Further, animals differ from one another in regard to the time of life that is best adapted for sexual intercourse.

[15] To begin with, in most animals the secretion of the seminal fluid and its generative capacity are not phenomena simultaneously manifested, but manifested successively. Thus, in all animals, the earliest secretion of sperm is unfruitful, or if it be fruitful the issue is comparatively poor and small. And this phenomenon is especially observable in man, in viviparous quadrupeds, and in birds; for in the case [20] of man and the quadruped the offspring is smaller, and in the case of the bird, the egg.

For animals that copulate, of one and the same species, the age for maturity is in most species tolerably uniform, unless it occurs prematurely by reason of abnormality, or is postponed by physical injury.

In man, then, maturity is indicated by a change of the tone of voice, by an [25] increase in size and an alteration in appearance of the sexual organs, as also of the breasts; and above all, in the hair-growth at the pubes. Man begins to possess seminal fluid about the age of fourteen, and becomes generatively capable at about the age of twenty-one years.

In other animals there is no hair-growth at the pubes (for some

animals have [30] no hair at all, and others have none on the belly, or less on the belly than on the back), but still, in some animals the change of voice is quite obvious; and in some animals other organs give indication of the commencing secretion of the sperm and the onset of generative capacity. As a general rule the female is sharper-toned in [545<sup>a</sup>1] voice than the male, and the young animal than the elder; for the stag has a much deeper-toned bay than the hind. Moreover, the male cries chiefly at rutting time, and the female under terror and alarm; and the cry of the female is short, and that [5] of the male prolonged. With dogs also, as they grow old, the tone of the bark gets deeper.

There is a difference observable also in the neighings of horses. That is to say, the female foal has a thin small neigh, and the male foal a small neigh, yet bigger and deeper-toned than that of the female, and a louder one as time goes on. And [10] when they are two years old and take to breeding, the neighing of the stallion becomes loud and deep, and that of the mare louder and shriller than heretofore; and this change usually goes on until they reach the age of twenty years; and after this time the neighing in both sexes becomes weaker.

[15] As a rule, then, as was stated, the voice of the male differs from the voice of the female, in animals where the voice admits of a prolonged sound, in the fact that the note in the male voice is deeper; not, however, in all animals, for the contrary holds good in the case of some, as for instance in cattle; for here the cow has a deeper note than the bull, and the calves a deeper note than the adults. And that is why gelded animals change their voice in the opposite direction; for male animals that [20] undergo this process assume the characters of the female.

The following are the ages at which various animals become capacitated for sexual commerce. The ewe and the she-goat are sexually mature when one year old, and the she-goat more definitely so; the ram and the he-goat are sexually mature at [25] the same age. The progeny of very young individuals among these animals differs from that of others; for the males improve in the course of the second year, when they become fully mature.<sup>9</sup> The boar and the sow are capable of intercourse when eight months old, and the female brings forth when one year old, the difference corresponding to her period of gestation. The boar is capable of generation when [30] eight months old, but, with a sire under a year in age, the litter is apt to be a poor one. The ages, however, are not invariable; now and then the boar and the sow are capable of intercourse when four months old, and are capable of producing a litter [545<sup>b</sup>1] which can be reared when six months old; but at times the boar begins to

be capable of intercourse when ten months. He continues sexually mature until he is three years old. The dog and the bitch are, as a rule, sexually capable and sexually receptive when a year old, and sometimes when eight months old; but this is more [5] common with the dog than with the bitch. The period of gestation with the bitch is sixty days, or sixty-one, or sixty-two, or sixty-three at the utmost; the period is never under sixty days, or, if it is, the litter comes to no good. The bitch, after delivering a litter, submits to the male in six months, but not before. The horse and the mare are, [10] at the earliest, sexually capable and sexually mature when two years old; the issue, however, of parents of this age is small and poor. As a general rule these animals are sexually capable when three years old, and they grow better for breeding purposes until they reach twenty years. The stallion is sexually capable up to the age of [15] thirty-three years, and the mare up to forty, so that, in point of fact, the animals are sexually capable all their lives long; for the stallion, as a rule, lives for about thirty-five years, and the mare for over forty; although a horse has been known to live to the age of seventy-five. The ass and the she-ass are sexually capable when [20] thirty months old; but, as a rule, they are not generatively mature until they are three years old, or three years and a half. An instance has been known of a she-ass bearing and bringing forth a foal when only a year old. A cow has been known to calve when only a year old, and the calf grew as big as might be expected, but no more. So much for the dates at which these animals attain to generative capacity. [25] In the human species, the male is generative, at the longest, up to seventy years, and the female up to fifty; but such extended periods are rare, for few produce children at those ages. As a rule, the male is generative up to the age of sixty-five, and to the age of forty-five the female is capable of conception. [30]

The ewe bears up to eight years, and, if she be carefully tended, up to eleven years; in fact, the ram and the ewe are sexually capable pretty well all their lives [546<sup>a</sup>1] long. He-goats, if they be fat, are less serviceable for breeding; and this is the reason why they say of a vine when it stops bearing that it is 'running the goat'. However, if an over-fat he-goat be thinned down, he becomes sexually capable and generative.

[5] Rams single out the oldest ewes for copulation, and show no regard for the young ones. And, as has been stated, the issue of the younger ewes is poorer than that of the older ones.

The boar is good for breeding purposes until he is three years of age; but after that age his issue deteriorates, for after that age his vigour is on the decline. The [10] boar normally mates after a good feed, and with the



first sow it mounts; otherwise the copulation is slightly longer, and the litter is comparatively poor. The first litter of the sow is the fewest in number; at the second litter she is at her prime. The animal, as it grows old, continues to breed, but mates more slowly. When they reach [15] fifteen years, they become unproductive, and are getting old. If a sow be highly fed, it is all the more eager for sexual commerce, whether old or young; but, if it be over-fattened in pregnancy, it gives the less milk after parturition. With regard to the age of the parents, the litter is the best when they are in their prime; but with regard to the seasons of the year, the litter is the best that comes at the beginning of winter; and the summer litter the poorest, consisting of animals small and thin and [20] flaccid. The boar, if it be well fed, is sexually capable at all hours, night and day; but otherwise is peculiarly salacious early in the morning. As it grows old the sexual passion dies away, as we have already remarked. Very often a boar, when more or less impotent from age or debility, finds itself unable to accomplish the sexual [25] commerce with due speed: then the sow, growing fatigued with the standing posture, will roll over on the ground, and the pair will conclude the operation side by side of one another. The sow is sure of conception if it drops its lugs in rutting time; if the ears do not thus drop, it may have to rut a second time before impregnation takes place.

Bitches do not submit to the male throughout their lives, but only until they reach a certain maturity of years. As a general rule, they are sexually receptive and [30] conceptive until they are twelve years old; although cases have been known where dogs and bitches have been respectively procreative and conceptive to the ages of eighteen and even of twenty years. But age diminishes the capability of generation and of conception with these animals as with all others.

[546<sup>b1</sup>] The female of the camel is retromingent, and submits to the male in the way above described; and the season for copulation in Arabia is about the month of Maemacterion. Its period of gestation is twelve months; and it is never delivered of [5] more than one foal at a time. The female becomes sexually receptive and the male sexually capable at the age of three years. After parturition, an interval of a year elapses before the female is again receptive to the male.

The female elephant becomes sexually receptive when ten years old at the youngest, and when fifteen at the oldest; and the male is sexually capable when five years old, or six. The season for intercourse is spring. The male allows an interval of [10] three years to elapse after commerce with a female; and, after it has once impregnated a female, it has no

intercourse with her again. The period of gestation with the female is two years; and only one young animal is produced at a time, in other words it is uniparous. And the embryo is the size of a calf two or three months old.

15 · So much for the copulations of such animals as copulate. We now proceed to treat of generation both with respect to copulating and non-copulating [15] animals, and we shall commence with discussing the subject of generation in the case of the testaceans.

The testacean is almost the only genus that throughout all its species is non-copulative.

The purple murices gather together to some one place in the spring-time, and deposit the so-called 'honey-comb' This substance resembles the comb, only that it [20] is not so neat; and looks as though a number of husks of white chick-peas were all stuck together. But none of these structures has any open passage, and the murex does not grow out of them, but these and all other testaceans grow out of mud and decaying matter. The substance is a sort of excretion of the trumpet-shell and the [25] murex; for it is deposited by the trumpet-shell as well. Such, then, of the testaceans as deposit the honeycomb are generated like all other testaceans, but they certainly come in greater abundance in places where their congeners have been living previously. At the commencement of the process of depositing the honeycomb, they throw off a slippery mucus, and of this the husklike formations are composed. These [30] formations, then, all melt and deposit their contents on the ground, and at this spot there are found on the ground a number of minute murices, and murices are caught at times with these animalculae upon them, some of which are too small to be differentiated in form. If the murices are caught before producing this honey-comb, [547<sup>a</sup>1] they sometimes go through the process in fishing-creels, not here and there in the baskets, but gathering to some one spot all together, just as they do in the sea; and owing to the narrowness of their new quarters they cluster together like a bunch of grapes.

There are many species of the purple murex; and some are large, as those found off Sigeum and Lectum; others are small, as those found in the Euripus, and [5] on the coast of Caria. And those that are found in bays are large and rough; in most of them the bloom is dark, in others it is reddish and small in size; some of the large ones weigh upwards of a mina apiece. But the specimens that are found along the coast and on the beaches are small-sized, and the bloom in their case is of a reddish [10]

hue. Further, as a general rule, in northern waters the bloom is blackish, and in southern waters of a reddish hue. The murex is caught in the spring-time when engaged in the construction of the honeycomb; but it is not caught at any time about the rising of the dog-star, for at that period it does not feed, but conceals itself and burrows. [The bloom of the animal is situated between the 'poppy' and the neck, [15] and the co-attachment of these is an intimate one. In colour it looks like a white membrane, and this is what people extract; and if it be squeezed it stains your hand with the colour of the bloom. There is a kind of vein that runs through it, and this would appear to be in itself the bloom. And the rest of its substance is somewhat [20] astringent.<sup>10</sup>] It is after the murex has constructed the honey-comb that the bloom is at its worst. Small specimens they break in pieces, shells and all, for it is no easy matter to extract the organ; but in dealing with the larger ones they first strip off the shell and then abstract the bloom. For this purpose the neck and poppy are [25] separated, for the bloom lies in between them, above the so-called stomach; hence the necessity of separating them in abstracting the bloom. Fishermen are anxious always to break the animal in pieces while it is yet alive, for, if it die before the process is completed, it vomits out the bloom; and for this reason the fishermen keep the animals in creels, until they have collected a sufficient number and can attend to them at their leisure. Fishermen in past times used not to lower creels or attach [30] them to the bait, so that very often the animal got dropped off in the pulling up; at present, however, they always attach a basket, so that if the animal fall off it is not lost. The animal is more inclined to slip off the bait if it be full inside; if it be empty [547<sup>b</sup>1] it is actually difficult to shake it off. Such are the phenomena peculiar to the murex.

The trumpet-shell comes into existence in the same way and at the same season as the murex. Both animals also have opercula, as do all the stromboids, and this is [5] congenital with them all; and they feed by protruding the so-called tongue underneath the operculum. The tongue of the murex is bigger than one's finger, and by means of it, it feeds, and perforates conchylia and the shells of its own kind. Both the murex and the trumpet-shell are long-lived. The murex lives for about six years; [10] and the yearly increase is indicated by a distinct interval in the spiral convolution of the shell.

The mussel also constructs a honey-comb.<sup>11</sup>

With regard to the lagoon oysters, wherever you have slimy mud there you are sure to find them beginning to grow. Cockles and clams and razor-fishes and [15] scallops grow in sandy places. The pinna grows

straight up from the bottom in sandy and slimy places; [these creatures have inside them a pinna-guard, in some cases a small carid and in other cases a little crab; if the pinna be deprived of this pinna-guard it soon dies.]<sup>12</sup>

As a general rule, then, all testaceans grow by spontaneous generation in mud, differing from one another according to the differences of the material; oysters [20] growing in slime, and cockles and the other testaceans above mentioned on sandy bottoms; and in the hollows of the rocks the ascidian and the barnacle, and common sorts, such as the limpet and the nerites. All these animals grow with great rapidity, especially the murex and the scallop; for the murex and the scallop attain their full [25] growth in a year. In some of the testaceans white crabs are found, very diminutive in size; they are most numerous in the trough-shaped mussel. In the pinna also is found the so-called pinna-guard. They are found also in the scallop and in the lagoon [30] oyster; they never appear to grow in size. Fishermen declare that they come into being at the same time as their hosts. Scallops burrow for a time in the sand, like the murex.

Shell-fish, then, grow in the way above mentioned; and some of them grow in shallow water, some on the seashore, some in muddy places, some on hard and stony [548<sup>a</sup>1] ground, and some in sandy places. Some shift about from place to place, others do not. Of those that keep to one spot the pinnae are rooted to the ground; the [5] razor-fish and the clam keep to the same locality, but are not so rooted; but still, if forcibly removed they die.

[The star-fish is naturally so warm that whatever it lays hold of is found, when suddenly taken away from the animal, to be scorched. Fishermen say that the star-fish is a great pest in the Strait of Pyrrha. In shape it resembles a star as seen in [10] a drawing. The so-called sea-lungs are generated spontaneously. The shells that painters use are a good deal thicker, and the bloom is outside the shell on the surface. These creatures are mostly found on the coast of Caria.]<sup>13</sup>

The hermit-crab grows out of soil and slime, and finds its way into untenanted [15] shells. As it grows it shifts to a larger shell, as for instance into the shell of the nerites, or of the strombus or the like, and very often into that of the small trumpet-shell. After entering a new shell, it carries it about, and begins to feed [again; and, by and by, as it grows, it shifts again into another larger one].<sup>14</sup> [20]

16 · Moreover, the animals that are unfurnished with shells grow like the testaceans, as, for instance, the sea-anemones and the sponges in rocky caves.

Of the sea-anemone there are two species; and of these one species lives in hollows and never loosens its hold upon the rocks, and the other lives on smooth flat [25] reefs, free and detached, and shifts its position from time to time. [Limpets also detach themselves, and shift from place to place.]<sup>15</sup>

In the chambered cavities of sponges pinna-guards are found. And over the chambers there is a kind of spider's web, by the opening and closing of which they catch minute fishes; that is to say, they open the web to let the fish get in, and close [30] it again to entrap them.

Of sponges there are three species; the first is of porous texture, the second is close-textured, the third, which is nicknamed 'the sponge of Achilles', is exceptionally [548<sup>b</sup>1] fine and close-textured and strong. This sponge is used as a lining to helmets and greaves, for the purpose of deadening the sound of the blow; and this is a very scarce species. Of the close-textured sponges such as are particularly hard and rough are nicknamed 'goats'.

Sponges grow either attached to a rock or on sea-beaches, and they get their [5] nutriment in slime: a proof of this statement is the fact that when they are first secured they are found to be full of slime. This is characteristic of all living creatures that get their nutriment by close local attachment. And the close-textured sponges are weaker than the more porous ones because their attachment extends [10] over a smaller area.

It is said that the sponge is sensitive; and as a proof of this statement they say that if the sponge is made aware of an attempt being made to pluck it from its place of attachment it draws itself together, and it becomes a difficult task to detach it. It makes a similar movement in windy and boisterous weather with the object of tightening its hold. Some persons express doubts as to the truth of this assertion; as, [15] for instance, the people of Torone.

The sponge breeds animals in itself—worms and other creatures—on which, if they be detached, the rock-fishes prey, as they prey also on the remaining stumps of the sponge; but, if the sponge be broken off, it grows again from the remaining stump and the place is soon as well covered as before.

The largest of all sponges are the loose-textured ones, and these are peculiarly [20] abundant on the coast of Lycia. The softest are the close-

textured sponges; for the so-called sponges of Achilles are harder than these. As a general rule, sponges that are found in deep calm waters are the softest; for windy and stormy weather has a tendency to harden them (as it has to harden all similar growing things), and to arrest their growth. And this accounts for the fact that the sponges found in the Hellespont are rough and close-textured; and, as a general rule, sponges found [25] beyond or inside Cape Malea are, respectively, comparatively soft or comparatively hard. But the habitat of the sponge should not be too warm, for it has a tendency to decay, like all growing things. And this accounts for the fact that the sponge is at its best when found in deep water close to shore; for owing to the depth of the water they are well protected against both conditions.

Whilst they are still alive and before they are washed, they are blackish in [30] colour. Their attachment is not made at one particular spot, nor is it made all over their bodies; for vacant pore-spaces intervene. There is a kind of membrane stretched over the under parts; [and the points of attachment are the more [549a1] numerous.]<sup>16</sup> On the top most of the pores are closed, but four or five are visible; and we are told by some that it is through these pores that the animal takes its food.

There is a particular species that is named the 'unwashable', from the [5] circumstance that it cannot be cleaned. This species has the large pores, but all the rest of the body is close-textured; and, if it be dissected, it is found to be closer and more glutinous than the ordinary sponge, and the whole thing is something lung-like in consistency. And, on all hands, it is allowed that this species is sensitive and long-lived. They are distinguished in the sea from ordinary sponges from the [10] circumstance that the ordinary sponges are white while the slime is in them,<sup>17</sup> but that these sponges are under any circumstances black.

And so much with regard to sponges and to generation in the testaceans.

[15] **17** · Of crustaceans, the female crayfish after copulation conceives and retains its eggs for about three months, during Scirrophorion, Hecatombaion, and Metageitnion; they then lay the eggs into the folds underneath the belly, and their eggs grow like grubs. This same phenomenon is observable in cephalopods also, and in such fishes as are oviparous; for in all these cases the egg continues to grow.

The egg of the crayfish is of a loose consistency, and is divided into eight parts; [20] for corresponding to each of the flaps on the side there is

a gristly formation to which the spawn is attached, and the entire structure resembles a cluster of grapes; for each gristly formation is split into several parts. This is obvious enough if you draw the parts asunder; but at first sight the whole appears to be one and indivisible. [25] And the largest are not those nearest to the outlet but those in the middle, and the farthest off are the smallest. The size of the small eggs is that of a fig-seed; and they are not quite close to the outlet, but placed middleways; for at both ends, tailwards [30] and trunkwards, there are two intervals; for it is thus that the flaps also grow. The side flaps, then, cannot close, but by placing the end flap on them the animal can close up all, and this end-flap serves them for a lid. And in the act of laying its eggs it seems to bring them towards the gristly formations by curving the flap of its tail, [549<sup>b</sup>1] and then, squeezing the eggs forwards and maintaining a bent posture, it performs the act of laying. The gristly formations at these seasons increase in size and become receptive of the eggs; for the animal lays its eggs into these formations, just as the [5] cuttlefish lays its eggs among twigs and driftwood.

It lays its eggs, then, in this manner, and after maturing them for about twenty days it rids itself of them all in one solid lump, as is quite plain from outside. And out of these eggs crayfish form in about fifteen days, and these are often caught less [10] than a finger's breadth in length. The animal, then, lays its eggs before the middle of September, and after the middle of that month throws off its eggs in a lump. With the prawns the time for gestation is four months or thereabouts.

Crayfish are found in rough and rocky places, lobsters in smooth places, and neither are found in muddy ones; and this accounts for the fact that lobsters are found in the Hellespont and on the coast of Thasos, and crayfish in the [15] neighbourhood of Sigeum and Mount Athos. Fishermen, accordingly, when they want to catch these various creatures out at sea, take bearings on the beach and elsewhere that tell them where the ground at the bottom is stony and where soft with slime. In winter and spring these animals keep in near to land, in summer they [20] keep in deep water; thus at various times seeking respectively for warmth or coolness.

The so-called bear-crab lays its eggs at about the same time as the crayfish; and consequently in winter and in the spring-time, before laying their eggs, they are at their best, and after laying at their worst.

They cast their shell in the spring-time (just as serpents shed their slough), [25] both directly after birth and in later life; this is true both of crabs and crayfish. And all crayfish are longlived.

18 · Cephalopods, after pairing and copulation, lay a white egg; and this spawn, as in the case of the testacean, gets granular in time. The octopus discharges [30] into its hole, or into a potsherd or into any similar cavity, a structure resembling the tendrils of a young vine or the fruit of the white poplar, as has been previously observed. The eggs, when the female has laid them, are clustered round the sides of [550<sup>a</sup>1] the hole. They are so numerous that, if they be removed, they suffice to fill a vessel much larger than the animal's body in which they were contained. Some fifty days [5] later, the eggs burst and the little octopuses creep out, like little spiders, in great numbers; the characteristic form of their limbs is not yet to be discerned in detail, but their general outline is clear enough. And they are so small and helpless that the greater number perish; it is a fact that they have been seen so extremely minute as to be absolutely without organization, but nevertheless when touched they moved. [10] The eggs of the cuttlefish look like big black myrtle-berries, and they are linked all together like a bunch of grapes, clustered round a centre, and are not easily sundered from one another; for the male exudes over them some moist mucus which [15] constitutes the sticky gum. These eggs increase in size; and they are white at the outset, but black and larger after the sprinkling of the male seminal fluid.

When it has come into being the young cuttlefish is first distinctly formed inside out of the white substance, and when the egg bursts<sup>18</sup> it comes out. The inner part is formed as soon as the female lays the egg, something like a hail-stone; and out of this substance the young cuttlefish grows by a head-attachment, just as [20] young birds grow by a belly-attachment. What is the exact nature of the navel-attachment has not yet been observed, except that as the young cuttlefish grows the white substance grows less and less in size, and at length, as happens with the yolk in the case of birds, the white substance in the case of the young cuttlefish disappears. In the case of the young cuttlefish, as in the case of other animals, the [25] eyes at first seem very large. To illustrate this by way of a figure, let A represent the egg, B and C the eyes, and D the young cuttlefish.

The female cuttlefish gets pregnant in the spring-time, and lays its eggs after fifteen days of gestation; after the eggs are laid there comes in another fifteen days something like a bunch of grapes, and at the bursting of these the young cuttlefish issue forth. But if, when the young ones are fully formed, you sever the outer [30] covering a moment too soon, the



young creatures eject excrement, and their colour changes from white to red in their alarm.

[550<sup>b</sup>1] Crustaceans, then, hatch their eggs by brooding over them underneath their bodies; but the octopus, the cuttlefish, and the like hatch their eggs wherever they may have laid them, and this statement is particularly applicable to the cuttlefish; in fact, its sac is often seen exposed to view close in to shore. The female octopus at [5] times sits brooding over her eggs, and at other times squats in front of her hole, stretching out her tentacles.

The cuttlefish lays her spawn near to land in the neighbourhood of sea-weed or reeds or anything of the sort that has been cast up, such as brushwood, twigs, or stones; and fishermen place heaps of twigs here and there on purpose, and on to such [10] heaps the female deposits a long continuous roe in shape like a curl of hair. It lays or spirts out the spawn with an effort, as though there were difficulty in the process. The female calamary spawns at sea; and it emits the spawn, as does the cuttlefish, in the mass.

The calamary and the cuttlefish are short-lived, as, with few exceptions, they never see the year out; and the same statement is applicable to the octopus. [15]

From one single egg comes one single cuttlefish; and this is likewise true of the young calamary.

The male calamary differs from the female; for if its gill-region be dilated and examined there are found two red formations resembling breasts, with which the male is unprovided. In the cuttlefish, apart from this distinction in the sexes, the [20] male, as has been stated, is more mottled than the female.<sup>19</sup>

19 · With regard to insects, that the male is less than the female and that he mounts upon her back, and how he performs the act of copulation and the circumstance that he gives over reluctantly, all this has already been set forth; in most cases of insect copulation this process is speedily followed up by parturition. [25]

All insects that copulate engender grubs, with the exception of a species of butterfly; and the female of this species lays a hard egg, resembling the seed of the safflower, with a juice inside it. But from the grub, the young animal does not grow out of a mere portion of it, as a young animal grows from a portion only of an egg, but the grub entire grows and the animal becomes differentiated out of it. [30]

And of insects some are derived from congeners, as the venom-spider and the common-spider from the venom-spider and the common-spider, and so with the locust, the grasshopper, and the cicada. Other insects are not derived from living parentage, but are generated spontaneously: some out of dew falling on leaves, by [551<sup>a</sup>1] nature in spring-time, but not seldom in winter too when there has been a stretch of fair weather and southerly winds; others grow in decaying mud or dung; others in timber, green or dry; some in the hair of animals; some in the flesh of animals; some [5] in excrements: and some from excrement after it has been voided, and some from excrement yet within the living animal, like the intestinal worms. And of these worms there are three species: one named the flat-worm, another the round worm, and the third the ascarid. These intestinal worms do not in any case propagate their [10] kind. The flat-worm, however, in an exceptional way, clings fast to the gut, and lays a thing like a melon-seed, by observing which indication the physician concludes that his patient is troubled with the worm.

The butterfly is generated from caterpillars which grow on green leaves, chiefly leaves of the raphanus, which some call cabbage. At first it is less than a [15] grain of millet; it then grows into a small grub; and in three days it is a tiny caterpillar. After this it grows on and on, and becomes quiescent and changes its shape, and is now called a chrysalis. The outer shell is hard, and the chrysalis moves if you touch it. It attaches itself by cobweb-like filaments, and is unfurnished with [20] mouth or any other apparent organ. After a little while the outer covering bursts asunder, and out flies the winged creature that we call the butterfly. At first, when [25] it is a caterpillar, it feeds and ejects excrement; but when it turns into the chrysalis it neither feeds nor ejects excrement.

The same remarks are applicable to all such insects as are developed out of the grub, both such grubs as are derived from the copulation of living animals and such as are generated without copulation. For the grub of the bee, the hornet, and the [551<sup>b</sup>1] wasp, whilst it is young, takes food and is seen to produce excrement; but when it has passed from the grub shape to its defined form and become what is termed a pupa, it ceases to take food and to void excrement, and remains tightly wrapped up and motionless until it has reached its full size, when it breaks the formation with [5] which the cell is closed, and issues forth. The insects named the hypera and the penia are derived from similar caterpillars, which move in an undulatory way, progressing with one part and then pulling up the hinder parts by a bend of the body. The developed insect in each case takes its peculiar colour from the caterpillar.

[10] From one particular large grub, which has as it were horns, and in other respects differs from grubs in general, there comes, by a metamorphosis of the grub, first a caterpillar, then the cocoon, then the *necydalus*; and the creature passes through all these transformations within six months. A class of women unwind and [15] reel off the cocoons of these creatures,<sup>20</sup> and afterwards weave a fabric; a Coan woman of the name of Pamphila, daughter of Plateus, being credited with the first invention of the fabric. After the same fashion the stag-beetle comes from grubs that live in dry wood: at first the grub is motionless, but after a while the shell bursts and the stag-beetle issues forth.

[20] From grubs on the beet comes the leekbane;<sup>21</sup> this creature is also winged. From the flat animalcule that skims over the surface of rivers comes the gadfly; and this accounts for the fact that gadflies most abound in the neighbourhood of waters on whose surface these animalcules are observed. From a certain small, black and [25] hairy caterpillar comes first a wingless glow-worm; and this creature again suffers a metamorphosis, and transforms into a winged insect named the 'curl.'

Gnats grow from ascarids; and ascarids are engendered in the slime of wells, or in places where water containing an earthy deposit collects. This slime decays, and [552<sup>a</sup>1] first turns white, then black, and finally blood-red; and at this stage there originate in it, as it were, little tiny bits of red weed, which at first wriggle about all clinging together, and finally break loose and swim in the water, and are hereupon known as [5] ascarids. After a few days they stand straight up on the water motionless and hard, and by and by the husk breaks off and the gnats are seen sitting upon it, until the sun's heat or a puff of wind sets them in motion, when they fly away.

With all grubs and all animals that break out from the grub state, movement is [10] due primarily to the heat of the sun or to wind.

Ascarids are more likely to be found, and grow with unusual rapidity, in places where there is a deposit of a mixed and heterogeneous kind, as in kitchens and in ploughed fields; for the contents of such places are disposed to rapid putrefaction. In autumn, also, owing to the drying up of moisture, they grow in unusual numbers.

The tick is generated from couch-grass. The cockchafer comes from a grub [15] that is generated in the dung of the cow or the ass. The dung-beetle rolls a piece of dung into a ball, lies hidden within it during the winter, and gives birth therein to small grubs, from which grubs come new dung-beetles. Certain winged insects also come from the grubs that are found in pulse, in the same fashion as in the cases [20] described.

Flies grow from grubs in the dung that farmers have gathered up into heaps; for those who are engaged in this work assiduously gather the remainder which has been mixed together, and this they term 'working-up' the manure. The grub is exceedingly minute to begin with; first—even at this stage—it assumes a reddish [25] colour, and then from a quiescent state it takes on the power of motion, as though born to it; it then becomes a small motionless grub; it then moves again, and again relapses into immobility; it then comes out a perfect fly, and moves away under the influence of the sun's heat or of a puff of air. The horse-fly is engendered in timber. [30] The budbane comes from a transformed grub; and this grub is engendered in cabbage-stalks. The cantharis comes from the caterpillars that are found on fig-trees or pear-trees or fir-trees—for on all these grubs are engendered—and also [552<sup>b</sup>1] from caterpillars found on the dog-rose; and the cantharis takes eagerly to ill-scented substances, from the fact of its having been engendered in ill-scented woods. The conops comes from a grub that is engendered in the slime of vinegar. [5]

And living animals are produced in substances that are usually supposed to be incapable of putrefaction; for instance, grubs are found in long-lying snow; and snow of this description gets reddish in colour, and hence the grub that is engendered in it is red and hairy. The grubs found in the snows of Media are large and white; and all such grubs are little disposed to motion. In Cyprus, in places where copper-ore is smelted, with heaps of the ore piled on day after day, an animal [10] is engendered in the fire, somewhat larger than a large fly, furnished with wings, which can hop or crawl through the fire. And the grubs and these latter animals perish when you keep the one away from the fire and the other from the snow. Now the salamander is a clear case in point, to show us that animals do actually exist that fire cannot destroy; for this creature, so the story goes, not only walks through the [15] fire but puts it out in doing so.

On the river Hypanis in the Cimmerian Bosphorus, about the time of the summer solstice, there are brought down towards the sea by the stream what look like little sacks rather bigger than grapes, out of which at their bursting issues a [20] winged quadruped. The insect lives and flies about until the evening, but as the sun goes down it pines away, and dies at sunset having lived just one day, from which circumstance it is called the ephemeron.

As a rule, insects that come from caterpillars and grubs are held at first by cobwebs.<sup>22</sup>

Such is the mode of generation of the insects above enumerated. [25]

20 · The wasps called ichneumons, less in size than the ordinary wasp, kill spiders and carry off the dead bodies to a wall or some such place with a hole in it; this hole they smear over with mud and lay their grubs inside it, and from the grubs come the hunter-wasps. Some of the coleoptera and of the small and nameless [553<sup>a</sup>1] insects make small holes of mud on a wall or on a grave-stone, and there deposit their grubs.

With insects, as a general rule, the time of generation from its commencement to its completion comprises three or four weeks. With grubs and grub-like creatures [5] the time is usually three weeks, and in the oviparous insects as a rule four. But, in the case of oviparous insects, the egg-formation comes at the close of seven days from copulation, and during the remaining three weeks the parent broods over and hatches its young; i.e. where this is the result of copulation, as in the case of the spider and its congeners. As a rule, the transformations take place in intervals of [10] three or four days, corresponding to the lengths of interval at which the crises recur in fevers.

So much for the generation of insects. Their death is due to the shrivelling of their organs, just as the larger animals die of old age. Winged insects die in autumn [15] from the shrinking of their wings. The horse-fly dies from dropsy in the eyes.<sup>23</sup>

21 · With regard to the generation of bees different hypotheses are in vogue. Some affirm that bees neither copulate nor give birth to young, but that they fetch their young. And some say that they fetch their young from the flower of the [20] calluntrum; others assert that they bring them from the flower of the reed, others, from the flower of the olive. And it is stated as a proof that, when the olive harvest is most abundant, the swarms are most numerous. Others declare that they fetch the brood of the drones from one of the stuffs above mentioned, but that the working [25] bees are engendered by the rulers of the hive.

Now of these rulers there are two kinds: the better kind is red in colour, the other is black and variegated; the ruler is double the size of the working bee. These rulers have the part below the waist half as large again, and they are called by some [30] the 'mothers', from an idea that they generate the bees; and, as a proof they declare that the brood of the drones appears even when there is no ruler-bee in the hive, but that the

bees do not appear in their absence. Others, again, assert that these insects [553<sup>b</sup>1] copulate, and that the drones are male and the bees female.

The ordinary bee is generated in the cells of the comb, but the ruler-bees in cells down below attached to the comb, suspended from it, apart from the rest, six or seven in number, and growing in a way quite different from the mode of growth of the ordinary brood.

[5] Bees are provided with a sting, but the drones are not so provided. The rulers are provided with stings, but they never use them; and this latter circumstance will account for the belief of some people that they have no stings at all.

**22** · Of bees there are various species. The best kind is a little round mottled insect; another is long, and resembles the hornet; a third is black and flat-bellied, [10] and is nicknamed the ‘robber’; a fourth kind is the drone, the largest of all, but stingless and inactive. And that is why some bee-masters place a net-work in front of the hives to keep the big drones out while it lets the bees go in.

Of the rulers there are, as has been stated, two kinds. In every hive there are more rulers than one; and a hive goes to ruin if there be too few rulers, not because [15] of anarchy thereby ensuing, but, as we are told, because these creatures contribute in some way to the generation of the bees. A hive will go also to ruin if there be too large a number of rulers in it; for they divide into factions.

Whenever the spring-time is late coming, and when there is drought and [20] mildew, then the progeny of the hive is small in number. But when the weather is dry they attend to the honey, and in rainy weather their attention is concentrated on the brood; and this will account for the coincidence of rich olive-harvests and abundant swarms.

The bees first work at the honeycomb, and then put the pupae in it: by the mouth, say those who hold the theory of their bringing them from elsewhere.<sup>24</sup> After [25] putting in the pupae they put in the honey for subsistence, and this they do in the summer and autumn; and the autumn honey is the better of the two.

The honeycomb is made from flowers, and the materials for the wax they gather from the resinous gum of trees, while honey is what falls from the air, and is deposited chiefly at the risings of the constellations or when a rainbow is in the sky; [30] and as a general rule there is no honey before the rising of the Pleiads. [The bee, then, makes the wax from

flowers. The honey, however, it does not make, but merely gathers what is deposited out of the atmosphere; and as a proof of this statement we have the known fact that bee-keepers find the hives filled with honey [554<sup>a</sup>1] within the space of one or two days. Furthermore, in autumn flowers are found, but honey, if it be withdrawn, is not replaced; now, after the withdrawal of the original honey, when no food or very little is in the hives, there would be a fresh stock of honey, if the bees made it from flowers.]<sup>25</sup> Honey, if allowed to mature, gathers [5] consistency; for at first it is like water and remains liquid for several days. If it be drawn off during these days it has no consistency; but it attains consistency in about twenty days. The taste of thyme-honey is discernible at once, from its peculiar [10] sweetness and consistency.

The bee gathers from every flower that is furnished with a calyx, and from all other flowers that are sweet-tasted, without doing injury to any fruit; and the juices of the flowers it takes up with the organ that resembles a tongue and carries off to the hive.

Honey is taken from the hives on the appearance of the wild fig. They produce [15] the best larvae at the time the honey is making. The bee carries wax and bees' bread round its legs, but vomits the honey into the cell. After depositing its young, it broods over it like a bird. The grub when it is small lies slantwise in the comb, but by [20] and by rises up straight by an effort of its own and takes food, and holds on so tightly to the honeycomb as actually to be squeezed against it.

The young of bees and of drones is white, and from the young come the grubs; and the grubs grow into bees and drones. The egg of the ruler is reddish in colour, [25] and its substance is about as consistent as thick honey; and from the first it is about as big as the bee that is produced from it. From the young of the ruler there is no intermediate stage, it is said, of the grub, but the bee comes at once.

Whenever the bee lays an egg in the comb there is always a drop of honey set against it. The larva of the bee gets feet and wings as soon as the cell has been stopped up with wax, and when it arrives at its completed form it breaks its [554<sup>b</sup>1] membrane and flies away. It ejects excrement in the grub state, but not afterwards; that is, not until it has got out of the encasing membrane, as we have already described. If you remove the heads from off the larvae before the coming of the wings, the bees will eat them up; and if you nip off the wings from a drone and let it [5] go, the bees will bite off the wings from all the remaining drones.

The bee lives for six years as a rule, as an exception for seven years. If a swarm lasts for nine years, or ten, it is considered to have done well.

In Pontus are found bees exceedingly white in colour, and these bees produce their honey twice a month. (The bees in Themiscyra, on the banks of the river [10] Thermodon, build honeycombs in the ground and in hives, and these honeycombs are furnished with very little wax but with honey of great consistency; and the honeycomb is smooth and level.) But this is not always the case with these bees, but only in the winter season; for in Pontus the ivy is abundant, and it flowers at this time of the year, and it is from the ivy-flower that they derive their honey. A white [15] and very consistent honey is brought down to Amisus, which is deposited by bees on trees without the employment of honeycombs; and this kind of honey is produced in other districts in Pontus.

There are bees also that construct triple honeycombs in the ground; and these honeycombs supply honey but never contain grubs. But the honeycombs in these [20] places are not all of this sort, nor do all the bees construct them.

**23** · Anthrenae and wasps construct combs for their young. When they have no ruler, but are wandering about in search of one, the anthrene constructs its comb on some high place, and the wasp inside a hole. When the anthrene and the wasp [25] have a ruler, they construct their combs underground. Their combs are in all cases hexagonal like the comb of the bee. They are composed, however, not of wax, but of a bark-like webbed fibre, and the comb of the anthrene is much neater than the comb of the wasp. Like the bee, they put their young just like a drop of liquid on to [555<sup>a</sup>1] the side of the cell, and the egg clings to the wall of the cell. But eggs are not deposited in all the cells simultaneously; on the contrary, in some cells are creatures big enough to fly, in others are nymphae, and in others are mere grubs. As in the [5] case of bees, excrement is observed only in the cells where the grubs are found. As long as the creatures are in the nymph condition they are motionless, and the cell is cemented over. In the comb of the anthrene there is found in the cell of the young a drop of honey in front of it. The larvae of the anthrene and the wasp make their appearance not in the spring but in the autumn; and their growth is especially discernible in times of full moon. And the eggs and the grubs never rest at the [10] bottom of the cells, but always cling on to the side wall.

**24** · There is a kind of humble-bee that builds a pointed nest of clay against a stone or in some similar situation, besmearing the clay with



something like spittle. And this is exceedingly thick and hard; in point of fact, one can hardly break it open [15] with a spike. Here the insects lay their eggs, and white grubs are produced wrapped in a black membrane. Apart from the membrane there is found some wax in the honeycomb; and this wax is much yellower than that of the bee.

**25** · Ants copulate and engender grubs; and these grubs do not attach [20] themselves to anything, but grow on and on from small and rounded shapes until they become elongated and defined in shape: and they are engendered in springtime.

**26** · The land-scorpion also lays a number of egg-shaped grubs, and broods over them. When the hatching is completed, the parent animal, as happens with the parent spider, is ejected and put to death by the young ones; for very often the young [25] ones are about eleven in number.

**27** · Spiders in all cases copulate in the way above mentioned, and generate at first small grubs. And these grubs metamorphose in their entirety, and not partially, into spiders; for the grubs are round-shaped at the outset. And the spider, when it lays its eggs, broods over them, and in three days they take definite shape. [555<sup>b</sup>1]

All spiders lay their eggs in a web; but some spiders lay in a small and fine web, and others in a thick one; and some, as a rule, lay in a round-shaped case, and some are only partially enveloped in the web. The young grubs are not all developed at one and the same time into young spiders; but the moment the development takes place, the young spider makes a leap and begins to spin his web. The juice of the [5] grub, if you squeeze it, is the same as the juice found in the spider when young; that is to say, it is thick and white.

The meadow spider lays its eggs at first into a web, one half of which is attached to itself and the other half is free; and on this the parent broods until the eggs are hatched. The phalangia lay their eggs in a sort of strong basket which they [10] have woven, and brood over it until the eggs are hatched. The smooth spider is much less prolific than the phalangium. These phalangia, when they grow to full size, very often surround the mother and eject and kill her; and not seldom they kill the male as well, if they catch him; for he has the habit of co-operating with the mother in the hatching. The brood of a single phalangium is

sometimes three hundred in number. [15] The spider attains its full growth in about four weeks.

**28** · Grasshoppers copulate in the same way as other insects; that is to say, [20] with the lesser covering the larger, for the male is smaller than the female. The females first insert the hollow tube, which they have at their tails, in the ground, and then lay their eggs (the male is not furnished with this tube). The females lay their eggs all in a lump together, and in one spot, so that the entire lump of eggs resembles a honeycomb. After they have laid their eggs, the eggs assume the shape of oval grubs and are enveloped by a sort of thin clay, like a membrane; in this [25] membrane-like formation they grow on to maturity. The larva is so soft that it collapses at a touch. The larva is not placed on the surface of the ground, but a little beneath the surface; and, when it reaches maturity, it comes out of its clayey investiture in the shape of a little black grasshopper; by and by, the skin integument strips off, and at once it grows larger and larger.

[556a1] The grasshopper lays its eggs at the close of summer, and dies after laying them. The fact is that, at the time of laying the eggs, grubs are engendered in the region of the mother grasshopper's neck; and the male grasshoppers die about the same time. [In spring-time they come out of the ground; and no grasshoppers are [5] found in mountainous land or in poor land, but only in flat and loamy land, for the fact is they lay their eggs in cracks of the soil.]<sup>26</sup> During the winter their eggs remain in the ground; and with the coming of summer the last year's larva develops into the grasshopper.

[10] **29** · The locusts lay their eggs and die in like manner after laying them. Their eggs are subject to destruction by the autumn rains, when the rains are unusually heavy; but in seasons of drought the locusts are exceedingly numerous, from the absence of any destructive cause, since their destruction seems then to be a matter of accident and to depend on luck.

[15] **30** · Of the cicada there are two kinds; one, small in size, the first to come and the last to disappear; the other, large, that comes last and first disappears. Both in the small and the large species some are divided at the waist, to wit, the singing ones, and some are undivided;

and these latter have no song. The large and singing [20] cicada is by some designated the 'chirper', and the small cicada the cicadelle. And such of the latter as are divided at the waist can sing just a little.

The cicada is not found where there are no trees; and this accounts for the fact that in the district surrounding the city of Cyrene it is not found at all in the plain country, but is found in great numbers in the neighbourhood of the city, and especially where olive-trees are growing; for an olive grove is not thickly shaded. For [25] the cicada is not found in cold places, and consequently is not found in any grove that keeps out the sunlight.

The large and the small cicada copulate alike, belly to belly. The male discharges sperm into the female, not the female into the male as is the case with insects in general; and the female cicada has a cleft generative organ into which the male discharges the sperm.<sup>27</sup>

They lay their eggs in fallow lands, boring a hole with the pointed organ they [30] carry in the rear, as do the locusts likewise; for the locust lays its eggs in untilled lands, and this fact accounts for their numbers in the territory adjacent to the city of Cyrene. The cicadae also lay their eggs in the canes which prop up vines, [556<sup>b</sup>1] perforating the canes; and also in the stalks of the squill. This brood runs into the ground. And they are most numerous in rainy weather. The grub, on attaining full size in the ground, becomes a nymph, and the creature is sweetest to the taste at this [5] stage before the husk is broken. When the summer solstice comes, the creature issues from the husk at night-time, and in a moment, as the husk breaks, the larva becomes the perfect cicada. The creature, also, at once turns black in colour and [10] harder and larger, and takes to singing. In both species, the larger and the smaller, it is the male that sings, and the female that is unvocal. At first, the males are the sweeter eating; but, after copulation, the females, as they are full then of white eggs.

If you make a sudden noise as they are flying overhead they let drop something [15] like water. Farmers, in regard to this, say that they are voiding urine, i.e. that they have an excrement, and that they feed upon dew.

If you present your finger to a cicada and bend back the tip of it and then extend it again, it will endure the presentation more quietly than if you were to keep your finger outstretched altogether; and it will set to climbing your finger; for the creature is so weak-sighted that it will take to climbing your finger as though that [20] were a moving leaf.

31 · Of insects that are not carnivorous but that live on the juices of living flesh, such as lice and fleas and bugs, all generate what are called 'nits', and these nits generate nothing.

Of these insects the flea is generated out of the slightest amount of putrefying [25] matter; for wherever there is any dry excrement, a flea is sure to be found. Bugs are generated from the moisture of living animals, as it dries up outside their bodies. Lice are generated out of the flesh of animals.

When lice are coming there is a kind of small eruption visible, unaccompanied by any discharge of purulent matter; and if you prick these the lice jump out. In some men the appearance of lice is a disease, in cases where the body is surcharged [557<sup>a</sup>1] with moisture; and, indeed, men have been known to succumb to this louse-disease, as Aleman the poet and the Syrian Pherecydes are said to have done. Moreover, in certain diseases lice appear in great abundance.

There is also a species of louse called the 'wild louse', and this is harder than [5] the ordinary louse, and there is exceptional difficulty in getting the skin rid of it. Boys' heads are apt to be lousy, but men's in less degree; and women are more subject to lice than men. But, whenever people are troubled with lousy heads, they [10] are less than ordinarily troubled with headache. And lice are generated in other animals than man. For birds are infested with them; and pheasants, unless they clean themselves in the dust, are actually destroyed by them. All other winged animals that are furnished with feathers are similarly infested, and all hair-coated [15] creatures also, with the single exception of the ass, which is infested neither with lice nor with ticks.

Cattle suffer both from lice and from ticks. Sheep and goats breed ticks, but do not breed lice. Pigs breed lice large and hard. In dogs are found the *Cynoroestes*. In [20] all animals that are subject to lice, the latter originate from the animals themselves. Moreover, in those bathing animals that have lice, lice are more than usually abundant when they change the water in which they bathe.

In the sea, lice are found on fishes, but they are generated not out of the fish [25] but out of slime; and they resemble multipedal wood-lice, only that their tail is flat. There is only one kind of sea-louse; they are found everywhere, and are particularly numerous on the fins. And all these insects<sup>28</sup> are multipedal and devoid of blood.

The parasite that feeds on the tunny is found in the region of the fins; it [30] resembles a scorpion, and is about the size of a spider. In the seas

between Cyrene and Egypt there is a fish that attends on the dolphin, which is called the louse. This fish gets exceedingly fat from enjoying an abundance of food while the dolphin is out in pursuit of its prey.

[557<sup>b</sup>1] **32** · Other animalcules besides these are generated, as we have already remarked, some in wool or in articles made of wool, as the clothes-moth. And these animalcules come in greater numbers if the woollen substances are dusty; and they come in especially large numbers if a spider be shut up with them; for the creature drinks up any moisture that may be there, and dries up the woollen substance. This [5] grub is found also in men's clothes.

A creature is also found in cheese<sup>29</sup> long laid by, just as in wood, and it is the smallest of animalcules and is white in colour, and is designated the mite. In books also other animalcules are found, some resembling the grubs found in garments, [10] and some resembling tailless scorpions, but very small. As a general rule we may state that such animalcules are found in practically anything, both in dry things that are becoming moist and in moist things that are drying, provided they contain the conditions of life.

There is a grub entitled the 'faggot-bearer', as strange a creature as is known. [15] Its head projects outside its shell, mottled in colour, and its feet are near the end, as is the case with grubs in general; but the rest of its body is cased in a tunic as it were of spider's web, and there are little dry twigs about it, that look as-though they had stuck by accident to the creature as it went walking about. But these twig-like formations are naturally connected with the tunic, for just as the shell is with the body of the snail so is the whole superstructure with our grub; and they do not drop [20] off, but can only be torn off, as though they were all of a piece with him, and the removal of the tunic is as fatal to this grub as the removal of the shell would be to the snail. In course of time this grub becomes a chrysalis, as is the case with the caterpillar, and lives in a motionless condition. But as yet it is not known into what winged condition it is transformed. [25]

The fruit of the wild fig contains the fig-wasp. This creature is a grub at first; but in due time the husk peels off and the wasp leaves the husk behind it and flies away, and enters into the fruit of the fig-tree through its orifice,<sup>30</sup> and causes the fruit not to drop off; and with a view to this phenomenon, farmers are in the habit of [30] tying wild figs on to fig-trees, and of planting wild fig-trees near domesticated ones.

**33** · In the case of animals that are quadrupeds and red-blooded and [558<sup>a</sup>1] oviparous, generation takes place in the spring, but copulation does not take place in an uniform season. In some cases it takes place in the spring, in others in summer time, and in others in the autumn, according as the subsequent season may be favourable for the young.

The tortoise lays eggs with a hard shell and of two colours, like birds' eggs, and [5] after laying them buries them in the ground and treads the ground hard over them; having done that, it comes back from time to time and broods over the eggs on the surface of the ground, and hatches the eggs the next year. The freshwater tortoise leaves the water and lays its eggs. It digs a hole of a cask-like shape, and deposits therein the eggs; after rather less than thirty days it digs the eggs up again and hatches them with great rapidity, and leads its young at once off to the water. The [10] sea-turtle lays on the ground eggs just like the eggs of domesticated birds, buries the eggs in the ground, and broods over them in the night-time. It lays a very great number of eggs, amounting at times to one hundred.

Lizards and crocodiles, terrestrial and fluvial, lay eggs on land. The eggs of [15] lizards hatch spontaneously on land, for the lizard does not live on into the next year; in fact, the life of the animal is said not to exceed six months. The river-crocodile lays a number of eggs, sixty at the most, white in colour, and broods over them for sixty days; for the creature is very long-lived. And the disproportion is [20] more marked in this animal than in any other between the smallness of the original egg and the huge size of the full-grown animal. For the egg is not larger than that of the goose, and the young crocodile is small, answering to the egg in size, but the full-grown animal attains the length of twenty-six feet; and some say that the animal goes on growing to the end of its days.

**34** · With regard to serpents, the viper is externally viviparous, having been [25] previously oviparous internally. The egg, as with the egg of fishes, is uniform in colour and soft-skinned. The young serpent grows on the surface of the egg, and, like the young of fishes, has no shell-like envelopment. The young of the viper is born inside a membrane that bursts from off the young creature in three days; and [30] at times the young viper eats its way out from the inside of the egg. The mother viper brings forth all its young all at once in one day, more than twenty in number. [558<sup>b</sup>1] The other serpents are externally oviparous, and their eggs are strung on to one another like a woman's necklace; after the

mother has laid her eggs in the ground she broods over them, and hatches the eggs in the following year.





## BOOK VI

[5] 1 · So much for the generative processes in snakes and insects, and also in oviparous quadrupeds.

Birds without exception lay eggs, but the pairing season and the times of parturition are not alike for all. Some birds couple and lay at almost any time in the [10] year, as for instance the fowl and the pigeon: the former of these coupling and laying during the entire year, with the exception of the month before and the month after the winter solstice. Some hens, even in the high breeds, lay a large quantity of eggs before brooding, amounting to as many as sixty; and the higher breeds are less prolific than the inferior ones. The Adrianic hens are small-sized, but they lay every [15] day; they are cross-tempered, and often kill their chickens; they are of all colours. Some domesticated hens lay twice a day; indeed, instances have been known where hens, after exhibiting extreme fecundity, have died suddenly. Hens, then, lay eggs, [20] as has been stated, continuously; the pigeon, the ring-dove, the turtle-dove, and the stock-dove lay twice a year, and the pigeon actually lays ten times a year. The great majority of birds lay during the spring-time. Some birds are prolific, and prolific in either of two ways—either by laying often, as the pigeon, or by laying many eggs at [25] a sitting, as the hen. All birds with crooked talons are unprolific, except the kestrel: this bird is the most prolific of birds of prey; as many as four eggs have been observed in the nest, and occasionally it lays even more.

Birds in general lay their eggs in nests, but such as are disqualified for flight, as [559<sup>a</sup>1] the partridge and the quail, do not lay them in nests but on the ground, and cover them over with loose material. The same is the case with the lark and the tetrax. These birds nest in sheltered places; but the bird called eirops in Boeotia, alone of all [5] birds, burrows into holes in the ground and hatches there.

Thrushes, like swallows, build nests of clay, on high trees, and build them in rows all close together, so that from their continuity the structure resembles a necklace of nests. Of all birds that hatch for themselves the hoopoe is the only one [10] that builds no nest whatever; it gets into the hollow of the trunk of a tree, and lays its eggs there without making any sort of nest. The martin builds either under a dwelling-roof or on cliffs.

The tetrix, called ourax in Athens, builds neither on the ground nor on trees, but on low-lying shrubs.

[15] 2 · The egg in the case of all birds alike is hard-shelled, if it be the produce of copulation and has not been damaged—for some hens lay soft eggs. The egg is of two colours, and the white part is outside and the yellow part within.

The eggs of birds that frequent rivers and marshes differ from those of birds that live on dry land; that is to say, the eggs of water-birds have comparatively more [20] of the yellow and less of the white. Eggs vary in colour according to their kind. Some eggs are white, as those of the pigeon and of the partridge; others are yellowish, as the eggs of marsh birds; in some cases the eggs are mottled, as the eggs of the guinea-fowl and the pheasant; while the eggs of the kestrel are red, like vermilion. [25]

Eggs are not symmetrically shaped at both ends: in other words, one end is sharp, and the other end is comparatively blunt; and it is the latter end that protrudes first at the time of laying. Long and pointed eggs are female; those that are round, or more rounded at the narrow end, are male. Eggs are hatched by the incubation of the mother-bird. In some cases, as in Egypt, they are hatched [559<sup>b</sup>1] spontaneously in the ground, by being buried in dung heaps. A story is told of a toper in Syracuse, how he used to put eggs into the ground under his rush-mat and to keep on drinking until he hatched them. Instances have occurred of eggs being deposited in warm vessels and getting hatched spontaneously. [5]

The sperm of all birds, as of animals in general, is white. After the female has submitted to the male, she draws up the sperm to underneath her midriff. At first it is little in size and white in colour; by and by it is red, the colour of blood; as it grows, it becomes pale and yellow all over. When at length it is getting ripe for hatching, it [10] is subject to differentiation, and the yolk gathers together within and the white settles round it on the outside. When the full time is come, the egg detaches itself and protrudes, changing from soft to hard with such temporal exactitude that, whereas it is not hard during the process of protrusion, it hardens immediately after [15] the process is completed—unless it comes out diseased. Cases have occurred where substances resembling the egg at a critical point of its growth—that is, when it is yellow all over, as the yolk is subsequently—have been found in the cock when cut open, underneath his midriff, just where the hen has her eggs; and these are

entirely yellow in appearance and of the same size as ordinary eggs. Such phenomena are regarded as monstrosities. [20]

Those who affirm that wind-eggs are the residua of eggs previously begotten from copulation are mistaken in this assertion; for we have cases well authenticated where chickens of the common hen and goose have laid wind-eggs without ever having been subjected to copulation. Wind-eggs are smaller, less palatable, and more liquid than true eggs, and are produced in greater numbers. When they are [25] put under the mother bird, the liquid contents never coagulate, but both the yellow and the white remain as they were. Wind-eggs are laid by a number of birds: as for instance by the common hen, the partridge, the pigeon, the peahen, the goose, and the vulpanser. Eggs are hatched under brooding hens more rapidly in summer than in winter; that is to say, hens hatch in eighteen days in summer, but occasionally in [560<sup>a</sup>1] winter take as many as twenty-five. And for brooding purposes some birds make better mothers than others. If it thunders while a hen-bird is brooding, the eggs get addled. Wind-eggs that are called by some *cynosura* and *uria* are produced chiefly [5] in summer. Wind-eggs are called by some zephyr-eggs, because at spring-time hen-birds are observed to inhale the breezes; they do the same if they be stroked in a certain way by hand. Wind-eggs can turn into fertile eggs, and eggs due to previous [10] copulation can change kind, if before the change of the yellow to the white the hen that contains wind-eggs or eggs begotten of copulation be trodden by another cock-bird. Under these circumstances the wind-eggs turn into fertile eggs, and the previously impregnated eggs follow the breed of the impregnator; but if the latter [15] impregnation takes place during the change of the yellow to the white, then no change in the egg takes place: the wind-egg does not become a true egg, and the true egg does not take on the breed of the latter impregnator. If when the egg-substance is small copulation be intermitted, the previously existing egg-substance exhibits no increase; but if the hen be again submitted to the male the increase in size proceeds [20] with rapidity.

The yolk and the white are opposite not only in colour but also in properties. Thus, the yolk congeals under the influence of cold, whereas the white instead of congealing is inclined rather to liquefy. Again, the white stiffens under the influence of fire, whereas the yolk does not stiffen; but, unless it be burnt through, it [25] remains soft, and in point of fact is inclined to set or to harden more from the boiling than from the roasting of the egg. The yolk and the white are separated by a membrane from one another. The 'hail-stones' that are found at the extremity of the

yellow in no way contribute towards generation, as some suppose: they are two in number, one below and the other above. If you take out of the shells a number of [560<sup>b</sup>1] yolks and a number of whites and pour them into a saucepan and boil them slowly over a low fire, the yolks will gather into the centre and the whites will set all round them.

Young hens lay first at the beginning of spring and lay more eggs than the [5] older hens; but the eggs of the younger hens are comparatively small. As a general rule, if hens get no brooding they pine and sicken. After copulation hens shiver and shake themselves, and often kick rubbish about all round them—and this they do [10] sometimes after laying—whereas pigeons trail their rumps on the ground, and geese dive under the water. Conception of the true egg and conformation of the wind-egg take place rapidly with most birds; as for instance with the hen-partridge when in heat. The fact is that, when she stands to windward and within scent of the male, [15] she conceives, and becomes useless for decoy purposes; for the partridge appears to have a very acute sense of smell.

The generation of the egg after copulation and the generation of the chick from the subsequent concoction of the egg are not brought about within equal periods for all birds, but differ according to the size of the parent-birds. The egg of the common [20] hen after copulation sets and matures in ten days as a general rule; the egg of the pigeon in a somewhat lesser period. Pigeons have the faculty of holding back the egg at the very moment of parturition; if a hen pigeon is put about by anyone, for instance if it be disturbed on its nest, or have a feather plucked out, or sustain any other annoyance or disturbance, then even though she was on the point of laying, she can keep the egg back in abeyance.

[25] A singular phenomenon is observed in pigeons with regard to pairing: that is, they kiss one another just when the male is on the point of mounting the female, and without this preliminary the male would decline to perform his function.<sup>1</sup> With the older males the preliminary kiss is only given to begin with, and subsequently he mounts without previously kissing; with younger males the preliminary is never omitted. Another singularity in these birds is that the hens tread one another when a [30] cock is not forthcoming, after kissing just as the males do. Though they do not impregnate one another they lay more eggs under these than under ordinary circumstances; no chicks, however, result therefrom, but all such eggs are wind-eggs. [561<sup>a</sup>1]

3 · Generation from the egg proceeds in an identical manner with all birds, but the full periods from conception to birth differ, as has been said. With the [5] common hen after three days and three nights there is the first indication of the embryo; with larger birds the interval being longer, with smaller birds shorter. Meanwhile the yolk comes into being, rising towards the sharp end, where the primal element of the egg is situated, and where the egg gets hatched; and the heart [10] appears, like a speck of blood, in the white of the egg. This point beats and moves as though endowed with life, and from it, as it grows, two vein-ducts with blood in them trend in a convoluted course towards each of the two circumjacent integuments; and a membrane carrying bloody fibres now envelops the white, leading off [15] from the vein-ducts. A little afterwards the body is differentiated, at first very small and white. The head is clearly distinguished, and in it the eyes, swollen out to a great extent. This condition lasts on for a good while, as it is only by degrees that they diminish in size and contract. At the outset the under portion of the body [20] appears insignificant in comparison with the upper portion. Of the two ducts that lead from the heart, the one proceeds towards the circumjacent integument, and the other, like a navel-string, towards the yolk. The origin of the chick is in the white of the egg, and the nutriment comes through the navel-string out of the yolk. [25]

When the egg is now ten days old the chick and all its parts are distinctly visible. The head is still larger than the rest of its body, and the eyes larger than the head, but still devoid of vision. At this time the eyes become projecting, larger than beans, and black; if the cuticle be peeled off them there is a white and cold liquid [30] inside, quite glittering in the sunlight, but there is no hard substance whatsoever. Such is the condition of the head and eyes. At this time also the internal organs are [561<sup>b</sup>1] visible, as also the stomach and the arrangement of the viscera; and the veins that seem to proceed from the heart are now close to the navel. From the navel there [5] stretch a pair of veins; one towards the membrane that envelops the yolk (and the yolk is now liquid, or more bulky than is normal), and the other towards that membrane which envelops collectively the membrane wherein the chick lies, the membrane of the yolk, and the intervening liquid. [For, as the chick grows, little by [10] little one part of the yolk goes upward, and another part downward, and the white liquid is between them; and the white of the egg is underneath the lower part of the yolk, as it was at the outset. On the tenth day the white is at the extreme outer surface, reduced in amount, glutinous, firm in substance, and sallow in colour.]<sup>2</sup>

The disposition of the several constituent parts is as follows. First and [15] outermost, next to the shell, comes the membrane of the egg, not that of the shell, but underneath it. Inside this membrane is a white liquid; then comes the chick, and a membrane round about it, separating it off so as to keep the chick free from the [20] liquid; next after the chick comes the yolk [into which one of the two veins was described as leading, the other one leading into the enveloping white substance. A membrane with a liquid resembling serum envelops the entire structure. Then comes another membrane right round the embryo, as has been described, separating it from the liquid. Underneath this comes the yolk, enveloped in another [25] membrane (into which yolk proceeds the navel-string that leads from the heart and the big vein), so as to keep the embryo free of both liquids.]<sup>3</sup>

About the twentieth day, if you open the egg and touch the chick, it moves inside and chirps; and it is already coming to be covered with down, when, after the twentieth day is past, the chick begins to break the shell. The head is situated over [30] the right leg close to the flank, and the wing is placed over the head; and about this time is plain to be seen the membrane resembling an after-birth that comes next after the outermost membrane of the shell, into which membrane the one of the [562<sup>a</sup>1] navel-strings was described as leading (and the chick in its entirety is now within it), and so also is the other membrane resembling an after-birth, namely that surrounding the yolk, into which the second navel-string was described as leading; and both of them were described as being connected with the heart and the big vein. [5] At this time the navel-string that leads to the outer after-birth collapses and becomes detached from the chick, and the membrane that leads into the yolk is fastened on to the thin gut of the creature, and by this time a considerable amount of the yolk is inside the chick and a yellow sediment is in its stomach. About this [10] time it discharges residuum in the direction of the outer after-birth, and has residuum inside its stomach; and the outer residuum is white and there comes a white substance inside. By and by the yolk, diminishing gradually in size, at length becomes entirely used up and comprehended within the chick (so that, ten days [15] after hatching, if you cut open the chick, a small remnant of the yolk is still left in connexion with the gut), but it is detached from the navel, and there is nothing in the interval between, but it has been used up entirely. During the period above referred to the chick sleeps, but if it is moved it wakes, looks up and chirps; and the [20] heart and the navel together palpitate as though the creature were respiring. So much as to

generation from the egg in the case of birds.

Birds lay some eggs that are unfruitful, even eggs that are the result of copulation, and no life comes from such eggs by incubation; and this phenomenon is observed especially with pigeons.

[25] Twin eggs have two yolks. In some twin eggs a thin partition of white intervenes to prevent the yolks mixing with each other, but some twin eggs are unprovided with such partition, and the yolks run into one another. There are some hens that lay nothing but twin eggs, and in their case the phenomenon regarding the [30] yolks has been observed. For instance, a hen has been known to lay eighteen eggs, and hatch twins out of them all, except those that were wind-eggs; the rest were [562<sup>b1</sup>] fertile (though one of the twins is always bigger than the other), but the eighteenth was monstrous.

4 · Birds of the pigeon kind, such as the ring-dove and the turtle-dove, lay two eggs at a time as a general rule, and they never lay more than three. The pigeon, as has been said, lays at all seasons; the ring-dove and the turtle-dove lay in the [5] spring-time, and they never lay more than twice in the same season. The hen-bird lays the second pair of eggs when the first pair happens to have been destroyed, for many of the hen-pigeons destroy the first brood. The hen-pigeon, as has been said, occasionally lays three eggs, but it never rears more than two chicks, and sometimes rears only one; and the odd one is always a wind-egg. [10]

Very few birds propagate within their first year. All birds, after once they have begun laying, keep on having eggs, though in the case of some birds it is difficult to detect the fact from the minute size of the creature.

The pigeon, as a rule, lays a male and a female egg, and generally lays the male [15] egg first; after laying she allows a day's interval to ensue and then lays the second egg. The male takes its turn of sitting during the daytime; the female sits during the night. The first-laid egg is hatched and brought to birth within twenty days; and the mother bird pecks a hole in the egg the day before she hatches it out. The two parent [20] birds brood for some time over the chicks in the way in which they brooded previously over the eggs. In all connected with the rearing of the young the female parent is more cross-tempered than the male, as is the case with most animals after parturition. The hens lay as many as ten times in the year; occasional instances have [25] been known of their laying eleven times, and in Egypt they actually lay twelve times. The pigeon, male and female, couples within the year; in fact, it couples when

only six months old. Some assert that ring-doves and turtle-doves pair and procreate when only three months old, and instance their superabundant numbers by way of [30] proof of the assertion. The hen-pigeon carries her eggs fourteen days; for as many more days the parent birds hatch the eggs; by the end of another fourteen days the chicks are so far capable of flight as to be overtaken with difficulty. [The ring-dove, [563<sup>a</sup>1] they say, lives up to forty years. The partridge lives over sixteen. After one brood the pigeon is ready for another within thirty days.]<sup>4</sup>

5 · The vulture builds its nest on inaccessible cliffs; for which reason its nest [5] and young are rarely seen. And therefore Herodorus, father of Bryson the Sophist, declares that vultures come from some foreign country unknown to us, stating as a proof of the assertion that no one has ever seen a vulture's nest, and also that vultures in great numbers make a sudden appearance in the rear of armies. [10] However, difficult as it is to get a sight of it, a vulture's nest has been seen. The vulture lays two eggs.

Carnivorous birds in general have not been observed to lay more than once a year. The swallow is the only carnivorous bird that builds a nest twice. If you prick out the eyes of swallow chicks while they are yet young, the birds will get well again [15] and will see by and by.

6 · The eagle lays three eggs and hatches two of them, as it is said in the verses ascribed to Musaeus:

That lays three, hatches two, and cares for one.

[20] This is the case in most instances, though a brood of three has been observed. As the young ones grow, the mother becomes wearied with feeding them and extrudes one of the pair from the nest. [At the same time the bird is said to abstain from food, to avoid harrying the young of wild animals. Thus its wings blanch, and for some days [25] its talons get turned awry. It is in consequence about this time cross-tempered to its own young.]<sup>5</sup> The phene is said to rear the young one that has been expelled from the nest. The eagle broods for about thirty days.

The hatching period is about the same for the larger birds, such as the goose and the great bustard; for the middle-sized birds it extends over about twenty days, [30] as in the case of the kite and the hawk. The kite in general lays two eggs, but occasionally rears three young ones. The so-



called aegolius at times rears four. It is [563<sup>b</sup>1] not true that, as some aver, the raven lays only two eggs; it lays a larger number. It broods for about twenty days and then extrudes its young. Other birds perform the same operation; at all events mother birds that lay several eggs often extrude one of their young.

[5] Birds of the eagle species are not alike in the treatment of their young. The white-tailed eagle is cross, the black eagle is affectionate in the feeding of the young; though, all birds of prey, as soon as their brood is able to fly, beat and extrude them from the nest. The majority of birds other than birds of prey, as has [10] been said, also act in this manner, and after feeding their young take no further care of them; but the crow is an exception. This bird for a considerable time takes charge of her young; for, even when her young can fly, she flies alongside of them and supplies them with food.

7 · The cuckoo is said by some to be a hawk transformed, because the hawk [15] disappears at that time. It is like . . .<sup>6</sup> And the other hawks too are hardly to be seen once the cuckoo has begun to call, except for a few days. The cuckoo appears only for a short time in summer, and in winter disappears. The hawk has crooked talons, [20] which the cuckoo has not; neither with regard to the head does the cuckoo resemble the hawk. In point of fact, both as regards the head and the claws it more resembles the pigeon. However, in colour and in colour alone it does resemble the hawk, only that the markings of the hawk are striped, and of the cuckoo mottled. And in size [25] and flight it resembles the smallest of the hawk tribe, which bird disappears as a rule about the time of the appearance of the cuckoo, though the two have been seen simultaneously. The cuckoo has been seen to be preyed on by the hawk; and this never happens between birds of the same species. They say no one has ever seen the [30] young of the cuckoo. The bird lays eggs, but does not build a nest. Sometimes it lays its eggs in the nest of a smaller bird after first devouring the eggs of this bird; it lays by preference in the nest of the ring-dove, after first devouring the eggs of the [564<sup>a</sup>1] pigeon. (It occasionally lays two, but usually one.) It lays also in the nest of the hypolais, and the hypolais hatches and rears the brood. It is about this time that the bird becomes fat and palatable. The young of hawks also get palatable and fat. One species builds a nest in the wilderness and on sheer cliffs. [5]

8 · With most birds, as has been said of the pigeon, the hatching is carried on by the male and the female in turns: with some birds, however, the male only sits long enough to allow the female to provide herself with food. In the goose tribe the female alone incubates, and after once sitting on the eggs she continues brooding [10] until they are hatched.

The nests of all marsh-birds are built in swampy districts well supplied with grass; consequently, the motherbird while sitting quiet on her eggs can provide herself with food without having to submit to absolute fasting. [15]

With the crow also the female alone broods, and broods throughout the whole period; the male bird supports the female, bringing her food and feeding her. The female of the ring-dove begins to brood in the afternoon and broods through the entire night until breakfast-time of the following day; the male broods during the [20] rest of the time. Partridges build a nest in two compartments; the male broods on the one and the female on the other. After hatching, each of the parent birds rears its brood. But the male, when he first takes his young out of the nest, treads them.

9 · Peafowl live for about twenty-five years, breed about the third year, and [25] at the same time take on their spangled plumage. They hatch their eggs within thirty days or rather more. The peahen lays but once a year, and lays twelve eggs, or may be a slightly lesser number: she does not lay all the eggs one after the other, but at intervals of two or three days. Such as lay for the first time lay about eight eggs. [30] The peahen lays wind-eggs. They pair in the spring; and laying begins immediately after pairing. The bird moults when the earliest trees are shedding their leaves, and [564<sup>b</sup>1] recovers its plumage when the same trees are recovering their foliage. People that rear peafowl put the eggs under the domestic hen, owing to the fact that when the peahen is brooding over them the peacock attacks her and tries to trample on them; owing to this circumstance some birds of wild varieties run away from the males and [5] lay their eggs and brood in solitude. Only two eggs are put under a hen, for she could not brood over and hatch a large number. They take every precaution, by supplying her with food, to prevent her going off the eggs and discontinuing the brooding.

With male birds about pairing time the testicles are larger than at other times, [10] and this is conspicuously the case with the more salacious birds, such as the domestic cock and the cock partridge; the

peculiarity is less conspicuous in such birds as are intermittent in regard to pairing.

## 10 · So much for the conception and generation of birds.

It has been previously stated that fishes are not all oviparous. The selachia are [15] viviparous; the rest are oviparous. And the selachia are first oviparous internally and subsequently viviparous; they rear the embryos internally, the fishing-frog being an exception.

[20] Fishes also, as was above stated, are provided with wombs of diverse kinds. The oviparous genera have wombs bifurcate in shape and low down in position; the selachia have wombs shaped like those of birds; but they differ in this respect from the womb of birds, that with some the eggs do not settle close to the diaphragm but middle-ways along the backbone, and as they grow they shift their position.

[25] The egg with all fishes is not of two colours but is of even hue; and the colour is nearer to white than to yellow, and that both when the young is inside it and previously as well.

Development from the egg in fishes differs from that in birds in this respect, that it does not exhibit that one of the two navel-strings that<sup>7</sup> leads off to the [30] membrane that lies close under the shell, while it does exhibit that one of the two that in the case of birds leads off to the yolk. In a general way the rest of the development from the egg onwards is identical in birds and fishes. That is to say, development takes place at the upper part of the egg, and the veins extend in like manner, at first from the heart; and at first the head, the eyes, and the upper parts [565<sup>a</sup>1] are largest; and as the creature grows the egg decreases and eventually disappears and becomes absorbed within the embryo, just as takes place with the yolk in birds.

[5] The navel-string is attached a little way below the mouth to the belly. When the creatures are young the navel-string is long, but as they grow it diminishes in size; at length it gets small and becomes incorporated, as was described in the case of birds. The embryo and the egg are enveloped by a common membrane, and just under this is another membrane that envelops the embryo by itself; and in between [10] the two membranes is a liquid. The food inside the stomach of the little fishes resembles that inside the stomach of young chicks, and is partly white and partly yellow.

As regards the shape of the womb, the reader is referred to the *Anatomies*. The womb, however, is diverse in diverse fishes, as for

instance in the dogfish as [15] compared one with another or as compared with the flat fish. That is to say, in some dogfish the eggs adhere in the middle of the womb round about the backbone, as has been stated, and this is the case with the 'puppy'; as the eggs grow they shift their place; and since the womb is bifurcate and adheres to the midriff, as in the rest of [20] similar creatures, the eggs pass into one or other of the two compartments. This womb and the womb of the other dogfish exhibit, as you go a little way off from the midriff, something resembling white breasts, which never make their appearance unless there be conception.

'Puppies' and rays have a kind of egg-shell, in which is found an egg-like liquid. [25] The shape of the egg-shell resembles the tongue of a bagpipe, and hair-like ducts are attached to the shell. With the puppy which is called by some the dappled dogfish, the young are born when the shell-formation breaks in pieces and falls out; with the ray, after it has laid the egg the shell-formation breaks up and the young [30] move out. The spiny dog-fish has its eggs close to the midriff above the breast-like formations; when the egg descends, as soon as it gets detached the young is born. The mode of generation is the same in the case of the fox-shark. [565<sup>b</sup>1]

The so-called smooth dogfish has its eggs in between the wombs like the 'puppy'; these eggs shift into each of the two horns of the womb and descend, and the young develop with the navel-string attached to the womb, so that, as the eggs get used up, the embryo is sustained to all appearance just as in the case of [5] quadrupeds. The navel-string is long and adheres to the under part of the womb (each navel-string being attached as it were by a sucker), and also to the centre of the embryo in the place where the liver is situated. If the embryo be cut open, even though it has the egg no longer, the food inside is egg-like. Each embryo, as in the [10] case of quadrupeds, is provided with a chorion and separate membranes. When young the embryo has its head upwards, but downwards when it gets strong and is completed in form. Males are generated on the left-hand side of the womb too, and females on the right-hand side, and males and females on the same side together. If [15] the embryo be cut open, then, as with quadrupeds, such internal organs as it is furnished with, as for instance the liver, are found to be large and supplied with blood.

All selachia have at one and the same time eggs above close to the midriff (some larger, some smaller), in considerable numbers, and also embryos lower down. And this circumstance leads many to suppose that

fishes of this species pair [20] and bear young every month, inasmuch as they do not produce all their young at once, but now and again and over a lengthened period. But such eggs as have come down below within the womb are simultaneously ripened and completed in growth.

Dog-fish in general can extrude and take in again their young, as the angel-fish and the electric ray—and a large electric ray has been seen with about eighty [25] embryos inside it—but the spiny dog-fish is an exception to the rule, being prevented by the spine of the young fish from so doing. Of the flat fish, the trygon and the ray cannot take in again in consequence of the roughness of their tails. The fishing-frog also is unable to take in its young owing to the size of the head and the [30] prickles; and, as was previously remarked, it is the only one of these fishes that is not viviparous.

So much for the varieties of the selachia and for their modes of generation from the egg. [566<sup>a</sup>1]

**11** · At the breeding season the sperm-ducts of the male are filled with milt, so much so that if they be squeezed the sperm flows out as a white fluid; the ducts are bifurcate, and start from the midriff and the great vein. About this period the [5] sperm-ducts of the male are quite distinct [from the womb of the female],<sup>8</sup> but at any other than the actual breeding time their distinctness is not obvious to a non-expert. The fact is that in certain fishes at certain times these organs are imperceptible, as was stated regarding the testicles of birds.

Among other distinctions observed between the milt ducts and the womb-ducts [10] is the circumstance that the former are attached to the loins, while the womb-ducts move about freely and are attached by a thin membrane. The particulars regarding [15] the milt ducts may be studied by a reference to the diagrams in the *Anatomies*.

Selachia are capable of superfoetation, and their period of gestation is six months at the longest. The so-called starry dog-fish bears young the most frequently; in other words it bears twice a month. The breeding-season begins in the month of Maemacterion. The dog-fish as a general rule bear twice in the year, with the exception of the 'puppy' which bears only once a year. Some of them bring forth [20] in the springtime. The angel-fish bears its first brood in the springtime, and its second in the autumn, about the winter setting of the Pleiads; the second brood is the stronger of the two. The electric ray brings forth in the late autumn.

Selachia come out from the main seas and deep waters towards the

shore and [25] there bring forth their young, and they do so for the sake of warmth and by way of protection for their young.

No fish has been observed to mate outside its own kind, except the angel-fish and the ray; for there is a fish called the rhinobatus, with the head and front parts of [30] the ray and the after parts of the angel-fish, just as though it were made up of both fishes together.<sup>9</sup>

Dog-fish then and their congeners, as the fox-shark and the hound, and the flat fishes, such as the electric ray, the ray, the smooth skate, and the trygon, are first [566<sup>b</sup>1] oviparous and then viviparous in the way above mentioned.

**12** · The dolphin, the whale, and all the rest of the cetacea, all, that is to say, that are provided with a blow-hole instead of gills, are viviparous; so too are the saw-fish and the ox-fish. That is to say, no one of all these fishes is ever seen to be [5] supplied with eggs, but directly with an embryo from whose differentiation comes the fish, just as in the case of mankind and the viviparous quadrupeds.

The dolphin bears one at a time generally, but occasionally two. The whale bears one or at the most two, generally two. The porpoise in this respect resembles [10] the dolphin; for it is in form like a little dolphin, and is found in the Euxine; it differs, however, from the dolphin as being less in size and broader in the back; its colour is blue-black. Many people are of opinion that the porpoise is a variety of the dolphin.

All creatures that have a blow-hole respire and inspire, for they are provided [15] with lungs. The dolphin has been seen asleep with his nose above water, and when asleep he snores.

The dolphin and the porpoise are provided with milk, and suckle their young. They also take their young, when small, inside them. The young of the dolphin grows rapidly, being full-grown at ten years of age. Its period of gestation is ten [20] months. It brings forth its young in summer, and never at any other season; and under the Dog-star it actually disappears for about thirty days. Its young accompany it for a considerable period; and, in fact, the creature is remarkable for the strength of its parental affection. It lives for many years; some are known to have lived for more than twenty-five, and some for thirty years; the fact is fishermen nick their tails sometimes and set them adrift again, and by this expedient their ages [25] are ascertained.

The seal is an ambivalent animal: that is to say, it does not take in water, but breathes and sleeps and brings forth on dry land—only close to

the shore—as being an animal furnished with feet; it spends, however, the greater part of its time in the [30] sea and derives its food from it, so that it must be classed in the category of marine animals. It is viviparous by immediate conception and brings forth its young alive, and exhibits an after-birth and all else just like a ewe. It bears one or two at a time, [567<sup>a</sup>1] and three at the most. It has two teats, and suckles its young like a quadruped. Like the human species it brings forth at all seasons of the year, but especially at the time when the earliest kids are forthcoming. It conducts its young ones, when they are about twelve days old, over and over again during the day down to the sea, [5] accustoming them by slow degrees to the water. It slips down steep places instead of walking, from the fact that it cannot steady itself by its feet. It can contract and draw itself in, for it is fleshy and soft and its bones are gristly. Owing to the flabbiness of its body it is difficult to kill a seal by a blow, unless you strike it on the [10] temple. It lows like a cow. The female in regard to its genital organs resembles the cow; in all other respects it resembles the female of the human species.

So much for the phenomena of generation and of parturition in animals that [15] live in water and are viviparous either internally or externally.

**13** · Oviparous fishes have their womb bifurcate and placed low down, as was said previously—and all scaly fish are oviparous, as the basse, the mullet, the grey mullet, and the etelis, and all the so-called white-fish, and all the smooth fish [20] except the eel—and their egg is of a crumbling substance. This seems to be one<sup>10</sup> because the whole womb of such fishes is full of eggs, so that in little fishes there seem to be only a couple of eggs there; for in small fishes the womb is indistinguishable, from its diminutive size and thin contexture. The pairing of fishes [25] has been discussed previously.

Fishes for the most part are divided into males and females, but one is puzzled to account for the erythrinus and the channa, for specimens of these species are never caught except in a condition of pregnancy.

With such fish as pair, eggs are the result of copulation, but such fish have them also without copulation; and this is shown in the case of some river-fish, for the [30] minnow has eggs when quite small,—almost, one may say, as soon as it is born. These fishes shed their eggs, and, as is stated, the males swallow the greater part of them, and some portion of them goes to waste in the water; but such of the eggs as [567<sup>b</sup>1] the

female deposits in suitable places are saved. If all the eggs were preserved, each species would be vast in number. The greater number of these eggs are not productive, but only those over which the male sheds the milt; for when the female has laid her eggs, the male follows and sheds its milt over them, and from all the [5] eggs so besprinkled young fishes proceed, while the rest are left to their fate.

The same phenomenon is observed in the case of cephalopods also; for in the case of the cuttlefish, after the female has deposited her eggs, the male besprinkles [10] them. It is reasonable to suppose that a similar phenomenon takes place in regard to cephalopods in general, though up to the present time the phenomenon has been observed only in the case of the cuttlefish.

[Fishes deposit their eggs close in to shore, the goby close to stones; and the spawn of the goby is flat and crumbly. Fish in general so deposit their eggs; for the water close in to shore is warm and is better supplied with food, and serves as a [15] protection to the spawn against the voracity of the larger fish. And it is for this reason that in the Euxine most fishes spawn near the mouth of the river Thermodon, because the locality is sheltered, genial, and supplied with fresh water.

Oviparous fish as a rule spawn only once a year. The black goby is an [20] exception, as it spawns twice; the male of the black goby differs from the female as being blacker and having larger scales.]<sup>11</sup>

Fishes then in general produce their young by copulation, and lay their eggs; but the pipe-fish, as some call it, when the time of parturition arrives, bursts in two, [25] and the eggs escape out. For the fish has a cleft under the belly and abdomen (like the blind snakes), and after it has spawned the sides of the split grow together again.

Development from the egg takes place similarly with fishes that are oviparous internally and with fishes that are oviparous externally; that is to say, the embryo comes at the upper end of the egg and is enveloped in a membrane, and the eyes, [30] large and spherical, are the first organs visible. From this circumstance it is plain that it is not true, as some say, that they develop in the same way as creatures that come from grubs; for the opposite phenomena are observed in the case of these latter, in that their lower extremities are the larger at the outset, and that the eyes [568a1] and the head appear later on.

After the egg has been used up, the young fishes are like tadpoles in shape, and at first, without taking any nutriment, they grow by sustenance derived from the juice oozing from the egg; by and by, they



are nourished up to full growth by the river-waters.

[5] [When the Euxine is ‘purged’ a substance called phycus is carried into the Hellespont, and this substance is of a pale yellow colour. Some writers aver that it is the flower of the phycus, from which rouge is made; it comes at the beginning of summer. Shellfish and the small fish of these localities feed on this substance, and [10] some of the inhabitants of these maritime districts say that the purple murex derives its peculiar colour from it.]<sup>12</sup>

14 · Marsh-fishes and river-fishes conceive at the age of five months as a general rule, and deposit their spawn towards the close of the year without exception. And with these fishes, as with the marine fishes, the female does not void [15] all her eggs at one time, nor the male his milt; but they are at all times more or less provided, the female with eggs, and the male with milt. The carp spawns as the seasons come round, five or six times, and follows in spawning the rising of the stars. The chalcis spawns three times, and the other fishes once only in the year. They all [20] spawn in pools left by the overflowing of rivers, and near to reedy places in marshes; as for instance the minnow and the perch.

The sheat-fish and the perch deposit their spawn in one continuous string, like the frog; so continuous, in fact, is the convoluted spawn of the perch that, by reason [25] of its smoothness, the fishermen in the marshes can unwind it off the reeds. The larger individuals of the sheat-fish spawn in deep waters, some in water of a fathom’s depth, the smaller in shallower water, generally close to the roots of the willow or of some other tree, or close to reeds or to moss. At times these fishes [30] intertwine with one another, a big with a little one; and, bringing into juxtaposition the ducts—which some writers designate as navels—at the point where they emit [568<sup>b</sup>1] the generative products, the one discharges the egg and the other the milt. Such eggs as are besprinkled with the milt grow, in a day or thereabouts, whiter and larger, and in a little while afterwards the fish’s eyes become visible, for these [5] organs in all fishes, as for that matter in all other animals, are early conspicuous and seem disproportionately big. But such eggs as the milt fails to touch remain, as with marine fishes, useless and infertile. From the fertile eggs, as the little fish grow, a kind of sheath detaches itself; this is a membrane that envelops the egg and the [10] young fish. When the milt has mingled with the eggs, the resulting product becomes very sticky and adheres to the roots of trees or wherever it may have been laid. The male keeps on

guard at the principal spawning-place, and the female after spawning goes away.<sup>13</sup>

In the case of the sheat-fish the growth from the egg is exceptionally slow, and, [15] in consequence, the male has to keep watch for forty or fifty days to prevent the spawn being devoured by such little fishes as chance to come by. Next in point of slowness is the generation of the carp. Nevertheless,<sup>14</sup> the spawn in this case too escapes if it is guarded.

In the case of some of the smaller fishes when they are only three days old [20] young fishes are generated. Eggs touched by the milt take on increase both the same day and also later. The egg of the sheat-fish is as big as a vetch-seed; the egg of the carp and of the carp-species as big as a millet-seed.

These fishes then spawn and generate in the way here described. The chalcis, [25] however, spawns in deep water in dense shoals of fish; and the so-called tilon spawns near to beaches in sheltered spots in shoals likewise. The carp, the baleros, and fishes in general push eagerly into the shallows for the purpose of spawning, and very often thirteen or fourteen males are seen following a single female. When the [30] female deposits her spawn and departs, the males follow on and shed the milt. The greater portion of the spawn gets wasted; because, owing to the fact that the female [569a1] moves about while spawning, the spawn scatters, or so much of it as is caught in the stream and does not get entangled with some rubbish. For, with the exception of the sheat-fish, no fish keeps on guard; unless it be the carp, which is said to remain on guard, if it so happen that its spawn lies in a solid mass. [5]

All male fishes are supplied with milt, excepting the eel: with the eel, the male is devoid of milt, and the female of eggs. The mullet goes up from the sea to marshes and rivers; the eels, on the contrary, make their way down from the marshes and rivers to the sea.

[10] **15** · The great majority of fish, then, as has been stated, proceed from eggs. [However, there are some fish that proceed from mud and sand, even of those kinds that proceed also from pairing and the egg. This occurs in ponds—especially in a pond in the neighbourhood of Cnidos. This pond, it is said, at one time ran dry about [15] the rising of the dog-star, and the mud was all taken out; at the first fall of the rains there was a show of water in the pond, and on the first appearance of the water shoals of tiny fish were found in the pond. The fish in question was a kind of mullet, one which does not proceed from normal pairing, about

the size of a small sprat, and not one of these fishes was provided with either egg or milt. There are found also in [20] Asia Minor, in rivers not communicating with the sea, little fishes like whitebait, different but found under similar circumstances. Some writers actually aver that mullet all grow spontaneously. In this assertion they are mistaken, for the female of the fish is found provided with eggs, and the male with milt. However, there is a [25] species of mullet that grows out of mud and sand.

From the facts above enumerated it is clear that certain fishes come spontaneously into existence, not being derived from eggs or from copulation. Such fish as are neither oviparous nor viviparous arise all either from mud or from sand and from decayed matter that rises thence as a scum; for instance, the so-called froth of the small fry comes out of sandy ground. This fry is incapable of growth and [569<sup>b</sup>1] of propagating its kind; after living for a while it dies away and another creature takes its place, and so, with short intervals excepted, it may be said to last the whole year through. At all events, it lasts from the autumn rising of Arcturus up to the spring-time. As a proof that these fish occasionally come out of the ground we have [5] the fact that in cold weather they are not caught, and that they are caught in warm weather, obviously coming up out of the ground to catch the heat; also, when the fishermen use dredges and the ground is scraped up, the fishes often appear in larger numbers and of superior quality. All other small fry are inferior in quality owing to rapidity of growth.

[10] The fry are found in sheltered and marshy districts, when after a spell of fine weather the ground is getting warmer, as, for instance, in the neighbourhood of Athens, at Salamis and near the tomb of Themistocles and at Marathon; for in these districts the froth is found. It appears, then, in such districts and during such [15] weather, and occasionally appears after a heavy fall of rain in the froth that is thrown up by the falling rain—which is why it is called froth. Foam is occasionally brought in on the surface of the sea in fair weather. And in this, where it has formed on the surface, the froth collects, as grubs swarm in manure; for which reason this [20] fry is often brought in from the open sea. The fish is at its best in quality and quantity in moist warm weather.

The ordinary fry is the normal issue of fishes: the so-called gudgeon-fry of small insignificant gudgeon-like fish that burrow under the ground. From the Phaleric fry comes the membras, from the membras the trichis, from the trichis the [25] trichias, and from one particular sort of fry, to wit from that found in the harbour of Athens, comes what is called the anchovy. There is another fry, derived from the sprat and the mullet.

The unfertile fry is watery and keeps only a short time, as has been stated; for at last only head and eyes are left. However, the fishermen of late have hit upon a [570<sup>a</sup>1] method of transporting it to a distance, as when salted it keeps for a considerable time.]]<sup>15</sup>

16 · Eels are not the issue of pairing, neither are they oviparous; nor was an eel ever found supplied with either milt or eggs, nor are they when cut open found to [5] have within them passages for milt or for eggs. In point of fact, this entire species of blooded animals proceeds neither from pairing nor from the egg.

There can be no doubt that the case is so. For in some standing pools, after the water has been drained off and the mud has been dredged away, the eels appear again after a fall of rain. In time of drought they do not appear even in stagnant [10] ponds, for the simple reason that their existence and sustenance is derived from rain-water.

There is no doubt, then, that they proceed neither from pairing nor from an egg. Some writers, however, are of opinion that they generate their kind, because in some eels little worms are found, from which they suppose that eels are derived. But [15] this opinion is not founded on fact. Eels are derived from the so-called 'earth's guts' that grow spontaneously in mud and in humid ground; in fact, eels have at times been seen to emerge out of such earthworms, and on other occasions have been rendered visible when the earthworms were laid open by either scraping or cutting. Such earthworms are found both in the sea and in rivers where there is a lot of [20] decayed matter: in the sea in places where sea-weed abounds, and in rivers and marshes near to the edge; for it is near to the water's edge that sun-heat has its chief power and produces putrefaction. So much for the generation of the eel. [25]

17 · Fish do not all bring forth their young at the same season nor all in like manner, neither is the period of gestation for all of the same duration.

Before pairing the males and females gather together in shoals; at the time for copulation and parturition they pair off. With some fishes the time of gestation is [30] not longer than thirty days, with others it is a lesser period; but with all it extends over a number of days divisible by seven. The longest period of gestation is that of the species which some call a *marinus*.

The sargue conceives during the month of Poseideon and carries its spawn for [570<sup>b</sup>1] thirty days; and the species of mullet named by some the chelon, and the myxon, go with spawn at the same period and over the same length of time.

All fish suffer greatly during the period of gestation, and are in consequence [5] very apt to be thrown up on shore at this time. In some cases they are driven frantic with pain and throw themselves on land. At all events they are throughout this time continually in motion until parturition is over (this being especially true of the mullet), and after parturition they are in repose. With many fish the time for [10] parturition terminates on the appearance of grubs within the belly; for small living grubs get generated there and drive out the spawn.

With shoal fishes parturition takes place in the spring, and indeed, with most fishes, about the time of the spring equinox; with others it is at different times, in [15] summer with some, and with others about the autumn equinox.

The first of shoal fishes to spawn is the atherine, and it spawns close to land; the last is the cephalus: and this is inferred from the fact that the brood of the atherine appears first of all and the brood of the cephalus last. The mullet also spawns early. The saupe spawns usually at the beginning of summer, but [20] occasionally in the autumn. The aulopias, which some call the anthias, spawns in the summer. Next in order of spawning comes the gilthead, the basse, the mormyrus, and in general such fish as are nicknamed 'runners'. Latest in order of the shoal fish come the red mullet and the coracine; these spawn in autumn. The red [25] mullet spawns on mud, and consequently, as the mud continues cold for a long while, spawns late in the year. The coracine carries its spawn for a long time; but, as it lives on rocky ground, it goes to a distance and spawns in places abounding in sea-weed, at a period later than the red mullet. The sprat spawns about the winter solstice. Of the others, such as are seagoing spawn for the most part in summer; [30] which fact is proved by their not being caught during this period.

Of fishes the most prolific is the sprat; of selachia, the fishing-frog. Specimens, however, of the fishing-frog are rare from the facility with which the young are destroyed, as the female lays her spawn all in a lump close in to shore. As a rule, [571<sup>a</sup>1] selachia are less prolific than other fish owing to their being viviparous; and their young by reason of their size have a better chance of escaping destruction.

The so-called pipe-fish is late in spawning, and the greater portion of them are burst asunder by the eggs before spawning; and the eggs are not

so many in number [5] as large in size. The young fish cluster round the parent like so many young spiders, for the fish spawns on to herself; and, if any one touch the young, they swim away. The atherine spawns by rubbing its belly against the sand.

[Tunny fish also burst asunder by reason of their fat. They live for two years; and the fishermen infer this age from the circumstance that once when there was a [10] failure of the young tunny fish for a year there was a failure of the full-grown tunny the next summer. They are of opinion that the tunny is a fish a year older than the pelamyd.]<sup>16</sup> The tunny and the mackerel pair about the close of the month of Elaphebolion, and spawn about the commencement of the month of Hecatombaeon; [15] they deposit their spawn in a sort of bag. The growth of the young tunny is rapid. After the females have spawned in the Euxine, there comes from the egg what some call scordylae, but what the Byzantines nickname 'growers', from their growing to a considerable size in a few days; these fish go out of the Pontus in autumn along with the young tunnies, and enter Pontus in the spring as pelamyds. Fishes as a rule take [20] on growth with rapidity, but this is peculiarly the case with all species of fish found in the Pontus; the growth, for instance, of the bonito is quite visible from day to day.

In general, we must bear in mind that the same fish, if they are not in the same localities, have not the same season for pairing, for conception, for parturition, or [25] for flourishing. The coracine, for instance, in some places spawns about wheat-harvest. The statements here given aim only to give what happens for the most part.

The conger also spawns, but the fact is not equally obvious in all localities, nor [30] is the spawn plainly visible owing to the fat of the fish; for the spawn is lanky in shape as it is with serpents. However, if it be put on the fire it shows its nature; for the fat evaporates and melts, while the eggs dance about and explode with a crack. Further, if you touch the substances and rub them with your fingers, the fat feels smooth and the egg rough. Some congers are provided with fat but not with any egg, [571<sup>b</sup>1] others are unprovided with fat but have eggs of the sort described.

**18** · We have, then, treated pretty fully of the animals that fly in the air or swim in the water, and of such of those that walk on dry land as are oviparous, to wit of their pairing, conception, and the like phenomena; it now remains to treat of the [5] same phenomena in

connexion with viviparous land animals and with man.

The statements made in regard to the pairing of the sexes apply partly to the particular kinds of animal and partly to all in general. It is common to all animals to be most excited by the desire for and the pleasure derived from copulation. The [10] female is most fierce just after parturition, the male during the time of pairing; for instance, stallions at this period bite one another, throw their riders, and chase them. Wild boars, though usually enfeebled at this time as the result of copulation, [15] are now unusually fierce, and fight with one another in an extraordinary way, clothing themselves with defensive armour and deliberately thickening their hide by rubbing against trees or by coating themselves repeatedly with mud and then drying themselves. They drive one another away from the swine pastures, and fight with [20] such fury that very often both combatants succumb. The case is similar with bulls, rams, and he-goats; for, though at ordinary times they herd together, at breeding time they hold aloof from and quarrel with one another. The male camel also is fierce at pairing time if either a man or a camel comes near him; as for a horse, a [25] camel is ready to fight him at any time.<sup>17</sup> It is the same with wild animals. The bear, the wolf, and the lion are all at this time ferocious towards such as come in their way, but they are less given to fight with one another from the fact that they are at no time gregarious. The she-bear is fierce after cubbing, and the bitch after [30] pupping.

Male elephants get savage about pairing time, and for this reason it is stated that men who have charge of elephants in India never allow the males to have [572<sup>a</sup>1] intercourse with the females; on the ground that the males go wild at this time and turn topsy-turvy the dwellings of their keepers, lightly constructed as they are, and commit all kinds of havoc. They also state that abundancy of food has a tendency to tame the males. They further introduce other elephants amongst the wild ones, and [5] punish and break them in by setting on the new-comers to chastise the others.

Animals that pair frequently and not at a single specific season, as for instance animals domesticated by man, such as swine and dogs, are found to indulge in such behaviour to a lesser degree owing to the frequency of their sexual intercourse.

[10] Of female animals the mare is the most sexually wanton, and next in order comes the cow. In fact, the mare is said to go a-horsing; and the term derived from the habits of this one animal serves as a term of abuse applicable to those who are unbridled in the way of sexual

appetite. The mare is said also about this time to get [15] wind-impregnated, and for this reason in Crete they never remove the stallion from the mares; and when the mare gets into this condition she runs away from all other horses. (This is the condition which in sows is known as going boaring.) The mares under these circumstances fly invariably either northwards or southwards, and never towards either east or west. When this complaint is on them they allow no one [20] to approach, until either they are exhausted with fatigue or have reached the sea. Then they discharge a certain substance called 'hippomanes', the title given to a growth on a new-born foal; this resembles the sow-virus, and is in great demand amongst women who deal in drugs. About horsing time the mares huddle closer [25] together, are continually switching their tails, their neigh is abnormal in sound, and from the sexual organ there flows a liquid resembling sperm, but much thinner than the sperm of the male. It is this substance that some call hippomanes, instead of the growth found on the foal; they say it is extremely difficult to get as it oozes out only [30] in small drops at a time. Mares also, when in heat, discharge urine frequently, and frisk with one another. Such are the phenomena connected with the horse.

Cows go a-bulling; and so completely are they under the influence of the sexual excitement that the herdsmen have no control over them and cannot catch hold of [572<sup>b</sup>1] them. Mares and cows alike, when in heat, indicate the fact by the upraising of their genital organs, and by continually voiding urine. Further, cows mount the bulls, [5] follow them about, and keep standing beside them. The younger females both with horses and cattle are the first to get in heat; and their sexual appetites are all the keener if the weather be warm and their bodily condition be healthy. Mares, when clipt of their coat, have the sexual feeling checked, and assume a downcast drooping [10] appearance. The stallion recognizes by the scent the mares that form his company, even though they have been together only a few days before breeding time; and those which have mixed with others, the stallion bites and drives away. He feeds apart, accompanied by his own troop of mares. Each stallion has assigned to him [15] about thirty mares or even somewhat more; when a strange stallion approaches, he huddles his mares into a close ring, runs round them, then advances to the encounter; if one of the mares make a movement, he bites her and drives her back. The bull in breeding time begins to graze with the cows, and fights with other bulls (having hitherto grazed with them), which is termed 'herd-spurning'. Often in Epirus a bull disappears for three months together. In a general way one



may state [20] that of male animals either none or few herd with their respective females before breeding time; but they keep separate after reaching maturity, and the two sexes feed apart. Sows, when they are moved by sexual desire, or are, as it is called, a-boaring, will attack even human beings. [25]

With bitches the same sexual condition is termed 'getting into heat'. The sexual organ rises at this time, and there is a moisture about the parts. Mares drip with a white liquid at this season.

Female animals are subject to menstrual discharges, but never in such [30] abundance as is the female of the human species. With ewes and she-goats there are signs of menstruation in breeding time, just before the time for submitting to the male; after copulation also the signs are manifest, and then cease for an interval [573<sup>a</sup>1] until the period of parturition arrives; the process then comes on again, and it is by this that the shepherd knows that such and such an ewe is about to bring forth. After parturition comes copious menstruation, not at first much tinged with blood, but deeply dyed with it by and by. With the cow, the she-ass, and the mare, the [5] discharge is more copious owing to their greater bulk, but proportionally to the greater bulk it is far less copious. The cow, for instance, when in heat, exhibits a small discharge to the extent of a quarter of a pint of liquid or a little less; and the time when this discharge takes place is the best time for her to be covered by the bull. Of all quadrupeds the mare is the most easily delivered of its young, exhibits [10] the least amount of discharge after parturition, and emits the least amount of blood; that is to say, in proportion to size. With cows and mares menstruation usually manifests itself at intervals of two, four, and six months; but, unless one be constantly attending to and thoroughly acquainted with such animals, it is difficult to verify the circumstance, and the result is that some are under the belief that the [15] process never takes place with these animals at all.

With mules menstruation never takes place, but the urine of the female is thicker than the urine of the male. As a general rule the discharge from the bladder in the case of quadrupeds is thicker than it is in the human species, and this discharge with ewes and she-goats is thicker than with rams and he-goats; but the [20] urine of the jackass is thicker than the urine of the she-ass, and the urine of the bull is more pungent than the urine of the cow. After parturition the urine of all quadrupeds becomes thicker, especially with such animals as exhibit comparatively slight discharges. At breeding time the milk becomes purulent, but after parturition it becomes wholesome. During pregnancy

ewes and she-goats get fatter and eat [25] more; as is also the case with cows, and, indeed, with all quadrupeds.

In general the sexual appetites of animals are keenest in spring-time; the time of pairing, however, is not the same for all, but is adapted so as to ensure the rearing [30] of the young at a convenient season.

Domesticated swine carry their young for four months, and bring forth a litter of twenty at the utmost; and if the litter be exceedingly numerous they cannot rear all the young. As the sow grows old she continues to bear, but grows indifferent to the boar; she conceives after a single copulation, but they have to put the boar to her [573<sup>b</sup>1] repeatedly owing to her dropping after intercourse what is called the sow-virus. This incident befalls all sows, but some of them discharge the sperm as well. During [5] conception any one of the litter that gets injured or dwarfed is called a runt: such injury may occur at any part of the womb. After littering the mother offers the foremost teat to the first-born. [When the sow is in heat, she must not at once be put to the boar, but only after she lets her lugs drop, for otherwise she is apt to get into [10] heat again; if she be put to the boar when in full condition of heat, one copulation, as has been said, is sufficient. It is as well to supply the boar at the period of copulation with barley, and the sow at the time of parturition with boiled barley. Some swine give fine litters only at the beginning, with others the litters improve as the mothers [15] grow in age and size. It is said that a sow, if she have one of her eyes knocked out, is almost sure to die soon afterwards. Sows for the most part live for fifteen years, but some fall little short of the twenty.]<sup>18</sup>

**19** · Ewes conceive after three or four copulations with the ram. If rain falls [20] after intercourse, she miscarries;<sup>19</sup> and it is the same with the she-goat. The ewe bears usually two lambs, sometimes three or four. Both ewe and she-goat carry their young for five months; consequently wherever a district is sunny and the animals are used to comfort and well fed, they bear twice in the year. The goat lives for eight [25] years and the sheep for ten, but in most cases not so long; the bell-wether, however, lives to fifteen years. In every flock they train one of the rams for bell-wether. When he is called on by name by the shepherd, he takes the lead of the flock: and to this duty the creature is trained from its earliest years. Sheep in Ethiopia live for twelve [30] or thirteen years, goats for ten or eleven. In the case of the sheep and the goat the two sexes have intercourse all their lives long.

Twins with sheep and goats may be due to richness of pasturage, or to the fact that either the ram or the he-goat is a twin-begetter or that the ewe or the she-goat is a twin-bearer. Of these animals some give birth to males and others to females; [574<sup>a</sup>1] and the difference in this respect depends on the waters they drink and also on the sires. And if they submit to the male when north winds are blowing, they are apt to bear males; if when south winds are blowing, females. Such as bear females may get to bear males, due regard being paid to their looking northwards when put to the [5] male. Ewes accustomed to be put to the ram early will refuse him if he attempt to mount them late. Lambs are born white and black according as white or black veins are under the ram's tongue; the lambs are white if the veins are white, and black if the veins are black, and white and black if the veins are white and black; and red if the veins are red. The females that drink salted waters are the first to take the male; [10] the water should be salted before and after parturition, and again in the springtime. With goats the shepherds appoint no bell-wether, as the animal is not of a stable nature but frisky and apt to ramble. If at the appointed season the elders [15] of the flock are eager for intercourse, the shepherds say that it bodes well for the flock; if the younger ones, that the flock is going to be bad.

20 · Of dogs there are several breeds. Of these the Laconian hound of either sex is fit for breeding purposes when eight months old: at about the same age some dogs lift the leg when voiding urine. The bitch conceives with one lining; this is [20] clearly seen in the case where a dog contrives to line a bitch by stealth, as they impregnate after mounting only once. The Laconian bitch carries her young the sixth part of a year or sixty days: or more by one, two, or three, or less by one; the pups are blind for twelve days after birth. After pupping, the bitch is mounted again [25] in six months, but not before. Some bitches carry their young for the fifth part of the year or for seventy-two days; and their pups are blind for fourteen days. Other bitches carry their young for a quarter of a year or for three whole months; and the [30] whelps of these are blind for seventeen days. The bitch appears to go in heat for the same length of time. Menstruation continues for seven days, and a swelling of the genital organ occurs simultaneously; it is not during this period that the bitch is disposed to submit to the dog, but in the seven days that follow. The bitch as a rule [574<sup>b</sup>1] goes in heat for fourteen days, but occasionally for sixteen. The birth-discharge occurs simultaneously with the delivery of the whelps, and the substance of it is thick and mucous, and the quantity

of it, when they have pupped, thins off less than [5] in proportion to their body. The bitch is usually supplied with milk five days before parturition; some seven days previously, some four; and the milk is serviceable immediately after birth. The Laconian bitch is supplied with milk thirty days after [10] lining. The milk at first is thickish, but gets thinner by degrees; with the bitch the milk is thicker than with the female of any other animal excepting the sow and the hare. When the bitch arrives at full growth an indication is given of her capacity for [15] the male; that is to say, just as occurs in the female of the human species, a swelling takes place in the teats of the breasts, and the breasts take on gristle. This incident, however, it is difficult for any but an expert to detect, as the part that gives the indication is inconsiderable. The preceding statements relate to the female, and not one of them to the male. The male as a rule lifts his leg to void urine when six [20] months old; some at a later period, when eight months old, some before they reach six months. In a general way one may put it that they do so when they begin to be strong. The bitch squats down when she voids urine; it is a rare exception that she lifts the leg to do so. The bitch bears twelve pups at the most, but usually five or six; [25] occasionally a bitch will bear one only. The bitch of the Laconian breed generally bears eight. The two sexes have intercourse with each other at all periods of life. A peculiar phenomenon is observed in the case of the Laconian hound: he is found to be more vigorous in commerce with the female after being hard-worked than when [30] allowed to live idle.

The dog of the Laconian breed lives ten years, and the bitch twelve. The bitch of other breeds usually lives for fourteen or fifteen years, but some live to twenty; and for this reason certain critics consider that Homer did well in representing the dog of Odysseus as having died in his twentieth year. With the Laconian hound, [575<sup>a</sup>1] owing to the hardships to which the male is put, he is less long-lived than the female; with other breeds the distinction as to longevity is not very apparent, though as a general rule the male is the longer-lived. [5]

The dog sheds no teeth except the so-called canines; these a dog of either sex sheds when four months old. As they shed these only, many people are in doubt as to the fact, and some people, owing to their shedding but two and its being hard to hit [10] upon this, fancy that the animal sheds no teeth at all; others, after observing the shedding of two, come to the conclusion that the creature sheds the rest in due turn. Men discern the age of a dog by inspection of its teeth; with young dogs the teeth are white and sharp pointed, with old dogs black and blunted.

[15] **21** · The bull impregnates the cow at a single mount, and mounts with such vigour as to weigh down the cow; if his effort be unsuccessful, the cow must be allowed an interval of twenty days before being again submitted. Bulls of mature age decline to mount the same cow several times on one day, except at considerable [20] intervals. Young bulls by reason of their vigour are enabled to mount the same cow several times in one day, and a good many cows besides. The bull is the least salacious of male animals. . . .<sup>20</sup> The victor among the bulls is the one that mounts the females; when he gets exhausted by his amorous efforts, his beaten antagonist sets on him and very often gets the better of the conflict. The bull and the cow are about a year old when it is possible for them to have commerce with chance of [25] offspring; as a rule, however, they are about twenty months old, but it is universally allowed that they are capable in this respect at the age of two years. The cow goes with calf for nine months, and she calves in the tenth month; some maintain that they go in calf for ten months, to the very day. A calf delivered before [30] the times here specified is an abortion and tends not to live, however little premature its birth may have been, as its hooves are weak and imperfect. The cow as a rule bears but one calf, very seldom two; she submits to the bull and bears as long as she lives.

Cows generally live for about fifteen years, and the bulls too, if they have been castrated; but some live for twenty years or even more, if their bodily constitutions [575b1] be sound. The herdsmen tame the castrated bulls, and give them an office in the herd analogous to the office of the bell-wether in a flock; and these bulls live to an exceptionally advanced age, owing to their exemption from hardship and to their browsing on pasture of good quality. The bull is in fullest vigour when five years old, [5] which leads the critics to commend Homer for applying to the bull the epithets of 'five-year-old', or 'of nine seasons', which epithets are alike in meaning. The ox sheds his teeth at the age of two years, not all together but just as the horse sheds his. When the animal suffers from podagra it does not shed the hoof, but is subject [10] to a considerable swelling in the feet. The milk of the cow is serviceable immediately after parturition, and before parturition there is no milk at all. The milk that first presents itself becomes as hard as stone when it clots; this result ensues unless it be previously diluted with water. Cows younger than a year old do not copulate unless under circumstances of a monstrous kind: instances have been recorded of [15] copulation in both sexes at the age of ten months. Cows in general begin to submit to the male about the month of Thargelion or of Scirophorion; some, however, are capable of

conception right on to the autumn. When cows in large numbers receive the bull and conceive, it is looked upon as prognostic of rain and stormy weather. Cows herd together like mares, but in lesser degree. [20]

22 · In the case of horses, the stallion and the mare are first fitted for breeding purposes when two years old. Instances, however, of such early maturity are rare, and their young are small and weak; the ordinary age for sexual maturity is three years, and from that age to twenty the two sexes go on improving in the [25] quality of their offspring. The mare carries her foal for eleven months, and casts it in the twelfth. It is not a fixed number of days that the stallion takes to impregnate the mare; it may be one, two, three, or more. An ass in covering will impregnate more expeditiously than a stallion. The act of intercourse with horses is not laborious [30] as it is with oxen. In both sexes the horse is the most salacious of animals next after the human species. The breeding faculties of the younger horses may be stimulated beyond their years if they be supplied with good feeding in abundance. The mare as a rule bears only one foal; occasionally she has two, but never more. A mare has been [576<sup>a1</sup>] known to cast two mules; but such a circumstance is regarded as monstrous.

The horse then is first fitted for breeding purposes at the age of two and a half years, but achieves full sexual maturity when it has ceased to shed teeth, except it be naturally infertile; however, some horses, it is said, have been known to impregnate [5] the mare while the teeth were in process of shedding.

The horse has forty teeth. It sheds its first set of four, two from the upper jaw and two from the lower, when two and a half years old. After a year's interval, it sheds another set of four in like manner, two upper and two lower, and another set of [10] four after yet another year's interval in like manner; after arriving at the age of four years and six months it sheds no more. An instance has occurred where a horse shed all his teeth at once, and another instance of a horse shedding all his teeth with his last set of four; but such instances are rare. It consequently happens that a horse [15] when four and half years old is in excellent condition for breeding purposes.

The older horses, whether of the male or female, are the more generatively productive. Horses will cover mares from which they have been foaled and mares which they have begotten; and, indeed, a troop of horses is only considered perfect [20] when they mount their own

progeny. Scythians use pregnant mares for riding as soon as the embryo has turned in the womb, and they assert that thereby the mothers have all the easier delivery. Quadrupeds as a rule lie down for parturition, and in consequence the young of them all come out of the womb sideways. The [25] mare, however, when the time for parturition arrives, stands erect and in that posture casts its foal.

The horse in general lives for eighteen or twenty years; some horses live for twenty-five or even thirty, and if a horse be treated with extreme care, it may last on to the age of fifty years [a horse, however, when it reaches thirty years is regarded [30] as exceptionally old. The mare lives usually for twenty-five years, though instances have occurred of their attaining the age of forty.]<sup>21</sup> The male is less long-lived than [576<sup>b</sup>1] the female by reason of the sexual service he is called on to render; and horses that are reared in a private stable live less long than such as are reared in troops. The [5] mare attains her full length and height at five years old, the stallion at six; in another six years the animal reaches its full bulk, and goes on improving until it is twenty years old. The female, then, reaches maturity more rapidly than the male, but in the womb the case is reversed, just as is observed in the human species; and [10] the same phenomenon is observed in the case of all animals that bear several young.<sup>22</sup>

The mare is said to suckle a mule-foal for six months, but not to allow its approach for any longer on account of the pain it is put to by the tugging; an ordinary foal it allows to suck for a longer period.

Horse and mule are at their best after the shedding of the teeth. After they [15] have shed them all, it is not easy to distinguish their age; hence they are said to carry their mark before the shedding, but not after. However, even after the shedding their age is pretty well recognized by the aid of the canines; for in the case of horses much ridden these teeth are worn away by attrition caused by the insertion of the [20] bit; in the case of horses not ridden the teeth are large and detached, and in young horses they are sharp and small.

The male of the horse will breed at all seasons and during its whole life; the mare can take the horse all its life long, but is not ready to pair at all seasons unless it be held in check by a halter or some other compulsion be brought to bear. There is no fixed time at which intercourse of the two sexes takes place;<sup>23</sup> however, if [25] intercourse has taken place at some chance time, they may not be able to rear the offspring. In a stable in Opus there was a stallion that used to serve mares when forty years old: his fore legs had to be lifted up for the operation.

Mares first take the horse in the spring-time. After a mare has foaled she does [30] not get impregnated at once again, but only after an interval; in fact, the foals will be all the better if the interval extend over four or five years. It is, at all events, [577<sup>a</sup>1] absolutely necessary to allow an interval of one year, and for that period to let her lie fallow. A mare, then, breeds at intervals; a she-ass breeds without intermission. Of mares some are absolutely sterile, others are capable of conception but incapable of [5] bringing the foal to full term; it is said to be an indication of this condition in a mare, that her foal if dissected is found to have other kidney-shaped substances round about its kidneys, presenting the appearance of having four kidneys.

After parturition the mare at once swallows the after-birth, and bites off the [10] growth, called the 'hippomanes', that is found on the forehead of the foal. This growth is somewhat smaller than a dried fig; and in shape is broad and round, and in colour black. If anyone gets possession of it before the mare, and the mare gets a smell of it, she goes wild and frantic at the smell. And it is for this reason that venders of drugs seek it out and collect it.

[15] If an ass cover a mare after the mare has been covered by a horse, the ass will destroy the previously formed embryo.

[Horse-trainers do not appoint a horse as leader to a troop, as herdsmen appoint a bull as leader to a herd, because the horse is not steady but quick-tempered and skittish.]<sup>24</sup>

**23** · The ass of both sexes is capable of breeding, and sheds its first teeth, at the age of two and a half years; it sheds its second teeth within six months, its third [20] within another six months, and the fourth after the like interval. These fourth teeth are termed the marks.

A she-ass has been known to conceive when a year old, and the foal to be reared. After intercourse with the male it will discharge the sperm with its urine unless it be hindered, and for this reason it is usually beaten after such intercourse and chased about. It casts its young in the twelfth month. It usually bears but one [25] foal, and that is its natural number; occasionally however it bears twins. The ass if it cover a mare destroys, as has been said, the embryo previously begotten by the horse; but, after the mare has been covered by the ass, the horse will not spoil the embryo. The she-ass has milk in the tenth month of pregnancy. Seven days after [30] casting a foal the she-ass submits to the male, and is almost sure to conceive if put to the male on this particular day; the same



result, however, is quite possible later on. If she has not given birth before losing her marks, she will not conceive or become pregnant in the whole of her remaining life. The she-ass will refuse to cast her foal [577<sup>b</sup>1] with any one looking on or in the daylight, and just before foaling she has to be led away into a dark place. If the she-ass has had young before the shedding of the marks, she will bear all her life through. The ass lives for more than thirty years, and the she-ass lives longer than the male. [5]

When there is a cross between a horse and a she-ass or a jackass and a mare, there is much greater chance of a miscarriage than where the commerce is normal. The period for gestation in the case of a cross depends on the male, and is just what it would have been if the male had had commerce with a female of his own kind. In [10] regard to size, looks, and vigour, the foal is more apt to resemble the mother. If such hybrid connexions be continued without intermittence, the female will soon go sterile; and for this reason trainers always allow of intervals between breeding [15] times. A mare will not take the ass, nor a she-ass the horse, unless the ass shall have been suckled by a mare; and for this reason they put what they call 'mare-sucklings' under mares. These mount the mares in the open pastures, mastering them by force as the stallions do.

**24** · A mule is fitted for commerce with the female after the first shedding of [20] its teeth, and at the age of seven will impregnate effectually; and where connexion has taken place with a mare, a jennet has been known to be produced. After the seven year it has no further intercourse with the female. A female mule has been known to be impregnated, but without the impregnation being followed up by parturition. In Syrophoenicia she-mules submit to the mule and bear young; but the [25] breed, though it resembles the ordinary one, is different. The jennet is foaled by a mare when she has gone sick during gestation, and corresponds to the dwarf in the human species and to the runt in swine; and, as is the case with dwarfs, the sexual organ of the jennet is abnormally large.

The mule lives for a number of years. There are on record cases of mules living [30] to the age of eighty, as did one in Athens at the time of the building of the temple; this mule on account of its age was let go free, but continued to assist in dragging burdens, and would go side by side with the other draught-beasts and stimulate them to their work; and in

consequence a public decree was passed forbidding any [578<sup>a</sup>1] corn-merchant from driving the creature away from his trays. The she-mule grows old more slowly than the mule. Some assert that the she-mule menstruates by the act of voiding her urine, and that the mule owes the prematurity of his decay to his habit of smelling at the urine. So much for the modes of generation in connexion with these animals.

[5] **25** · Breeders can distinguish between young and old quadrupeds. If, when drawn back from the jaw, the skin at once goes back to its place, the animal is [10] young; if it remains long wrinkled up, the animal is old.

**26** · The camel carries its young for ten months, and bears but one at a time and never more; the young camel is removed from the mother when a year old. The animal lives for a long period, more than fifty years. It bears in spring-time, and [15] gives milk until the time of the next conception. Its flesh and milk are exceptionally palatable. The milk is drunk mixed with water in the proportion of either two to one or three to one.

**27** · The elephant of either sex is fitted for breeding before reaching the age of twenty. The female carries her young, according to some accounts, for eighteen [20] months; according to others, for three years; and the discrepancy is due to the fact that their copulation is not easily observed. The female settles down on its rear to cast its young, and obviously suffers greatly during the process. The young one, immediately after birth, sucks the mother, not with its trunk but with the mouth; [25] and can walk about and see distinctly the moment it is born.

**28** · The wild sow submits to the boar at the beginning of winter, and in the spring-time retreats for parturition to a lair in some district inaccessible to intrusion, hemmed in with sheer cliffs and chasms and overshadowed by trees. The [30] boar usually remains by the sow for thirty days. The number of the litter and the period of gestation is the same as in the case of the domesticated pig. The sound of the grunt also is similar; only that the sow grunts more, and the boar seldom. Of the wild boars such as are castrated grow to the largest size and become fiercest:

to [578<sup>b</sup>1] which circumstance Homer alludes when he says:—

‘He reared against him a wild castrated boar: it was not like a corn-eating beast, but like a forest-clad promontory.’<sup>25</sup>

Wild boars become castrated owing to an itch befalling them in early life in the region of the testicles, and they squeeze out their testicles by their rubbing [5] themselves against the trunks of trees.

**29** · The hind, as has been stated, submits to the stag as a rule only under compulsion, as she is unable to endure the male often owing to the rigidity of the penis. However, they do occasionally submit to the stag as the ewe submits to the [10] ram; and when they are in heat the hinds avoid one another. The stag is not constant to one particular hind, but after a while quits one and mates with others. The breeding time is after the rising of Arcturus, during the months of Boedromion and Maimacterion. The period of gestation lasts for eight months. Conception comes on [15] a few days after intercourse; and a number of hinds can be impregnated by a single male. The hind, as a rule, bears but one fawn, although instances have been known of her casting two. Out of dread of wild beasts she casts her young by the side of the high-road. The young fawn grows with rapidity. Menstruation occurs at no other time with the hind; it takes place only after parturition, and the substance is [20] phlegm-like.

The hind leads the fawn to her lair; this is her place of refuge, a cave with a single inlet, inside which she shelters herself against attack.

Fabulous stories are told concerning the longevity of the animal, but the stories [25] have never been verified, and the period of gestation and the growth in the fawn would not lead one to attribute extreme longevity to this creature.

In the mountain called Deer Mountain, which is in Arginussa in Asia Minor—the place where Alcibiades died—all the hinds have one ear split, so that, if [30] they stray to a distance, they can be recognized by this mark; and the embryo actually has the mark while yet in the womb of the mother.

The hind has four teats like the cow. After the hinds have become pregnant, the males all segregate one by one, and in consequence of the violence of their sexual passions they keep each one to himself and dig a hole in the ground; they smell rank, [579<sup>a</sup>1] like goats, and their foreheads from getting wetted become black. In this way they pass the time until the rain falls, after which time they turn to pasture. The animal

acts in this way owing to its sexual wantonness and also to its obesity; for in [5] summertime it becomes so exceptionally fat as to be unable to run: in fact at this period they can be overtaken by the hunters that pursue them on foot in the second or third run; and in consequence of the heat of the weather and their getting out of breath they always make for water. In the rutting season, the flesh of the deer is unsavoury and rank, like the flesh of the he-goat. In wintertime the deer becomes [10] thin and weak, but towards the approach of the spring he is at his best for running. When on the run the deer keeps pausing from time to time, and waits until his pursuer draws upon him, whereupon he starts off again. This habit appears due to [15] some internal pain: at all events, the gut is so slender and weak that, if you strike the animal ever so softly, it is apt to break asunder, though the hide of the animal remains sound and uninjured.

[20] **30** · Bears, as has been previously stated, do not copulate with the male mounting the back of the female, but with the female lying down under the male. The she-bear goes with young for thirty days. She brings forth sometimes one cub, sometimes two cubs, and at most five. Of all animals the newly born cub of the she-bear is the smallest in proportion to the size of the mother; that is to say, it is larger than a mouse but smaller than a weasel. It is also smooth and blind, and its [25] legs and most of its organs are as yet inarticulate. Pairing takes place in the month of Posideon, and they hibernate until Elaphebolion; parturition takes place about the time for retiring into winter quarters; about this time the bear and the she-bear are at the fattest. After the she-bear has reared her young, she comes out of her [30] winter lair in the third month, when it is already spring. The female porcupine hibernates and goes with young the same number of days as the she-bear, and in other respects resembles this animal. When a she-bear is with young, it is a very hard task to catch her.

**31** · It has already been stated that the lion and lioness copulate rearwards, and that these animals are retromingent. They do not copulate nor bring forth at all seasons indiscriminately, but once in the year only. The lioness brings forth in the [579<sup>b</sup>1] spring, generally two cubs at a time, and six at the very most; but sometimes only one. The story about the lioness discharging her womb in the act of parturition is a pure fable, and was merely invented to account for the scarcity of the animal by [5] someone who was at a loss to explain it otherwise; for the animal is a rare

animal, and is not found in many countries. In fact, in the whole of Europe it is only found in the strip between the rivers Achelous and Nessus. The cubs of the lioness when newly born are exceedingly small, and can scarcely walk when two months old. The [10] Syrian lion bears cubs five times: five cubs at the first litter, then four, then three, then two, and lastly one; after this the lioness ceases to bear for the rest of her days. The lioness has no mane, but this appendage is peculiar to the lion. The lion sheds only the four so-called canines, two in the upper jaw and two in the lower; and it [15] sheds them when it is six months old.

**32** · The hyena in colour resembles the wolf, but is more shaggy, and is furnished with a mane running all along the spine. What is recounted concerning its genital organs, to the effect that every hyena is furnished with the organ both of the male and the female, is untrue. The fact is that the sexual organ of the male hyena resembles the same organ in the wolf and in the dog; the part resembling the female [20] genital organ lies underneath the tail, and does to some extent resemble the female organ, but it has no duct, and the passage for the residuum comes underneath it. The female hyena has the part that resembles the organ of the female, and, as in the [25] case of the male, has it underneath her tail, unprovided with duct; and after it the passage for the residuum, and underneath this the true female genital organ. The female hyena has a womb, like all other female animals of the same kind. It is an exceedingly rare circumstance to meet with a female hyena. At least a hunter said that out of eleven hyenas he had caught, only one was a female. [30]

**33** · Hares copulate in a rearward posture, as has been stated, for the animal is retromingent. They breed and bear at all seasons, superfoetate during pregnancy, and bear young every month. They do not give birth to their young ones all together at one time, but bring them forth at intervals over as many days as it may happen to be. The female is supplied with milk before parturition; and after bearing submits [580<sup>a</sup>1] immediately to the male, and is capable of conception while still suckling her young. The milk in consistency resembles sow's milk. The young are born blind, as is the case with the greater part of the fissipeds. [5]

**34** · The fox mounts the vixen in copulation, and the vixen bears young like the she-bear; in fact, her young ones are even more

inarticulately formed. Before parturition she retires to sequestered places, so that it is a great rarity for a vixen to be caught while pregnant. After parturition she warms her young and gets them into shape by licking them. She bears four at most at a birth. [10]

**35** · The wolf resembles the dog in regard to the time of conception and parturition, the number of the litter, and the blindness of the newborn young. The sexes couple at one special period, and the female brings forth at the beginning of the summer. There is an account given of the parturition of the she-wolf that borders on the fabulous, to the effect that she confines her lying-in to within twelve [15] particular days of the year. And they give the reason for this in the form of a myth, viz. that when they transported Leto in so many days from the land of the Hyperboreans to the island of Delos, she assumed the form of a she-wolf to escape the anger of Hera. Whether the account be correct or not<sup>26</sup> has not yet been verified; [20] I give it merely as it is currently told. There is no truth in the current statement that the she-wolf bears only once in her lifetime.

The cat and the ichneumon bear as many young as the dog, and live on the [25] same food; they live about six years. The cubs of the panther are born blind like those of the wolf, and the female bears four at the most at one birth. The particulars of conception are the same for the jackal as for the dog; the cubs of the animal are born blind, and the female bears two, or three, or four at a birth. It is long in the body and low in stature; but<sup>27</sup> notwithstanding the shortness of its legs it is [30] exceptionally fleet of foot, owing to the suppleness of its frame and its capacity for leaping. [580<sup>b</sup>1]

**36** · There is found in Syria a so-called mule. It is not the same as the cross between the horse and ass, but resembles it just as a wild ass resembles the domesticated congener, and derives its name from the resemblance. Like the wild [5] ass, this wild mule is remarkable for its speed. The animals of this species interbreed with one another; and a proof of this statement may be gathered from the fact that a certain number of them were brought into Phrygia in the time of Pharnaces, the father of Pharnabazus, and the animal is there still. There are three now, but there were originally nine, so they say.

[10] **37** · The phenomena of generation in regard to the mouse are the most astonishing both for the number of the young and for the rapidity. On one occasion a she-mouse in a state of pregnancy was shut up by accident in a jar containing millet-seed, and after a little while the lid of the jar was removed and one hundred and twenty mice were found inside it.

The way in which mice in country places appear in enormous numbers and [15] disappear is puzzling. In many places their number is so incalculable that but very little of the corn-crop is left; and so rapid is their mode of proceeding that sometimes a small farmer will one day observe that it is time for reaping, and on the following [20] morning, when he takes his reapers afield, he finds his entire crop devoured. Their disappearance is unaccountable: in a few days not a mouse will there be to be seen. And yet in the time before these few days men fail to keep down their numbers by fumigating and unearthing them, or by hunting them and turning in swine upon [25] them; for pigs root up the mouse-holes. Foxes also hunt them, and the wild ferrets in particular destroy them, but they make no way against the prolific qualities of the animal and the rapidity of its breeding. When they attack, nothing succeeds in thinning them down except the rain; and then they disappear rapidly.

[30] In a certain district of Persia when a female mouse is dissected the female embryos appear to be pregnant. Some people assert, and positively assert, that a [581<sup>a</sup>1] female mouse by licking salt can become pregnant without the intervention of the male.

Mice in Egypt are covered with bristles like the hedgehog. There is also a different breed of mice that walk on their two hind-legs; their front legs are small [5] and their hind-legs long; the breed is exceedingly numerous. There are many other breeds of mice.





## BOOK VII

1 · As to man's growth, first within his mother's womb and afterward to old age, the course of nature, in so far as man is specially concerned, is after the [10] following manner. The difference of male and female and of their respective organs has been dealt with earlier. When twice seven years old, in the most of cases, the male begins to engender seed; and at the same time hair appears upon the pubes, in like manner, so Alcmaeon of Croton remarks, as plants first blossom and then seed. [15] About the same time, the voice begins to alter, getting harsher and more uneven, neither shrill as formerly nor deep as afterward, nor yet of any even tone, but like an instrument whose strings are frayed and out of tune—they say his voice is 'breaking'. Now this breaking of the voice is the more apparent in those who are making trial of their sexual powers; for in those who are prone to lustfulness the [20] voice turns into the voice of a man, but not so in the continent. For if a lad strives diligently to hinder his voice from breaking, as some do of those who devote themselves to music, the voice lasts a long while unbroken and may even persist with little change. And the breasts swell and likewise the private parts, altering in size [25] and shape. (And at this time of life those who try by friction to provoke emission of seed are apt to experience pain as well as pleasure.) At the same age in the female, the breasts swell and the so-called menstrual fluids commence to flow; and this fluid [581<sup>b1</sup>] resembles fresh blood. The 'whites' occur even in very young children, more especially if their diet be largely of a fluid nature; and this malady causes arrest of growth and loss of flesh. In the majority of cases menstruation begins by the time [5] the breasts have grown to the height of two fingers' breadth. In girls, too, about this time the voice changes to a deeper note; for while in general the woman's voice is higher than the man's, so also the voices of girls are pitched in a higher key than the elder women's, just as the boy's are higher than the men's; and the girls' voices are [10] shriller than the boys', and a maid's flute is tuned sharper than a lad's.

Girls of this age have much need of surveillance. For then in particular they feel a natural impulse to make usage of the sexual faculties that are developing in them; so that unless they guard against

any further impulse beyond that<sup>1</sup> which [15] their bodily development of itself supplies, even in the case of those who abstain altogether from passionate indulgence, they contract habits which are apt to continue into later life. For girls who give way to wantonness grow more and more wanton; and the same is true of boys, if they do not guard against the one temptation or both; for the passages become dilated and set up a flux and besides this the [20] recollection of pleasure associated with former indulgence creates a longing for its repetition.

Some men are congenitally impotent and sterile owing to structural defect; and in like manner women also may suffer from congenital incapacity. Both men and women are liable to constitutional change, growing healthier or more sickly, or [25] altering in the way of leanness, stoutness, and vigour; thus, after puberty some lads who were thin before grow stout and healthy, and the converse also happens; and the same is equally true of girls. For when in boy or girl the body is loaded with [30] superfluous matter, then, when such superfluities are got rid of in the spermatic or menstrual discharge, their bodies improve in health and condition owing to the removal of what had acted as an impediment to health and nutrition; but in such as [582<sup>a</sup>1] are of opposite habit their bodies become emaciated and out of health, for then the spermatic discharge in the one case and the menstrual flow in the other take place at [5] the cost of natural healthy conditions.

Furthermore, in the case of maidens the condition of the breasts is diverse in different individuals, for they are sometimes quite big and sometimes little; and as a general rule their size depends on whether the body was burdened in childhood with [10] superfluous material. For when the signs of womanhood are nigh but not come, the more there be of moisture the more will it cause the breasts to swell, even to the bursting point; and the result is that the breasts remain during after-life of the bulk that they then acquired. And among men, the breasts grow more conspicuous and [15] more like to those of women, both in young men and old, when the individual is moist and sleek and not veined, and all the more among the dark than the fair.

At the outset and till the age of twenty-one the semen is sterile; afterwards it becomes fertile, but young men and women produce undersized and imperfect [20] progeny, as is the case also with the common run of animals. Young women conceive readily, but, having conceived, their labour in childbed is apt to be difficult.

The body generally fails to reach its full development and ages quickly in men of intemperate lusts and in women who become mothers

of many children; for it [25] appears to be the case that growth ceases when the woman has given birth to three children. Women of a lascivious disposition grow more sedate and virtuous after they have borne several children.

After the age of twenty-one women are fully ripe for child-bearing, but men go [30] on increasing in vigour. When the spermatic fluid is of a thin consistency it is infertile; when granular it is fertile and likely to produce male children, but when thin and unclotted it is apt to produce female offspring. And it is about this time of life that in men the beard makes its appearance.

2 · The onset of menstruation takes place towards the end of the month; and [582<sup>b</sup>1] on this account the wiseacres assert that the moon is feminine, because the discharge in women and the waning of the moon happen at one and the same time, and after the wane and the discharge both one and the other grow whole again. In some women menstruation occurs regularly but sparsely every month, but for most [5] women every third month. With those in whom it lasts but a little while, two days or three, recovery is easy; but where the duration is longer, it is more troublesome. For women are ailing during these days; and sometimes the discharge is sudden and sometimes gradual, but in all cases alike there is bodily distress until the attack be over. In many cases at the commencement of the attack, when the discharge is [10] about to appear, there occur spasms and rumbling noises within the womb until such time as the discharge manifests itself.

Under natural conditions it is after recovery from these symptoms that conception takes place in women, and women in whom the signs do not manifest themselves for the most part remain childless. But some conceive in spite of the absence of these symptoms; and these are cases in which a secretion accumulates, [15] not in such a way as actually to issue forth, but in amount equal to the residuum left in the case of child-bearing women after the normal discharge has taken place. And some conceive while the signs are on but not afterwards, those namely in whom the womb closes up immediately after the discharge. In some cases the menses persist [20] during pregnancy up to the very last; but the result in these cases is that the offspring are poor, and either fail to survive or grow up weakly.

In many cases, owing to excessive desire, arising either from youthful impetuosity or from lengthened abstinence, prolapsion of the womb takes

place and the menses appear repeatedly, thrice in the month, until conception occurs; and [25] then the womb withdraws upwards again to its proper place. Sometimes even if she possesses it but happens to be moist, she blows out the moister part of the semen.<sup>2</sup>

As we have remarked above, the discharge is wont to be more abundant in women than in the females of any other animals. In creatures that do not bring forth [30] their young alive nothing of the sort manifests itself, this particular residue being converted into bodily substance; and in such animals the females are sometimes larger than the males; and moreover, the material is used up sometimes for scutes and sometimes for scales, and sometimes for the abundant covering of feathers, whereas in the vivipara possessed of limbs it is turned into hair and into bodily [583<sup>a</sup>1] substance (for man alone among them is smooth-skinned), and into urine, for this excretion is in the majority of such animals thick and copious. Only in the case of women is the residue turned into a discharge instead of being utilized in these other ways.

There is something similar to be remarked of men; for in proportion to his size [5] man emits more seminal fluid than any other animals (for which reason man is the smoothest of animals), especially such men as are of a moist habit and not over corpulent, and fair men in greater degree than dark. It is likewise with women; for [10] in the stout, a great part of the excretion goes to nourish the body. In the act of intercourse, women of a fair complexion discharge a more plentiful secretion than the dark; and furthermore, a watery and pungent diet conduces to this phenomenon.

**3** · It is a sign of conception in women when the place is dry immediately [15] after intercourse. If the lips of the orifice be smooth conception is difficult, for the matter slips off; and if they be thick it is also difficult. But if on digital examination the lips feel somewhat rough and adherent, and if they be likewise thin, then the chances are in favour of conception. Accordingly, if conception be desired, we must [20] bring the parts into such a condition as we have just described; but if on the contrary we want to avoid conception then we must bring about a contrary disposition. For if the lips are smooth, conception does not take place—that is why some anoint that part of the womb on which the seed falls with oil of cedar, or with ointment of lead or with frankincense, commingled with olive oil. If the seed remain within for seven [25] days then it is certain that conception has taken place; for it is during that

period that what is known as effluxion takes place.

In most cases the menstrual discharge recurs for some time after conception has taken place, its duration being mostly thirty days in the case of a female and about forty days in the case of a male child. After parturition also it is common for [30] the discharge to be withheld for an equal number of days, but not in all cases with equal exactitude. After conception, and when the above-mentioned days are past, the discharge no longer takes its natural course but finds its way to the breasts and turns to milk. The first appearance of milk in the breasts is scant in quantity and so to speak cobwebby. And when conception has taken place, there is apt to be a sort of [583<sup>b</sup>1] feeling in the region of the flanks, which in some cases quickly swell up a little, especially in thin persons, and also in the groin.

In the case of male children the first movement usually occurs on the right-hand side of the womb and about the fortieth day, but if the child be a female [5] then on the left-hand side and about the ninetieth day. However, we must by no means assume this to be an accurate statement of fact, for there are many cases in which the movement is manifested on the right-hand side though a female child be coming, and on the left-hand side though the infant be a male. And in short, these and all suchlike phenomena are usually subject to differences that may be summed up as differences of degree.

[10] About this period the embryo begins to resolve into distinct parts, it having hitherto consisted of a fleshlike substance without distinction of parts.

What is called effluxion is a destruction of the embryo within the first week, while abortion occurs up to the fortieth day; and the greater number of such embryos as perish do so within the space of these forty days.

[15] In the case of a male embryo aborted at the fortieth day, if it be placed in cold water it holds together in a sort of membrane, but if it be placed in any other fluid it dissolves and disappears. If the membrane be pulled to bits the embryo is revealed, as big as one of the large kind of ants; and all the limbs are plain to see, including the [20] penis, and the eyes also, which as in other animals are of great size. But the female embryo, if it suffer abortion during the first three months, is as a rule found to be undifferentiated; if however it reach the fourth month it comes to be subdivided and quickly attains further differentiation. In short, while within the womb, the female [25] infant accomplishes the whole development of its parts more slowly than the male, and more

frequently than the man-child takes ten months to come to perfection. But after birth, the females pass more quickly than the males through youth and maturity and age; and this is especially true of those that bear many children, as I [30] have already said.

4 · When the womb has conceived the seed, straightway in the majority of cases it closes up until seven months are fulfilled; but in the eight month it opens, and the embryo, if it be fertile, descends in the eighth month. But such embryos as [35] are not fertile but are devoid of breath at eight months old, their mothers do not bring into the world by parturition, neither does the embryo descend within the womb at that period nor does the womb open. And it is a sign that the embryo is not [584<sup>a</sup>1] capable of life if it be formed without the above-named circumstances taking place.

After conception women are prone to a feeling of heaviness in all parts of their bodies, and they experience a sensation of darkness in front of the eyes and suffer [5] also from headache. These symptoms appear sooner or later, sometimes as early as the tenth day, according as the patient be more or less productive of residues. Nausea also and sickness affect most women, and especially such as those that we have just now mentioned, after the menstrual discharge has ceased and before it is yet turned in the direction of the breasts.

Moreover, some women suffer most at the beginning of their pregnancy and [10] some at a later period when the embryo has had time to grow; and in some women it is a common occurrence to suffer from strangury towards the end of their time. As a general rule women who are pregnant of a male child escape comparatively easily and retain a comparatively healthy look, but it is otherwise with those whose infant is a female; for these latter look as a rule paler and suffer more pain, and in many [15] cases they are subject to swellings of the legs and eruptions on the body. Nevertheless in some the opposite occurs.

Women in pregnancy are a prey to all sorts of longings and to rapid changes of mood, and some call this the 'ivy-sickness'; and with the mothers of female [20] infants the longings are more acute, and they are less contented when they have got what they desired.

In a certain few cases the patient feels unusually well during pregnancy. The worst time of all is just when the child's hair is beginning to grow.

In pregnant women their own natural hair is inclined to grow thin

and fall out, [25] but on the other hand hair tends to grow on parts of the body where it was not wont to be. As a general rule, a man-child is more prone to movement within its mother's womb than a female child, and it is usually born sooner. And labour in the case of female children is apt to be protracted and sluggish, while in the case of male children it is acute and by a long way more difficult. Women who have connexion [30] with their husbands shortly before childbirth are delivered all the more quickly. Occasionally women seem to be in the pains of labour though labour has not in fact commenced, what seemed like the commencement of labour being really the result of the foetus turning its head.

Now all other animals bring the time of pregnancy to an end in a uniform way; [35] in other words, one single term of pregnancy is defined for each of them. But in the case of mankind alone of all animals the times are diverse; for pregnancy may be of seven months' duration, or of eight months or of nine, and still more commonly of ten months, while some few women go even into the eleventh month. [584<sup>b</sup>1]

Children that come into the world before seven months can under no circumstances survive. The seven-months' children are the earliest that are capable of life, and most of them are weakly—for which reason, by the way, it is customary to swaddle them in wool,—and many of them are born with some of the orifices of the body imperforate, for instance the ears or the nostrils. But as they get bigger [5] they become more perfectly developed, and many of them grow up.

In Egypt, and in some other places where the women are fruitful and are wont to bear and bring forth many children without difficulty, and where the children when born are capable of living even if they be born subject to deformity, in these places the eight-months' children live and are brought up, but in Greece it is only a [10] few of them that survive while most perish. And this being the general experience, when such a child does happen to survive the mother is apt to think that it was not an eight-months' child after all, but that she had conceived at an earlier period without being aware of it.

[15] Women suffer most pain about the fourth and the eighth months, and if the foetus perishes in the fourth or in the eighth month the mother also succumbs as a general rule; so that not only do the eight-months' children not live, but when they die their mothers are in great danger of their own lives. In like manner children that [20] are apparently born at a later term than eleven months are held to be in doubtful case; inasmuch as with them also the beginning of conception may have escaped the notice of the mother. For often the womb gets

filled with wind, and then when at a later period intercourse and conception take place, they think that the former circumstance was the beginning of conception from the similarity of the symptoms [25] that they experienced.

Such then are the differences between mankind and other animals in regard to the many various modes<sup>3</sup> of completion of the term of pregnancy. Furthermore, some animals produce one and some produce many at a birth, but the human species does sometimes the one and sometimes the other. As a general rule and [30] among most nations the women bear one child at a birth; but frequently and in many lands they bear twins, as for instance in Egypt. Sometimes women bring forth three and even four children, and especially in certain parts of the world, as has already been stated. The largest number ever brought forth is five, and such an occurrence has been witnessed on several occasions. There was once a certain [35] woman who had twenty children at four births; each time she had five, and most of them grew up.

Now among other animals, if a pair of twins happen to be male and female [585<sup>a</sup>1] they have as good a chance of surviving as though both had been males or both females; but among mankind very few twins survive if one happen to be a boy and the other a girl.

Of all animals the woman and the mare are most inclined to receive the commerce of the male during pregnancy; while all other animals when they are [5] pregnant avoid the male, save those in which the phenomenon of superfoetation occurs, such as the hare. Unlike that animal, the mare after once conceiving cannot be rendered pregnant again, but brings forth one foal only, at least as a general rule; in the human species cases of superfoetation are rare, but they do happen now and then.

[10] An embryo conceived some considerable time after a previous conception does not come to perfection, but gives rise to pain and causes the destruction of the earlier embryo; and a case has been known to occur where owing to this destructive influence no less than twelve embryos conceived by superfoetation have been discharged. But if the second conception take place at a short interval, then the mother bears that which was later conceived, and brings forth the two children like actual twins, as happened, according to the legend, in the case of Iphicles and [15] Hercules. The following also is a striking example: a certain woman, having committed adultery, brought forth the one child resembling her husband and the other resembling the adulterous lover.

The case has also occurred where a woman, being pregnant of twins,



has subsequently conceived a third child; and in course of time she brought forth the twins perfect and at full term, but the third a five-months' child; and this last died there and then. And in another case it happened that the woman was first delivered [20] of a seventh-months' child, and then of two which were of full term; and of these the first died and the other two survived.

Some also have been known to conceive while about to miscarry, and they have lost the one child and been delivered of the other.

If women while going with child cohabit after the eighth month the child is in [25] most cases born covered over with a slimy fluid. Often also the child is found to be replete with food of which the mother had partaken.

When women have partaken of salt in over-abundance their children are apt to be born destitute of nails.

5 · Milk that is produced earlier than the seventh month is unfit for use; but [30] as soon as the child is fit to live the milk is fit to use. The first of the milk is saltish, as it is with sheep. Most women are sensibly affected by wine during pregnancy; for if they partake of it they grow relaxed and debilitated.

The beginning of child-bearing in women and of the capacity to procreate in [35] men, and the cessation of these functions in both cases, coincide in the one case with the emission of seed and in the other with the discharge of the menstrual fluids: with this qualification, that there is a lack of fertility at the commencement of these symptoms, and again towards their close when the emissions become scanty and [585<sup>b</sup>1] weak. The age at which the sexual powers begin has been related already. As for their end, the menstrual discharge ceases in most women about their fortieth year; but with those in whom it goes on longer it lasts even to the fiftieth year, and women of that age have been known to bear children. But beyond that age there is no case [5] on record.

6 · Men in most cases continue to be fertile until they are sixty years old, and if that limit be overpassed then until seventy years; and men have been actually known to procreate children at seventy years of age. With many men and many women it so happens that they are unable to produce children to one another, while [10] they are able to do so in union with other individuals. The same thing happens with regard to the

production of male and female offspring; for sometimes men and women in union with one another produce male children or female, as the case may be, but children of the opposite sex when otherwise mated. And they are apt to change in this respect with advancing age; for sometimes a husband and wife while [15] they are young produce female children and in later life male children; and in other cases the very contrary occurs. And just the same thing is true in regard to the generative faculty; for some while young are childless, but have children when they grow older; and some have children to begin with, and later on no more.

There are certain women who conceive with difficulty, but if they do conceive, [20] bring the child to maturity; while others again conceive readily, but are unable to bring the child to birth. Furthermore, some men and some women produce female offspring and some male, as for instance in the story of Hercules, who among all his [25] two and seventy children is said to have begotten but one girl. Those women who are unable to conceive, save with the help of medical treatment or some other adventitious circumstance, are as a general rule apt to bear female children rather than male.

It is a common thing with men to be at first sexually competent and afterwards impotent, and then again to revert to their former powers.

[30] From deformed parents come deformed children, lame from lame and blind from blind, and speaking generally, children often resemble their parents in respect of their unnatural features and are born with similar marks, such as pimples or scars. Such things have been known to be handed down through three generations; for instance, a certain man had a mark on his arm which his son did not possess, but [35] his grandson had it in the same spot though not very distinct.

Such cases, however, are few; for the children of cripples are mostly sound,<sup>4</sup> [586<sup>a</sup>1] and there is no hard and fast rule regarding them. While children mostly resemble their parents or their ancestors, it sometimes happens that no such resemblance is to be traced. But parents may pass on resemblance after several generations, as in the [5] case of the woman in Elis, who committed adultery with a negro; in this case it was not the woman's own daughter but the daughter's child that was a negro.

As a rule the girls have a tendency to take after the mother, and the boys after the father; but sometimes it is the other way, the boys taking after the mother and the girls after the father. And they may resemble both parents in particular features.

There have been known cases of twins that had no resemblance to

one another, [10] but they are alike as a general rule. There was once a woman who had intercourse with her husband a week after giving birth to a child, and she conceived and bore a second child as like the first as any twin. Some women have a tendency to produce children that take after themselves, and others children that take after the husband; and this latter case is like that of the mare in Pharsalus, that got the name of the [15] Honest Wife.

7 · In the emission of semen there is a preliminary discharge of air, and the outflow is manifestly caused by a blast of air; for nothing is cast to a distance save by force of air. After the seed reaches the womb and remains there for a while, a [20] membrane forms around it; for when it happens to escape before it is distinctly formed, it looks like an egg enveloped in its membrane after removal of the eggshell; and the membrane is full of veins.

All animals, whether they fly or swim or walk upon dry land, whether they bring forth their young alive or in the egg, develop in the same way: save only that [25] some have the navel attached to the womb, namely the viviparous animals, and some have it attached to the egg, and some to both parts alike, as in a certain sort of fishes. And in some cases membranous envelopes surround the egg, and in other cases the chorion surrounds it. And first of all the animal develops within the innermost envelope, and then another membrane appears around the former one, which latter is for the most part attached to the womb, but is in part separated from it and contains fluid. In between is a watery or sanguineous fluid, which women call [30] the forewaters.

8 · All animals which have a navel, grow by the navel. And the navel is attached to the cotyledon in all such as possess cotyledons, and to the womb itself by a vein in all such as have the womb smooth. And as regards their shape within the womb, the four-footed animals all lie stretched out, and the footless animals lie on [586<sup>b</sup>1] their sides, as for instance fishes; but two-legged animals lie in a bent position, as for instance birds; and human embryos lie bent, with nose between the knees and eyes upon the knees, and the ears free at the sides.

All animals alike have the head upwards to begin with; but as they grow and [5] approach the term of egress from the womb they turn downwards, and birth in the natural course of things takes place in all animals head foremost; but in abnormal cases it may take place in a bent

position, or feet foremost.

The young of quadrupeds when they are near their full time contain excrements, both liquid and in the form of solid lumps, the latter in the lower part of [10] the bowel and the urine in the bladder.

In those animals that have cotyledons in the womb the cotyledons grow less as the embryo grows bigger, and at length they disappear altogether. The navel-string is a sheath wrapped about blood-vessels which have their origin in the womb, from [15] the cotyledons in those animals which possess them and from a blood-vessel in those which do not. In the larger animals, such as the embryos of oxen, the vessels are four in number, and in smaller animals two; in the very little ones, such as birds, one vessel only.

Of the vessels that run into the embryo, two pass through the liver where the [20] so-called gates are, running in the direction of the great vein, and the other two run in the direction of the aorta towards the point where it divides and becomes two vessels instead of one. Around each pair of blood-vessels are membranes, and surrounding these membranes is the navel-string itself, after the manner of a sheath. And as the embryo grows, the veins themselves tend more and more to [25] dwindle in size. And also as the embryo matures it comes down into the hollow of the womb and is observed to move here, and sometimes rolls over in the vicinity of the pudenda.

9 · When women are in labour, their pains occur in many different parts of the body, and in most cases to one or other of the thighs. Those are the quickest to be [30] delivered who experience severe pains in the region of the belly; and parturition is difficult in those who begin by suffering pain in the loins, and speedy when the pain is abdominal. If the child about to be born be a male, the preliminary flood is watery and pale in colour, but if a girl it is tinged with blood, though still watery. In some cases of labour these latter phenomena do not occur, either one way or the other.

[587<sup>a</sup>1] In other animals parturition is unaccompanied by pain, and the dam is plainly seen to suffer but moderate inconvenience. In women, however, the pains are more severe, and this is especially the case in persons of sedentary habits, and in those who are weak-chested and short of breath. Labour is apt to be especially difficult if [5] during the process the woman while exerting force with her breath fails to hold it in.

First of all, when the embryo starts to move and the membranes

burst, there issues forth the watery flood; then afterwards comes the embryo, while the womb everts and the afterbirth comes out from within.

10 · The cutting of the navel-string, which is the nurse's duty, is a matter [10] calling for no little care and skill. For not only in cases of difficult labour must she be able to render assistance with skilful hand, but she must also have her wits about her in all contingencies, and especially in the operation of tying the cord. For if the afterbirth has come away, the navel is tied off from the afterbirth with a woollen [15] thread and is then cut above it; and at the place where it has been tied it heals up, and the remaining portion drops off. (If the tie comes loose the child dies from loss of blood.) But if the afterbirth has not yet come away, but remains after the child itself is extruded, it is cut away within after the tying of the cord.

[20] It often happens that the child appears to have been born dead when it is merely weak, and when, before the umbilical cord has been tied the blood has run out into the cord and its surroundings. But experienced midwives have been known to squeeze back the blood into the child's body from the cord, and immediately the child that a moment before was bloodless came back to life again.

[25] It is the natural rule, as we have mentioned above, for all animals to come into the world head foremost, and children, moreover, have their hands stretched out by their sides. And the child gives a cry and puts its hands up to its mouth as soon as it issues forth.

Moreover the child voids excrement sometimes at once, sometimes a little [30] later, but in all cases during the first day; and this excrement is unduly copious in comparison with the size of the child; it is what the midwives call the 'poppy-juice'. In colour it resembles blood, extremely dark and pitch-like, but later on it becomes milky, for the child takes at once to the breast. Before birth the child makes no sound—not even when in difficult labor it puts forth its head while the rest of the body remains within.

[587<sup>b</sup>1] In cases where flooding takes place rather before its time, it is apt to be followed by difficult parturition. But if discharge take place after birth in small quantity, and in cases where it only takes place at the beginning and does not [5] continue till the fortieth day, then in such cases women make a better recovery and are the sooner ready to conceive again.

Until the child is forty days old it neither laughs nor weeps during

waking hours, but of nights it sometimes does both; and for the most part it does not even notice being tickled, but passes most of its time in sleep. As it keeps on growing it [10] gets more and more wakeful; and moreover it shows signs of dreaming, though it is long afterwards before it remembers what it dreams.

In other animals there is no contrasting difference between one bone and another, but all are properly formed; but in children the fontanelle is soft and late ossifying. And some animals are born with teeth, but children begin to cut their teeth in the seventh month; and the front teeth are the first to come through, [15] sometimes the upper and sometimes the lower ones. And the warmer the nurses' milk so much the quicker are the children's teeth to come.

11 · After parturition and the cleansing flood the milk comes in plenty, and in some women it flows not only from the nipples but at divers parts of the breasts, [20] and in some cases even from the armpits. And for some time afterwards there continue to be 'knots', which occur when it so happens that the moisture is not concocted and finds no outlet but solidifies. For the whole breast is so spongy that if a woman in drinking happen to swallow a hair, she gets a pain in her breast, which [25] ailment is called 'trichia'; and the pain lasts till the hair either find its own way out or be sucked out with the milk. Women continue to have milk until their next conception; and then the milk stops coming and goes dry, alike in the human species and in the quadrupedal vivipara. So long as there is a flow of milk the menstrual [30] discharges do not take place as a general rule, though the discharge has been known to occur during the period of suckling. For, speaking generally, a flow of moisture does not take place at one and the same time in several directions; as for instance the menstrual discharges tend to be scanty in persons suffering from haemorrhoids. And in some women the like happens owing to their suffering from varicose veins, when the fluids issue from the pelvic region before entering into the womb. And patients who during suppression of the menses happen to vomit blood are no whit [588<sup>a</sup>1] the worse.

12 · Children are very commonly subject to convulsions, more especially such of them as are more than ordinarily well-nourished on rich or unusually plentiful milk from a stout nurse. Wine tends to excite this malady, and red wine is [5] worse than white, especially when taken undiluted; and most things that tend to induce flatulency are also bad,

and constipation too is prejudicial. The majority of deaths in infancy occur before the child is a week old, hence it is customary to name the child at that age, from a belief that it has now a better chance of survival. This malady is worst at the full moon; and it is a dangerous symptom when the spasms [10] begin in the child's back.

## BOOK VIII

1 · We have now discussed the physical characteristics of animals and their methods of generation. Their habits and their modes of living vary according to their character and their food. [15]

In the great majority of animals there are traces of psychical qualities which are more markedly differentiated in the case of human beings. For just as we pointed out resemblances in the physical organs, so in a number of animals we observe gentleness or fierceness, mildness or cross temper, courage or timidity, fear [20] or confidence, high spirit or low cunning, and, with regard to intelligence, something equivalent to sagacity. Some of these qualities in man, as compared with the corresponding qualities in animals, differ only quantitatively: that is to say, a man has more of this quality, and an animal has more of some other; other qualities in man are represented by analogous qualities: for instance, just as in man we find [25] knowledge, wisdom, and sagacity, so in certain animals there exists some other natural capacity akin to these. The truth of this statement will be the more clearly apprehended if we have regard to the phenomena of childhood; for in children may be observed the traces and seeds of what will one day be settled habits, though [588<sup>b</sup>1] psychologically a child hardly differs for the time being from an animal; so that one is quite justified in saying that, as regards man and animals, certain psychical qualities are identical with one another, whilst others resemble, and others are analogous to, each other.

Nature proceeds little by little from things lifeless to animal life in such a way [5] that it is impossible to determine the exact line of demarcation, nor on which side thereof an intermediate form should lie. Thus, next after lifeless things comes the plant, and of plants one will differ from another as to its amount of apparent vitality; and, in a word, the whole genus of plants, whilst it is devoid of life as [10] compared with an animal, is endowed with life as compared with other corporeal entities. Indeed, as we just remarked, there is observed in plants a continuous scale of ascent towards the animal. So, in the sea, there are certain objects concerning which one would be at a loss to determine whether they be animal or vegetable. For instance, certain of these objects are fairly rooted,<sup>1</sup> and in several cases perish if [15] detached; thus the pinna is rooted to a particular spot, and the razor-shell cannot



survive withdrawal from its burrow. Indeed, broadly speaking, the entire genus of testaceans have a resemblance to vegetables, if they be contrasted with such animals as are capable of progression.

In regard to sensibility, some animals give no indication whatsoever of it, whilst others indicate it but indistinctly. Further, the substance of some of these intermediate creatures is fleshlike, as is the case with the so-called ascidians and the [20] sea-anemones; but the sponge is in every respect like a vegetable. And so throughout the entire animal scale there is a graduated differentiation in amount of vitality and in capacity for motion.

A similar statement holds good with regard to habits of life. Thus of plants that [25] spring from seed the one function seems to be the reproduction of their own particular species, and the sphere of action with certain animals is similarly limited. Such activities, then, are common to all alike. If sensibility be superadded,<sup>1</sup> then their lives will differ from one another in respect to sexual intercourse through the varying amount of pleasure derived therefrom, and also in regard to modes of [30] parturition and ways of rearing their young. Some animals, like plants, simply procreate their own species at definite seasons; other animals busy themselves also in procuring food for their young, and after they are reared quit them and have no [589<sup>a</sup>1] further dealings with them; other animals are more intelligent and endowed with memory, and they live with their offspring for a longer period and on a more social footing.

The life of animals, then, may be divided into two parts, procreation and feeding; for on these two acts all their interests and life concentrate. Their food [5] varies chiefly according to the matter of which they are severally constituted; for the source of their growth in all cases will be this substance. And whatsoever is in conformity with nature is pleasant, and all animals pursue pleasure in keeping with their nature. [10]

2 · Animals are also differentiated locally: that is to say, some live upon dry land, while others live in the water. And this differentiation may be interpreted in two<sup>2</sup> different ways. Thus, some animals are termed terrestrial as inhaling air, and others aquatic as taking in water; and there are others which do not actually take in these elements, but nevertheless are naturally adapted to the cooling influence, so [15] far as is needful to them, of one element or the other, and hence are called terrestrial or aquatic [though they neither breathe air nor take in water.]<sup>3</sup> Again, other

animals are so called from their finding their food and fixing their habitat on land or in water: for many animals, although they inhale air and breed on land, yet derive their food from the water, and live in water for the greater part of their lives; and [20] these are the only animals which seem to be ambivalent—for you might class them both as terrestrial and as aquatic. There is no animal taking in water that is terrestrial or that derives its food from the land, whereas of the great number of land animals inhaling air many get their food from the water; moreover some are [25] such that if they be shut off altogether from the water they cannot possibly live, as for instance, the so called seaturtle, the crocodile, the hippopotamus, the seal, and some of the smaller creatures, such as the fresh-water tortoise and the frog: now all these animals choke if they do not from time to time breathe; they breed and rear [30] their young on dry land, or near the land, but they pass their lives in water.

But the dolphin is equipped in the most remarkable way of all animals: the dolphin and other similar aquatic animals, including the other cetaceans which resemble it,<sup>4</sup> that is to say, the whale, and all the other creatures that are furnished [589<sup>b</sup>1] with a blow-hole. One can hardly allow that such an animal is terrestrial and terrestrial only, or aquatic and aquatic only, if by terrestrial we mean an animal that inhales air, and if by aquatic we mean an animal that takes in water. For the fact is the dolphin performs both these processes: he takes in water and discharges it [5] by his blow-hole, and he also inhales air into his lungs; for the creature is furnished with this organ and respire thereby, and accordingly, when caught in the nets, he is quickly suffocated for lack of air. He can also live for a considerable while out of the water, moaning and groaning, like other animals that breathe; furthermore, when [10] sleeping, the animal keeps his nose above water, so that he may breathe the air. Now it would be unreasonable to assign one and the same class of animals to both categories seeing that these are contrary to one another; we must accordingly supplement our definition of the term 'aquatic'. For the fact is, some aquatic animals take in water and discharge it again, for the same reason that leads [15] air-breathing animals to inhale air: in other words, with the object of cooling the blood. Others take in water as incidental to their mode of feeding; for as they get their food in the water they cannot but take in water along with their food, and if they take in water they must be provided with some organ for discharging it. Those sanguineous animals, then, that use water for a purpose analogous to respiration are provided with gills; and such as take in water when feeding, with the blow-hole. [20] Similar remarks are applicable to

cephalopods and crustaceans; for again it is by way of procuring food that these creatures take in water.

Aquatic in different ways, the differences depending on bodily constitution and on habit of life, are such animals on the one hand as take in air but live in water, and such on the other hand as take in water and are furnished with gills but go upon [25] dry land and get their living there. At present only one animal of the latter kind is known, the so-called water-newt; this creature is furnished not with lungs but with gills, but for all that it is a quadruped and fitted for walking on dry land.

In the case of all these animals their nature appears in some kind of a way to have got warped, just as some male animals get to resemble the female, and some female animals the male. The fact is that animals, if they be subjected to a [30] modification in minute organs, are liable to immense modifications in their general configuration. This phenomenon may be observed in the case of gelded animals: [590<sup>a</sup>1] only a minute organ of the animal is mutilated, and the creature passes from the male to the female form. We may infer, then, that if in the primary conformation of the embryo an infinitesimally minute but essential organ sustain a change of magnitude, the animal will in one case turn to male and in the other to female; and also that, if the said organ be obliterated altogether, the animal will be of neither one sex nor the other. And so by the occurrence of modification in minute organs it [5] comes to pass that one animal is terrestrial and another aquatic, in both senses of these terms. And again, some animals are ambivalent, whilst other animals are not ambivalent, owing to the circumstance that in their conformation while in the [10] embryonic condition there got intermixed into them some portion of the matter of which their subsequent food is constituted; for, as was said above, what is in conformity with nature is to every animal agreeable.

Animals then have been categorized into terrestrial and aquatic in three ways, [15] according to their taking in of air or of water, the constitution of their bodies, or the character of their food; and the mode of life of an animal corresponds to the category in which it is found. That is to say, in some cases it depends on constitution and diet combined, as well as upon its method of respiration; and sometimes on constitution and habits alone.

Of testaceans, some, that are incapable of motion, subsist on fresh water (for, [20] being thinner than the seawater which concocts with it, it percolates through the grosser parts)—just as they were originally engendered from the same. Now that fresh water is contained in the sea

and can be strained off from it is plain; for a test has already been made to prove it: take a thin vessel of moulded wax, attach a cord [25] to it, and let it down quite empty into the sea: in twenty-four hours it will be found to contain a quantity of water, and the water will be fresh.

Sea-anemones feed on such small fishes as come in their way. The mouth of this creature is in the middle of its body; and this fact may be clearly observed in the case of the larger varieties. Like the oyster it has a duct for the outlet of the [30] residuum; and this duct is at the top of the animal. In other words, the sea-anemone corresponds to the inner fleshy part of the oyster, and the stone to which the one creature clings corresponds to the shell.

The limpet detaches itself from the rock and goes about in quest of food. Of shell-fish that are mobile, some are carnivorous and live on little fishes, as for [590<sup>b</sup>1] instance, the purple murex—and there can be no doubt that the purple murex is carnivorous, as it is caught by a bait of fish; others feed also on marine vegetation.

The sea-turtles feed on shell-fish—for their mouths are extraordinarily hard; [5] (whatever object it seizes, stone or other, it crunches into bits, but when it leaves the water it browses on grass). These creatures suffer greatly, and oftentimes die when they lie on the surface of the water exposed to a scorching sun; for they find a difficulty in sinking again.

Crustaceans feed in like manner. They are omnivorous; that is to say, they live [10] on stones, slime, sea-weed, and excrement—as for instance the rock-crab—and are also carnivorous. The crayfish can get the better of fishes even of the larger species, though in some of them it occasionally finds more than its match. Thus, this animal is so overmastered by the octopus that it dies of terror if it become aware of an [15] octopus in the same net with itself. The crayfish can master the conger-eel, for owing to the rough spines the eel cannot slip away. The conger-eel, however, devours the octopus, for owing to the slipperiness of its antagonist the octopus can [20] make nothing of it. The crayfish feeds on little fish, capturing them beside its hole; for it is found out at sea on rough and stony bottoms, and in such places it makes its den. Whatever it catches, it puts into its mouth with its pincer-like claws, like the [25] crab. Its nature is to walk straight forward when it has nothing to fear, with its feelers hanging sideways; if it be frightened, it makes its escape backwards, darting off to a great distance. These animals fight one another with their claws, just as rams fight with their horns, raising them and striking their opponents; they are [30] often also seen crowded

together as it were in herds. So much for the mode of life of the crustacean.

Cephalopods are all carnivorous;<sup>5</sup> and of cephalopods the calamary and the cuttlefish are more than a match for fishes even of the large species. The octopus for [591<sup>a</sup>1] the most part gathers shell-fish, extracts the flesh, and feeds on that; in fact, fishermen recognize their holes by the number of shells lying about. Some say that the octopus devours itself, but this statement is incorrect—in fact, some have had [5] their tentacles eaten off by the conger.

Fishes all feed on spawn in the spawning season; but in other respects the food [10] varies with the varying species. Some fishes are exclusively carnivorous, as the *Selachia*, the conger, the channa, dentex, the tunny, the bass, the bonito, the sea-perch, and the muraena. The red mullet is carnivorous, but feeds also on sea-weed, on shell-fish, and on mud. The grey mullet feeds on mud,<sup>6</sup> the dascyllus [15] on mud and excrement, the scarus and the melanurus on sea-weed, the saupe on excrement and sea-weed; the saupe feeds also on *zostera*,<sup>7</sup> and is the only fish that is captured with a gourd. All fishes devour their own species, with the exception of the mullet; and the conger is especially ravenous in this respect. The cephalus and the mullet in general are the only fish that eat no flesh; this may be inferred from the [20] facts that when caught they are never found with flesh in their intestines, and that the bait used to catch them is not flesh but barley-cake. Every fish of the mullet-kind lives on sea-weed and sand. The cephalus, called by some the chelon, keeps near in to the shore, the peraeas keeps out at a distance from it, and feeds on a [25] mucous substance exuding from itself, and consequently is always in a starved condition. The cephalus lives in mud, and is in consequence heavy and slimy; it never feeds on any other fish. As it lives in mud, it often makes a leap upwards so as to wash the slime from off its body. There is no creature known to prey upon the spawn of the cephalus, so that the species is exceedingly numerous; when, however, [591<sup>b</sup>1] the fish is fullgrown it is preyed upon by a number of fishes, and especially by the bass. Of all fishes the mullet is the most voracious and insatiable, and in consequence its belly is kept at full stretch; whenever it is not starving, it may be considered as out of condition. When it is frightened, it hides its head in mud, under [5] the notion that it is hiding its whole body. The synodon is carnivorous and feeds on cephalopods. Very often the synodon and the channa cast up their stomachs while chasing smaller fishes; for fishes have their stomachs close to the mouth, and are not furnished with a gullet.

Some fishes then, as has been stated, are carnivorous, and carnivorous only, as [10] the dolphin, the synodon, the gilthead, the selachians, and the cephalopods.<sup>8</sup> Other fishes feed habitually on mud or sea-weed or sea-moss or the so-called stalk-weed or growing plants; as for instance, the phycis, the goby, and the rock-fish; and the only [15] meat that the phycis will touch is that of prawns. Very often, however, as has been stated, they devour one another, and especially do the larger ones devour the smaller. The proof of their being carnivorous is the fact that they can be caught with flesh for a bait. The bonito, the tunny, and the bass are for the most part carnivorous, but they do occasionally feed on sea-weed. The sargue feeds on the [20] leavings of the red mullet. The red mullet burrows in the mud, and when it sets the mud in motion and quits its haunt, the sargue settles down into the place and feeds on what is left behind, and prevents any smaller fish from settling in the immediate vicinity.

Of all fishes the so-called scarus is the only one known to chew the cud like a quadruped.

As a general rule the larger fishes catch the smaller ones in their mouths whilst [25] swimming straight after them in the ordinary position; but the selachians, the dolphin, and all the cetacea must first turn over on their backs, as their mouths are placed down below; this allows a fair chance of escape to the smaller fishes, and, indeed, if it were not so, there would be very few of the little fishes left, for the speed and voracity of the dolphin is something marvellous.

Of eels a few here and there feed on mud and on chance morsels of food thrown [592<sup>a1</sup>] to them; the greater part of them subsist on fresh water. Eel-breeders are particularly careful to have the water kept perfectly clear, by its perpetually flowing on to flat slabs of stone and then flowing off again; sometimes they coat the eel-tanks with plaster. The fact is that the eel will soon choke if the water is not [5] clear, as his gills are peculiarly small. On this account, when fishing for eels, they disturb the water. In the river Strymon eel-fishing takes place at the rising of the Pleiads, because at this period the water is troubled and the mud raised up by contrary winds; unless the water be in this condition, it is as well to leave the eels alone. When dead the eel, unlike the majority of fishes, neither floats on nor rises to [10] the surface; and this is owing to the smallness of the stomach. A few eels are supplied with fat, but the greater part are not. When removed from the water they can live for five or six days; for a longer period if north winds prevail, for a shorter if south winds. If they are removed in summer from the pools to the tanks

they will [15] die; but not so if removed in the winter. They are not capable of holding out against any abrupt change; for example, they often die in large numbers when men engaged in transporting<sup>9</sup> them from one place to another dip them into water particularly cold. They will also die of suffocation if they be kept in a scanty supply of water. [20] This same remark will hold good for fishes in general; for they are suffocated if they be long confined in a short supply of water, with the water kept unchanged—just as animals that respire are suffocated if they be shut up with a scanty supply of air. The eel in some cases lives for seven or eight years. The river-eel feeds on his own species, on grass, or on roots, or on any chance food found in the mud. Their usual [25] feeding-time is at night, and during the day-time they retreat into deep water. And so much for the food of fishes.

3 · Of birds, such as have crooked talons are carnivorous without exception, and cannot swallow corn even if it be put into their bills; as for instance, the eagle of [592<sup>b</sup>1] every variety, the kite, the two species of hawks, to wit, the dove-hawk and the sparrow-hawk—and these two hawks differ greatly in size from one another—and the buzzard. The buzzard is of the same size as the kite, and is visible at all seasons of the year. There is also the phene and the vulture. The phene is larger than the [5] common eagle and is ashen in colour. Of the vulture there are two varieties: one small and whitish, the other comparatively large and rather more ashen-coloured. Further, of birds that fly by night, some have crooked talons, such as the night-raven, the owl, and the eagle-owl. The eagle-owl resembles the common owl [10] in shape, but it is quite as large as the eagle. Again, there is the eleus, the Aegolian owl, and the little horned owl. Of these birds, the eleus is somewhat larger than the domestic cock, and the Aegolian owl is of about the same size as the eleus, and both these birds hunt the jay; the little horned owl is smaller than the common owl. All [15] these three birds are alike in appearance, and all three are carnivorous.

Again, of birds that have not crooked talons some are carnivorous, such as the swallow. Others feed on grubs, such as the chaffinch, the sparrow, the batis, the green linnet, and the titmouse. Of the titmouse there are three varieties. The largest [20] is the finch-titmouse—for it is about the size of a finch; the second has a long tail, and from its habitat is called the hill-titmouse; the third resembles the other two in appearance, but is less in size than either of them. Then come the becca-fico, the

black-cap, the bullfinch, the robin, the epilais, the midget-bird, and the golden-crested wren. This wren is little larger than a locust, has a crest of bright red, and is [25] in every way a beautiful and graceful little bird. Then the anthus, a bird about the size of a finch; and the mountain-finch, which resembles a finch and is of much the same size, but its neck is blue, and it lives in the mountains; and lastly the wren and the rook. The above-enumerated birds and the like of them feed either wholly or for the most part on grubs, but the following and the like feed on thistles; to wit, the [593<sup>a</sup>1] linnet, the thraupis, and the goldfinch. All these birds feed on thistles, but never on grubs or any living thing whatever; they sleep also on the plants from which they derive their food.

There are other insectivorous birds, which live by hunting insects—as for [5] instance, the great and the small pie, which are nicknamed the woodpeckers. These two birds resemble one another in plumage and in note, only that the note of the larger bird is the louder of the two; they both frequent the trunks of trees in quest of food. There is also the greenpie, a bird about the size of a turtle-dove, green-coloured all over, that pecks at the bark of trees with extraordinary vigour, lives [10] generally on the branch of a tree, has a loud note, and is mostly found in the Peloponnèse. There is another bird called the ‘grubpicker’, about as small as the penduline titmouse, with speckled plumage of an ashen colour, and with a poor note; it is a variety of the woodpecker.

[15] There are other birds that live on fruit and herbage, such as the wild pigeon or ring-dove, the common pigeon, the rock-dove, and the turtle-dove. The ring-dove and the common pigeon are visible at all seasons; the turtle-dove only in the summer, for in winter it lurks in some hole or other and is never seen. The rock-dove [20] is chiefly visible in the autumn, and is caught at that season; it is larger than the common pigeon but smaller than the wild one; it is generally caught while drinking. These pigeons bring their young ones with them when they visit this country. All our other birds come to us in the early summer and build their nests here, and the greater part of them rear their young on animal food, with the sole exception of the pigeon and its varieties.

[25] The whole genus of birds may be pretty well divided into such as procure their food on dry land, such as frequent rivers and lakes, and such as live on or by the sea.

Of water-birds such as are web-footed live actually on the water, while such as are split-footed live by the edge of it—and water-birds that are not carnivorous live [593<sup>b</sup>1] on water-plants, but most of them live on fish, like the heron and the spoonbill that frequent the banks of lakes



and rivers; and the spoonbill is smaller than the common heron, and has a long flat bill. There are furthermore the stork and the seamew; and [5] the seamew is ashen-coloured. There is also the schoenilus, the cinclus, and the white-rump. Of these smaller birds the last mentioned is the largest, being about the size of the common thrush; all three may be described as 'wagtails'. Then there is the scalidris, with plumage ashen-grey, but speckled. Moreover, the family of the kingfishers live by the waterside. Of kingfishers there are two varieties; one that sits [10] on reeds and sings; the other, the larger of the two, is without a note. Both these varieties are blue on the back. There is also the trochilus. The kingfisher and the cerylus are found near the seaside. The crow also feeds on such animal life as is cast [15] up on the beach, for the bird is omnivorous. There are also the white gull, the cepphus, the aethya, and the charadrius.

Of web-footed birds, the larger species live on the banks of rivers and lakes; as the swan, the duck, the coot, the grebe, and the teal—a bird resembling the duck but less in size—and the cormorant. This bird is the size of a stork, only that its legs [20] are shorter; it is web-footed and is a good swimmer; its plumage is black. It roosts on trees, and is the only one of all such birds as these that is found to build its nest in a tree. Further there is the goose, the little gregarious goose, the vulpanser, the aix [25] and the penelops. The sea-eagle lives in the neighbourhood of the sea and seeks its quarry in lagoons.

A great number of birds are omnivorous. Birds of prey feed on any animal or bird that they may catch, except that they never touch one of their own genus, whereas fishes often devour members actually of their own species. [594<sup>a</sup>1]

Birds, as a rule, are very spare drinkers. In fact birds of prey never drink at all, excepting a very few, and these drink very rarely; and this last observation is peculiarly applicable to the kestrel. The kite has been seen to drink, but he certainly drinks very seldom.

4 · Animals that are coated with tessellates—such as the lizard and the other quadrupeds, and the serpents—are omnivorous: at all events they are carnivorous [5] and graminivorous; and serpents are of all animals the greatest gluttons.

Tessellated animals are spare drinkers, as are also all such animals as have a spongy lung, and such a lung, scantily supplied with blood, is found in all oviparous animals. Serpents have an insatiate appetite for

wine; consequently, at times men [10] hunt for vipers by pouring wine into saucers and putting them into the interstices of walls, and the creatures are caught when inebriated. Serpents are carnivorous, and whenever they catch an animal they extract all its juices and eject the creature whole. [And this is done by all other creatures of similar habits, as for instance the spider; only that the spider sucks out the juices of its prey outside, and the serpent [15] does so in its belly.]<sup>10</sup> The serpent takes any food presented to him, eats birds and animals, and swallows eggs entire. But after taking his prey he stretches himself until he stands straight out to the very tip, and then he contracts and squeezes [20] himself into little compass, so that the swallowed mass may pass down his outstretched body; and this action on his part is due to the tenuity and length of his gullet. Spiders and snakes can both go without food for a long time; and this remark may be verified by observation of specimens kept alive in the shops of the apothecaries.

[25] **5** · Of viviparous quadrupeds, such as are fierce and saw-toothed are without exception carnivorous; though, by the way, it is stated of the wolf, but of no other animal, that in extremity of hunger it will eat a certain kind of earth. These carnivorous animals never eat grass except when they are sick, just as dogs bring on a vomit by eating grass and thereby purge themselves.

[30] The solitary wolf is more apt to attack man than the wolf that goes with a pack.

The animal called 'glanus' by some and 'hyaena' by others is as large as a wolf, [594<sup>b</sup>1] with a mane like a horse, only that the hair is stiffer and longer and extends over the entire length of the chine. It will lie in wait for a man and chase him, [and will inveigle a dog within its reach by making a noise that resembles the retching noise of a man vomiting.]<sup>11</sup> It is exceedingly fond of putrefied flesh, and will burrow in a [5] graveyard to gratify this propensity.

The bear is omnivorous. It eats fruit, and is enabled by the suppleness of its body to climb a tree; it also eats vegetables, and it will break up a hive to get at the honey; it eats crabs and ants also, and is carnivorous. It is so powerful that it will [10] attack not only the deer but the wild boar, if it can take it unawares, and also the bull. After coming to close quarters with the bull it falls on its back in front of the animal, and, when the bull proceeds to butt, the bear seizes hold of the bull's horns with its front paws, fastens its teeth into his shoulder, and drags him down to the [15]

ground. For a short time together it can walk erect on its hind legs. All the flesh it eats it first allows to become carrion.

The lion, like all other savage and saw-toothed animals, is carnivorous. It devours its food greedily, and often swallows its prey entire without rending it at all; it will then go fasting for two or three days together, being rendered capable of this [20] abstinence by its previous surfeit. It is a spare drinker. It discharges the solid residuum sparingly, about every other day or at irregular intervals, and the substance of it is hard and dry like the excrement of dog. The wind discharged from off its stomach is pungent, and its urine emits a strong odour, a phenomenon which, [25] in the case of dogs, accounts for their habit of sniffing at trees; for the lion, like the dog, lifts its leg to void its urine. It infects the food it eats with a strong smell by breathing on it, and when the animal is cut open an overpowering vapour exhales from its inside.

[30] Some wild quadrupeds feed in lakes and rivers; the seal is the only one that gets its living on the sea. To the former class of animals belong the marten, the otter, and [595<sup>a</sup>1] the beaver. The beaver is flatter than the otter and has strong teeth; it often at night-time emerges from the water and goes nibbling at the bark of the aspens that fringe the riversides. The otter will bite a man, and it is said that whenever it bites it will never let go until it hears a bone crack. The hair of the beaver is rough, [5] intermediate in appearance between the hair of the seal and the hair of the deer.

6 · Saw-toothed animals drink by lapping, as do also some animals with teeth differently formed, as the mouse. Animals whose upper and lower teeth meet evenly drink by suction, as the horse and the ox; the bear neither laps nor sucks, but [10] gulps. Birds, as a rule, drink by suction, but the long-necked birds stop and elevate their heads at intervals; the purple coot is the only one that gulps.

Horned animals, domesticated or wild, and all such as are not saw-toothed, are [15] all frugivorous and graminivorous, save under great stress of hunger. The pig is an exception; it cares little for grass or fruit, but of all animals it is the fondest of roots, owing to the fact that its snout is peculiarly adapted for digging them out of the ground; it is also of all animals the most easily pleased in the matter of food. It takes on fat more rapidly in proportion to its size than any other animal; in fact, a pig can [20] be fattened for the market in sixty days. Pig-dealers can tell the

amount of flesh taken on, by having first weighed the animal while it was being starved. Before the fattening process begins, the creature must be starved for three days; (animals in general will take on fat if subjected previously to a course of starvation); after the three days, pig-breeders feed the animal lavishly. Breeders in Thrace, when [25] fattening pigs, give them a drink on the first day; then they miss one, and then two days, then three and four, until the interval extends over seven days. This animal is fattened on barley, millet, figs, acorns, wild pears, and cucumbers. These animals—and other animals that have warm bellies—are fattened by repose. [Pigs also fatten the better by being allowed to wallow in mud. They like to feed in [595<sup>b</sup>1] batches of the same age. A pig will give battle even to a wolf.]<sup>12</sup> A sixth part of what it weighs when living is made up of hair, blood, and the like. When suckling their young, sows—like all other animals—get attenuated. So much for these animals. [5]

7 · Cattle feed on fruit and grass, and fatten on vegetables that tend to cause flatulency, such as bitter vetch or bruised beans or bean-stalks. [The older ones also will fatten if they be fed up after an incision has been made into their hide, and air blown into it.]<sup>13</sup> Cattle will fatten also on barley, in its natural state or winnowed, or [10] on sweet food, such as figs, or pulp from the wine-press,<sup>14</sup> or on elm-leaves. [But nothing is so fattening as the heat of the sun and wallowing in warm waters. If the horns of young cattle be smeared with wax, you may mould them to any shape you please, and cattle are less subject to disease of the hoof if you smear the horns with [15] wax, pitch, or olive oil.]<sup>15</sup> Herded cattle suffer more when they are forced to change their pasture-ground by frost than when snow is the cause of change. Cattle grow all the more in size when they are kept from sexual commerce over a number of years; and it is with a view to growth in size that in Epirus the so-called Pyrrhic cattle are [20] not allowed intercourse with the bull until they are nine years old; from which circumstance they are nicknamed the ‘unbull’d’ cattle. Of these they say that there are only about four hundred in the world, that they are the private property of the royal family, and that they cannot thrive out of Epirus although people elsewhere have tried.

8 · Horses, mules, and asses feed on fruit and grass, but are fattened chiefly [25] by drink. Just in proportion as beasts of burden drink water, so will they more or less enjoy their food, and a place will give good or

bad feeding according as the water is good or bad. Green corn, while ripening, will give a smooth coat; but such corn is injurious if the spikes are hard. The first crop of clover is unwholesome, and so is [30] clover over which ill-scented water runs; for the clover is sure to get the taint of the water. Cattle like clear water for drinking; but the horse in this respect resembles the camel, for the camel likes turbid and thick water, and will never drink from a [596<sup>a</sup>1] stream until he has trampled it into a turbid condition. The camel can go without water for as much as four days, but after that when he drinks, he drinks in immense quantities.

9 · The elephant at the most can eat nine Macedonian medimni of barley at [5] one meal; but so large an amount is unwholesome. As a general rule it can take six or seven medimni, five medimni of wheat, and five *mareis* of wine—six cotylae going to the *maris*. An elephant has been known to drink right off fourteen Macedonian *metretae* of water, and another eight *metretae* later in the day.

[10] Camels live for about thirty years; in some exceptional cases they live much longer, and instances have been known of their living to the age of a hundred. The elephant is said by some to live for about two hundred years; by others, for three hundred.

10 · Sheep and goats are graminivorous, but sheep browse assiduously and [15] steadily, whereas goats shift their ground rapidly, and browse only on the tips of the herbage. Sheep are fattened by drinking, and accordingly they give the flocks salt every five days in summer, to the extent of one medimnus to the hundred sheep, and [20] this is found to render a flock healthier and fatter. In fact they mix salt with the greater part of their food; a large amount of salt is mixed into their bran (for the reason that they drink more when thirsty), and in autumn they get cucumbers with a sprinkling of salt on them; this admixture of salt in their food tends also to increase the quantity of milk. If sheep be kept on the move at midday they will drink more copiously towards evening; and if the ewes be fed with salted food as the lambing [25] season draws near they will get larger udders. Sheep are fattened by twigs of the olive or of the oleaster, by vetch, and bran of every kind; and these articles of food fatten all the more if they be first sprinkled with brine. Sheep too will take on flesh all the better if they be first put for three days through a process of starving. In autumn, water from the north is more wholesome for sheep than water from the [30] south. Pasture

grounds are all the better if they have a westerly aspect.

Sheep will lose flesh if they be kept overmuch on the move or be subjected to any hardship. In winter time shepherds can easily distinguish the vigorous sheep from the weakly, from the fact that the vigorous sheep are covered with hoar-frost while the weakly ones are quite free of it; the fact being that the weakly ones feeling [596<sup>b</sup>1] oppressed with the burden shake themselves and so get rid of it. The flesh of all quadrupeds deteriorates in marshy pastures, and is the better on high grounds. Sheep that have flat tails can stand the winter less well than long-tailed sheep, and [5] short-fleeced sheep than the shaggy-fleeced; and sheep with crisp wool stand the rigour of winter very poorly. Sheep are healthier than goats, but goats are stronger than sheep. [The fleeces and the wool of sheep that have been killed by wolves, as also the clothes made from them, are exceptionally infested with lice.]<sup>16</sup> [10]

**11** · Of insects, such as have teeth are omnivorous; such as have a tongue feed on liquids only, extracting with that organ juices from all quarters. And of these latter some may be called omnivorous, inasmuch as they feed on every kind of juice, as for instance, the common fly; others are blood-suckers, such as the gadfly [15] and the horse-fly, others again live on the juices of fruits and plants. The bee is the only insect that does not settle on things rotten; it will touch no article of food unless it have a sweet-tasting juice, and it is particularly fond of drinking water if it be found bubbling up clear from a spring.

So much for the food of animals of the various genera. [20]

**12** · The habits of animals are all connected with either breeding and the rearing of young, or with the procuring a due supply of food; and these habits are modified so as to suit cold and heat and the variations of the seasons. For all animals have an instinctive perception of the changes of temperature, and, just as men seek [25] shelter in houses in winter, or as men of great possessions spend their summer in cool places and their winter in sunny ones, so also all animals that can do so shift their habitat at various seasons.

Some creatures can make provision against change without stirring from their [30] ordinary haunts; others migrate, quitting Pontus and the cold countries after the autumnal equinox to avoid the approaching winter, and after the spring equinox [597<sup>a</sup>1] migrating from warm lands

to cool lands to avoid the coming heat. In some cases they migrate from places near at hand, in others they may be said to come from the ends of the world, as in the case of the crane; for these birds migrate from the steppes of Scythia to the marshlands south of Egypt where the Nile has its source. [5] [And it is here that they are said to fight with the pygmies; and the story is not fabulous, but there is in reality a race of dwarfish men, and the horses are little in proportion, and the men live in caves underground.]<sup>17</sup> Pelicans also migrate, and fly [10] from the Strymon to the Ister, and breed on the banks of this river. They depart in flocks, and the birds in front wait for those in the rear, owing to the fact that when the flock is passing over the intervening mountain range, the birds in the rear lose sight of their companions in the van.

[15] Fishes also in a similar manner shift their habitat now out of the Euxine and now into it. In winter they move from the outer sea in towards land in quest of heat; in summer they shift from shallow waters to the deep sea to escape the heat.

Weakly birds in winter and in frosty weather come down to the plains for [20] warmth, and in summer migrate to the hills because of the heat. The more weakly an animal is the greater hurry will it be in to migrate on account of extremes of temperature, either hot or cold; thus the mackerel migrates in advance of the tunnies, and the quail in advance of the cranes. The former migrates in the month of [25] Boedromion, and the latter in the month of Maemacterion. All creatures are fatter in migrating from cold to heat than in migrating from heat to cold; thus the quail is fatter in autumn than in spring. The migration from cold countries is contemporaneous with the close of the hot season. Animals are in better trim for breeding [30] purposes in spring-time, when they change from hot to cool lands.

Of birds, the crane, as has been said, migrates from one end of the world to the [597<sup>b</sup>1] other; they fly against the wind. The story told about the stone is untrue: to wit, that the bird, so the story goes, carries a stone by way of ballast, and that the stone when vomited up is a touchstone for gold.

The cushat and the rock-dove migrate, and never winter in our country, as is [5] the case also with the swallow and the turtle-dove; the common pigeon, however, stays behind. The quail also migrates; only a few quails and turtle-doves may stay behind in sunny districts. Cushats and turtle-doves flock together, both when they arrive and when the season for migration comes round again. When quails come to [10] land, if it be fair weather or if a north wind is blowing, they will pair off and

manage pretty comfortably; but if a southerly wind prevail they are greatly distressed owing to the difficulties in the way of flight, for a southerly wind is wet and violent. For this reason bird-catchers trap them in southerly winds but not during fine weather. They fly badly because of their weight; for their body is heavy, and that is why the [15] bird always screams while flying—for the labour is severe. When the quails come from abroad they have no leaders, but when they migrate hence, the glottis flits along with them, as does also the landrail, and the eared owl, and the corncrake. The corncrake calls them in the night, and when the bird-catchers hear the croak of [20] the bird in the night-time they know that the quails are on the move. The landrail is like a marsh bird, and the glottis has a tongue that can project far out of its beak. [The eared owl is like an ordinary owl, only that it has feathers about its ears; by some it is called the night-raven. It is a rogue and a mimic: while it apes the dance of [25] the hunter, his accomplice comes behind and catches it. The common owl is caught by a similar trick.

As a general rule all birds with crooked talons are short-necked, flat-tongued, and disposed to mimicry. The Indian bird, the parrot, which is said to have a man's tongue, answers to this description; and after drinking wine, the parrot becomes more saucy than ever.

[30] Of birds, the following live in flocks—the crane, the swan, the pelican, and the lesser goose.]<sup>18</sup>

**13** · Of fishes, some, as has been observed, migrate from the outer seas in towards shore, and from the shore towards the outer seas, to avoid the extremes of [598<sup>a</sup>1] cold and heat.

Fish living near to the shore are better eating than deep-sea fish. The fact is they have more abundant and better feeding, for wherever the sun's heat can reach vegetation is more abundant, better in quality, and more delicate, as is seen in any ordinary garden. Further, the black shore-weed grows near to shore; the other [5] shore-weed is like wild weed.<sup>19</sup> Besides, the parts of the sea near to shore are subjected to a more equable temperature; and consequently the flesh of shallow-water fishes is more consistent, whereas the flesh of deep water fishes is flaccid and watery.

The following fishes are found near into shore—the synodon, the black bream, [10] the merou, the gilthead, the mullet, the red mullet; the wrasse, the weaver, the callionymus, the goby, and rock-fishes of all kinds. The following are deep-sea fishes—the trygon, the selachia, the white conger, the channa, the erythrinus, and the glaucus. The braize, the



sea-scorpion, the black conger, the muraena, and the piper are found alike in shallow and deep waters. These fishes, however, vary for [15] various localities; for instance, the goby and all rock-fish are fat off the coasts of Crete. Again, the tunny is good again after the rising of Arcturus; for then it is free from parasites—that is why it is worse in summer. A number of fish also are found in sea-estuaries; such as the saupe, the gilthead, the red mullet, and, in point of fact, [20] the greater part of the gregarious fishes. The bonito also is found in such waters, as, for instance, off the coast of Alopecurus; and most species of fish are found in Lake Bistonis. The coly-mackerel as a rule does not enter the Euxine, but passes the summer in the Propontis, where it spawns, and winters in the Aegean. The tunny, [25] the pelamys, and the bonito penetrate into the Euxine in summer and pass the summer there; as do also the greater part of such fish as congregate in shoals together. And most fish congregate in shoals, and shoal-fishes in all cases have leaders.

Fish penetrate into the Euxine for food. For the feeding is more abundant and [30] better in quality owing to the amount of fresh water, and moreover, the large fishes are fewer—indeed, there is no large fish in the Euxine excepting the dolphin and the [598<sup>b</sup>1] porpoise, and the dolphin is a small variety; but as soon as you get into the outer sea the big fishes are there. Furthermore, fish penetrate into this sea for the purpose of breeding; for there are regions there favourable for spawning, and the fresh and [5] sweet water has an invigorating effect upon the spawn. After spawning, when the young fishes have attained some size, the parent fish swim out immediately after the rising of the Pleiads. If winter comes in with a southerly wind, they swim out more slowly; but, if a north wind be blowing, they swim out with greater rapidity, from the fact that the breeze is favourable to their own course. And the young fish are caught about this time in the neighbourhood of Byzantium very [10] small in size, as might have been expected from the shortness of their sojourn in the Euxine. The shoals in general are visible both as they quit and enter the Euxine. The trichiae, however, only can be caught during their entry, but are never visible during their exit; in point of fact, when a trichia is caught in the neighbourhood of Byzantium, the fishermen are particularly careful to cleanse their nets, as they do [15] not often swim out. The reason is that this fish alone swims northwards into the Ister, and then at the point of its bifurcation swims down into the Adriatic. And, as a proof that this theory is correct, the very opposite phenomenon presents itself in the Adriatic; that is to say, that they are not caught in that sea during their entry, but are caught during their exit.

Tunny-fish swim into the Euxine keeping the shore on their right, and swim [20] out of it with the shore upon their left. It is stated that they do so as being naturally weak-sighted, and seeing better with the right eye.

During the daytime shoal-fish continue on their way, but during the night they rest and feed. But if there be moonlight, they continue their journey without resting at all. Some people accustomed to sea-life assert that shoal-fish at the period of the [25] winter solstice never move at all, but keep perfectly still wherever they may happen to have been overtaken by the solstice, and this lasts until the equinox.

The coly-mackerel is caught more frequently on entering than on quitting the Euxine. And in the Propontis the fish is at its best before the spawning season. Shoal-fish, as a rule, are caught in greater quantities as they leave the Euxine, and [30] at that season they are in the best condition. At the time of their entrance they are caught in very plump condition close to shore, but those are in comparatively poor [599<sup>a</sup>1] condition that are caught farther out to sea. Very often, when the coly-mackerel and the mackerel are met by a south wind in their exit, there are better catches to the southward than in the neighbourhood of Byzantium. So much then for the phenomenon of migration of fishes.

[5] Now the same phenomenon is observed in fishes as in terrestrial animals in regard to hibernation: in other words, during winter fishes take to concealing themselves, and quit their places of concealment in the warmer season. But animals go into concealment by way of refuge against extreme heat, as well as against extreme cold. Sometimes an entire genus will thus seek concealment; in other cases [10] some species will do so and others will not. For instance, the shell-fish seek concealment without exception, as is seen in the case of those dwelling in the sea, the purple murex, the trumpet-shell, and all such like; but though in the case of the detached species the phenomenon is obvious—for they hide themselves, as is seen in the scallop, or they are provided with an operculum on the free surface, as in the [15] case of land snails—in the case of the non-detached the concealment is not so clearly observed. They do not go into hiding at one and the same season; but the snails go in winter, the purple murex and the trumpet-shell for about thirty days at the rising of the Dog-star, and the scallop at about the same period. But for the most part they go into concealment when the weather is either extremely cold or extremely hot.

such of them as live in human habitations or perish before the completion of the year. The rest hide in the winter; some of them for several days, others for only the coldest days, as the bee. For the bee also goes into hiding; and the proof that it does so is that bees never [25] touch the food set before them, and if a bee creeps out of the hive, it is quite transparent, with nothing whatsoever in its stomach; and the period of its rest lasts from the setting of the Pleiads until spring-time.

Animals hide by concealing themselves in warm places, or in places where they have been used to lie concealed.

**15** · Several blooded animals hide, such as the tessellates, namely, the [30] serpent, the lizard, the gecko, and the river-crocodile, all of which go into hiding for four months in the depth of winter, and during that time eat nothing. Serpents in general burrow under ground for this purpose; the viper conceals itself under a [599<sup>b1</sup>] stone.

A great number of fishes also take this sleep, and notably, the hippurus and coracinus in winter time; for, whereas fish in general may be caught at all periods of the year more or less, these are never caught at all outside a certain fixed period of [5] the year. The muraena also hides, and the sea-perch, and the conger. Rock-fish pair off, male and female, for hiding [just as for breeding];<sup>20</sup> as is observed in the case of the wrasse and the owzel and the perch.

The tunny also takes a sleep in winter in deep waters, and gets exceedingly fat after the sleep. The fishing season for the tunny begins at the rising of the Pleiads [10] and lasts, at the longest, down to the setting of Arcturus; during the rest of the year they are hid and inactive. About the time of hibernation a few tunnies or other hibernating fishes are caught while swimming about, in particularly warm localities and in exceptionally fine weather, or on nights of full moon; for the fishes emerge [15] for a while from their lair in quest for food.

Most fishes are at their best during the hiding-period.

The primas-tunny conceals itself in the mud; this may be inferred from the fact it is not caught, and that it is covered with mud and has its fins damaged. In the [20] spring<sup>21</sup> these tunnies get in motion and proceed towards the coast, coupling and breeding, and the females are now caught full of spawn. At this time, they are considered as in season, but in autumn and in winter as of inferior quality; at this time also the males are full of milt. When the spawn is small, the fish is hard to [25] catch, but it is easily caught when the spawn gets large, as the fish is then

infested by its parasite. Some fish burrow for sleep in the sand and some in mud, just keeping their mouths outside.

Most fishes hide, then, during the winter, but crustaceans, the rock-fish, the ray, and the selachia hide only during extremely severe weather, and this may be [30] inferred from the fact that these fishes are not caught when the weather is extremely cold. Some fishes, however, hide during the summer too, as the glaucus; this fish hides in summer for about sixty days. The hake also and the gilthead hide; [600<sup>a</sup>1] and we infer that the hake hides over a lengthened period from the fact that it is only caught at long intervals. We are led also to infer that fishes hide in summer from the circumstance that the takes of certain fish are made between the rise and [5] setting of certain constellations: of the dog-star in particular, the sea at this period being upturned. This phenomenon may be observed to best advantage in the Bosporus; for the mud is there brought up to the surface and the fish are brought up along with it. They say also that very often, when the sea-bottom is dredged, more fish will be caught by the second haul than by the first one. Furthermore, after very heavy rains numerous specimens become visible of creatures that at other times are [10] never seen at all or seen only rarely.

16 · A great number of birds also go into hiding; they do not all migrate, as is generally supposed, to warmer countries. Thus, certain birds [as the kite and the [15] swallow]<sup>22</sup> when they are not far off from places of this kind, in which they have their permanent abode, betake themselves thither; others, that are at a distance from such places, do not migrate but hide themselves. Swallows, for instance, have been often found in holes, quite denuded of their feathers, and the kite on its first appearance has been seen to fly from out some such hiding-place. And with regard to this hibernation, there is no distinction observed, whether the talons of a bird be [20] crooked or straight; for instance, the stork, the owzel, the turtle-dove, and the lark, all go into hiding. The case of the turtle-dove is the most accepted of all, for we would defy any one to assert that he had anywhere seen a turtle-dove in winter-time; at the beginning of the hiding time it is exceedingly plump, and during this period it [25] moults, but retains its plumpness. Some cushats hide; others, instead of hiding, migrate at the same time as the swallow. The thrush and the starling hide; and of birds with crooked talons the kite and the owl hide for a few days.

17 · Of viviparous quadrupeds the hedgehog and the bear retire into [30] concealment. The fact that the bear hides is well established, but there are doubts as to whether it does so by reason of the cold or from some other cause. About this period the male and the female become so fat as to be hardly capable of motion. The [600<sup>b</sup>1] female brings forth her young at this time, and remains in concealment until it is time to bring the cubs out; and she brings them out in spring, about three months after the winter solstice. The bear hides for at least forty days; during fourteen of [5] these days it is said not to move at all, but during most of the subsequent days it moves, and from time to time wakes up. A she-bear in pregnancy has either never been caught at all or has been caught very seldom. There can be no doubt but that during this period they eat nothing; for they never emerge from their hiding-place, and further, when they are caught, their belly and intestines are found to be quite [10] empty. It is also said that from no food being taken the gut almost closes up, and that in consequence the animal on first emerging takes to eating arum with the view of opening up and distending the gut.

The dormouse actually hides in a tree, and gets very fat at that period; as does [15] also the white mouse of Pontus.

[Of animals that hide some slough off what is called their 'old-age'. This name is applied to the outermost skin, and to the casing that envelops the developing organism.]<sup>23</sup>

In discussing the case of terrestrial vivipara we stated that the reason for the bear's seeking concealment is disputed. The tessellates for the most part go into [20] hiding, and if their skin is soft they slough off their 'old-age', but not if the skin is shell-like, as is the shell of the tortoise—for the tortoise and the freshwater tortoise belong to the tessellates. Thus, the old-age is sloughed off by the gecko, the lizard, and above all, by serpents; and they slough off the skin in springtime when emerging from their torpor, and again in the autumn. Vipers also slough off their skin both in [25] spring and in autumn, and it is not the case, as some aver, that this species of the serpent family is exceptional in not sloughing. When the serpent begins to slough, the skin peels off at first from the eyes, so that any one ignorant of the phenomenon would suppose the animal were going blind; after that it peels off the head—for in [30] all cases it appears white.<sup>24</sup> The sloughing goes on for a day and a night, beginning with the head and ending with the tail. During the sloughing the skin turns inside out; for the creature emerges just as the embryo from its afterbirth. [601<sup>a</sup>1]

All insects that slough at all slough in the same way; as the silphe, and the midge, and all the coleoptera, as for instance the cantharus-beetle. They all slough after the period of development; for just as the afterbirth breaks from off the young of the vivipara so the outer husk breaks off from around the young of the vermipara, [5] in the same way both with the bee and the grasshopper. The cicada the moment after issuing from the husk goes and sits upon an olive tree or a reed; after the breaking up of the husk the creature issues out, leaving a little moisture behind, and after a short interval flies into the air and sets a-chirping. [10]

Of marine animals the crayfish and the lobster slough sometimes in the spring, and sometimes in autumn after parturition. Crayfish have been caught occasionally with the parts about the thorax soft, from the shell having there peeled off, and the lower parts hard, from the shell having not yet peeled off there; for they do not [15] slough in the same manner as the serpent. The crayfish hides for about five months. Crabs also slough off their old-age; this is generally allowed with regard to the soft-shelled crabs, and it is said to be the case with the testaceous kind, as for instance with the 'granny' crab. When these animals slough their shell becomes soft all over, and as for the crab, it can scarcely crawl. These animals also do not cast [20] their skins once but often.

So much for the animals that go into hiding, for the times at which, and the ways in which, they go; and so much also for the animals that slough off their old-age, and for the times at which they undergo the process.

18 · Animals do not all thrive at the same seasons, nor do they thrive alike [25] during all extremes of weather. Further, animals of diverse species are in a diverse way healthy or sickly at certain seasons; and, in point of fact, some animals have ailments that are unknown to others. Birds thrive in times of drought, both in their general health and in regard to parturition, and this is especially the case with the [30] cushat; fishes, however, with a few exceptions, thrive best in rainy weather; on the contrary, rainy seasons are bad for birds—and so by the way is much drinking— and drought is bad for fishes. Birds of prey, as has been already stated, may in a [601<sup>b</sup>1] general way be said never to drink at all, though Hesiod appears to have been ignorant of the fact, for in his story about the siege of Nineveh he represents the eagle that presided over the auguries as in the act of drinking; all other birds drink,

[5] but drink sparingly, as is the case also with all other spongy-lunged oviparous animals. Sickness in birds may be diagnosed from their plumage, which is ruffled when they are sickly instead of lying smooth as when they are well.

19 · The majority of fishes, as has been stated, thrive best in rainy seasons. [10] Not only have they food in greater abundance at this time, but in a general way rain is wholesome for them just as it is for vegetation—for kitchen vegetables, though artificially watered, nevertheless grow better when rained upon; and the same [15] remark applies even to reeds that grow in marshes, as they hardly grow at all without a rainfall. That rain is good for fishes may be inferred from the fact that most fishes migrate to the Euxine for the summer; for owing to the number of the rivers that discharge into this sea its water is exceptionally fresh, and the rivers bring down a large supply of food. Besides, a great number of fishes, such as the [20] bonito and the mullet, swim up the rivers and thrive in the rivers and marshes. The goby also fattens in the rivers, and, as a rule, countries abounding in lagoons furnish excellent fish. Of types of rain, summer showers are particularly good for most fish; [25] and they benefit when the spring, summer, and autumn are rainy and the winter is fine. As a general rule what is good for men is good for fishes also.

Fishes do not thrive in cold places, and those fishes suffer most in severe [30] winters that have a stone in their head, as the chromis, the basse, the sciaena, and the braize; for owing to the stone they get frozen with the cold, and are thrown up on shore.

Whilst rain is wholesome for most fishes, it is, on the contrary, unwholesome [602<sup>a</sup>1] for the mullet, the cephalus, and the so-called marinus, for rain superinduces blindness in most of these fishes, and all the more rapidly if the rainfall be superabundant. The cephalus is peculiarly subject to this malady in severe winters; [5] their eyes grow white, and when caught they are in poor condition, and eventually the disease kills them. It would appear that this disease is due to cold even more than to an excessive rainfall; at all events, in many places and more especially in [10] shallows off the coast of Nauplia, in the Argolid, a number of blind fishes have been caught in seasons of severe cold. The gilthead also suffers in winter; the acharnas suffers in summer, and loses condition. The coracine is exceptional among fishes in deriving benefit from drought, and this is due to the fact that heat and drought are [15]

apt to come together.

Particular places suit particular fishes: those at home off shore or in the deep sea thrive in those places; those which are ambivalent thrive in both. Some fishes will thrive in one particular spot, and in that spot only. As a general rule it may be said that places abounding in weeds are wholesome; at all events, fishes caught in such places are exceptionally fat: that is, such fishes as inhabit all sorts of localities [20] as well. The fact is that weed-eating fishes find abundance of their special food in such localities, and carnivorous fish find an unusually large number of smaller fish. It matters also whether the wind be from the north or south: the longer fish thrive better when a north wind prevails, and in summer at one and the same spot more long fish will be caught than flat fish with a north wind blowing. [25]

The tunny and the sword-fish are infested with a parasite about the rising of the dog-star; that is to say, about this time both these fishes have a grub beside their fins that is nicknamed the 'gadfly'. It resembles the scorpion in shape, and is about the size of the spider. So acute is the pain it inflicts that the sword-fish will sometimes leap as high out of the water as a dolphin; in fact, it often falls into a [30] boat. The tunny delights more than any other fish in the heat of the sun. It will make for the sand near to shore because of the warmth, or will, because it is warm, disport [602<sup>b</sup>1] itself on the surface of the sea.

The fry of little fishes escape by being overlooked, for it is only the larger ones that large fish pursue. The greater part of the spawn and the fry of fishes is destroyed by the heat of the sun, for whatever of them the sun reaches it spoils. [5]

Fishes are caught in greatest abundance before sunrise and after sunset, or, speaking generally, just about sunset and sunrise. Fishermen haul up their nets at these times, and speak of the hauls then made as timely. The fact is, that at these times fishes are particularly weaksighted; at night they are at rest, and as the light [10] grows stronger they see comparatively well.

We know of no pestilential malady attacking fishes, such as those which attack man, and horses and oxen among the quadrupedal vivipara, and certain other animals, domesticated and wild; but fishes do seem to suffer from sickness; and [15] fishermen infer this from the fact that at times fishes in poor condition, and looking as though they were sick, and of altered colour, are caught in a large haul of well-conditioned fish of their own species. So much for sea-fishes.



20 · River-fish and lake-fish also are exempt from diseases of a pestilential [20] character, but certain species are subject to special maladies. For instance, the sheat-fish just before the rising of the dog-star, owing to its swimming near the surface of the water, is liable to sunstroke, and is paralysed by a loud peal of thunder. The carp is subject to the same eventualities, but in a lesser degree. The sheat-fish is destroyed in great quantities in shallow waters by the serpent called the [25] dragon. In the balerus and tilon a worm is engendered about the rising of the dog-star, that sickens these fish and causes them to rise towards the surface, where they are killed by the excessive heat. The chalcis is subject to a very violent malady; lice are engendered underneath their gills in great numbers, and cause destruction among them; but no other species of fish is subject to any such malady. [30]

Mullein kills fish; that is why fishermen use mullein in rivers and ponds—by the Phoenicians it is made use of also in the sea. [603<sup>a</sup>1]

There are two other methods employed for catching fish. In winter fishes emerge from the deep parts of rivers—and at all seasons fresh water is tolerably cold. A trench accordingly is dug leading though dry ground into a river, and [5] wattled at the river end with reeds and stones, an aperture being left in the wattling through which the river water flows into the trench; when the frost comes on the fish can be taken out of the trench in weels. Another method is adopted in summer and winter alike. They run across a stream a dam composed of rushwood and stones, [10] leaving a small open space, and in this space they insert a weel in which they catch them when they have removed the stones.<sup>25</sup>

Shell-fish, as a rule are benefited by rainy weather. The purple murex is an exception; if it be placed on a shore near to where a river discharges, it will die [15] within a day after tasting the fresh water. The murex lives for about fifty days after capture; during this period they feed off one another, as there grows on the shell a kind of sea-weed or sea-moss; if any food is thrown to them during this period, it is said to be done to make them weigh more.

To shell-fish in general drought is unwholesome. During dry weather they [20] decrease in size and degenerate in quality; and it is during such weather that the red scallop is found in more than usual abundance. In the Pyrrhaean Strait the scallop was exterminated, partly by the dredging-machine used in their capture, and partly by long-continued droughts. Rainy weather is wholesome to the generality of shell-fish owing to the fact that the sea-water then becomes exceptionally sweet. In [25] the

Euxine, owing to the coldness of the climate, shell-fish are not found; nor yet in rivers, excepting a few bivalves. Univalves are very apt to freeze to death in extremely cold weather. So much for animals that live in water.

21 · To turn to quadrupeds, the pig suffers from three diseases, one of which is called *branchos*, a disease attended with swellings about the windpipe and the [603<sup>b</sup>1] jaws. It may break out in any part of the body; very often it attacks the foot, and occasionally the ear; the neighbouring parts also soon rot, and the decay goes on until it reaches the lungs, when the animal succumbs. The disease develops with [5] great rapidity, and the moment it sets in the animal gives up eating. The swineherds know but one way to cure it, namely, by complete excision, when they detect the first signs of the disease. There are two other diseases, which are both alike termed *craurus*. The one is attended with pain and heaviness in the head, and this is the commoner of the two, the other with diarrhoea. The latter is incurable, the former is [10] treated by applying wine to the snout and rinsing the nostrils with wine. Even this disease is very hard to cure; it has been known to kill within three or four days. The animal is chiefly subject to *branchos* when it gets extremely fat, and when the heat has brought a good supply of figs. The treatment is to feed on mulberries, to give [15] repeated warm baths, and to lance the under part of the tongue.

Pigs with flabby flesh are subject to measles about the legs, neck, and shoulders, for the pimples develop chiefly in these parts. If the pimples are few in number the flesh is comparatively sweet, but if they be numerous it gets watery and flaccid. The symptoms of measles are obvious, for the pimples show chiefly on the [20] under side of the tongue, and if you pluck the bristles off the chine the skin will appear suffused with blood, and further the animal will be unable to keep its hind-feet at rest. Pigs never take this disease while they are mere sucklings. The pimples may be got rid of by tiphe; and this is useful as food too. The best food for [25] rearing and fattening pigs is chickpeas and figs, but the one thing essential is to vary the food as much as possible, for this animal, like animals in general, delights in a change of diet; and it is said that one kind of food blows the animal out, that another superinduces flesh, and that another puts on fat, and that acorns, though liked by the animal, render the flesh flaccid. Besides, if a pregnant sow eats acorns in great [604<sup>a</sup>1] quantities, it will miscarry, as is also the case with the ewe—for acorns quite plainly have that effect on ewes. The

pig is the only animal known to be subject to measles.

**22** · Dogs suffer from three diseases; rabies, quinsy, and sore feet. Rabies [5] drives the animal mad, and any animal whatever, excepting man, will take the disease if bitten by a dog so afflicted; the disease is fatal to the dog itself, and to any animal it may bite, man excepted. Quinsy also is fatal to dogs; and only a few dogs recover from disease of the feet. The camel, like the dog, is subject to rabies. The [10] elephant, which is reputed to enjoy immunity from all other illnesses, is occasionally subject to flatulency.

**23** · Cattle in herds are liable to two diseases, foot-sickness and craurus. In the former their feet suffer from eruptions, but the animal recovers from the disease [15] without even the loss of the hoof. It is found of service to smear the horny parts with warm pitch. In craurus, the breath comes warm at short intervals; in fact, craurus in cattle answers to fever in man. The symptoms of the disease are drooping of the ears [20] and disinclination for food. The animal soon succumbs, and when the carcase is opened the lungs are found to be rotten.

**24** · Horses out at pasture are free from all diseases excepting disease of the feet. From this disease they sometimes lose their hooves; but after losing them they [25] grow them soon again, for as one hoof is decaying it is being replaced by another. Symptoms of the malady are a sinking in and wrinkling of the lip in the middle under the nostrils, and a twitching of the right testicle.

Stall-reared horses are subject to very numerous forms of disease. They are liable to a disease called 'eileus'. Under this disease the animal trails its hind-legs [604<sup>b</sup>1] under its belly so far forward as almost to fall back on its haunches; if it goes without food for several days and then turns rabid, it may be of service to draw blood, or to castrate the male. The animal is subject also to tetanus: the veins get rigid, as also the head and neck, and the animal walks with its legs stretched out [5] straight. The horse suffers also from abscesses. Another painful illness afflicts them called the 'barley-surfeit'. The symptoms are a softening of the palate and heat of the breath; it is incurable, unless the animal recovers spontaneously.

[10] There is also a disease called nymphia, in which the animal is

said to be possessed and droops its head on hearing flute-music; if during this ailment the horse be mounted, it will run off at a gallop until it is pulled. Even with this rabies in full force, it preserves a dejected spiritless appearance; some of the symptoms are a throwing back of the ears followed by a projection of them, great languor, and [15] panting. Heart-ache also is incurable, of which the symptom is pain and loosening of the bowels; and so is displacement of the bladder, which is accompanied by a retention of urine and a drawing up of the hooves and haunches. Neither is there any cure if the animal swallow the grape-beetle, which is about the size of the [20] knuckle-beetle. The bite of the shrewmouse is dangerous to other draught animals as well; it is followed by boils. The bite is all the more dangerous if the mouse be pregnant when she bites, for the boils then burst, but do not burst otherwise. The cicigna—called ‘chalcis’ by some, and ‘zignis’ by others—either causes death by its [25] bite or, at all events, intense pain; it is like a small lizard, with the colour of the blind snake. In point of fact, according to experts, the horse and the sheep have pretty well as many ailments as the human species. The drug realgar is extremely injurious to a horse, and to all draught animals; it is given to the animal in a solution of water, the liquid being filtered. The mare when pregnant is apt to miscarry when disturbed by the odour of an extinguished candle; and a similar accident happens occasionally [605<sup>a</sup>1] to women in their pregnancy. So much for the diseases of the horse.

The so-called hippomanes grows, as they say, on the foal, and the mare nibbles it off as she licks and cleans the foal. All the curious stories connected with the [5] hippomanes are due to old wives and to the venders of charms. What is called the ‘polium’ is, as all the accounts state, delivered by the mother before the foal appears.

A horse will recognize the neighing of any other horse with which it may have fought at any previous period. The horse delights in meadows and marshes, and [10] likes to drink muddy water; in fact, if water be clear, the horse will trample in it to make it turbid, will then drink it, and afterwards will wallow in it. The animal is fond of water and of bathing—and this explains the peculiar constitution of the hippopotamus. In regard to water the ox is the opposite of the horse; for if the water [15] be impure or cold, or mixed up with alien matter, it will refuse to drink it.

25 · The ass suffers chiefly from one particular disease which they call ‘melis’. It arises first in the head, and a clammy humor runs down the nostrils, thick [20] and red; if it stays in the head the animal may recover,

but if it descends into the lungs the animal will die. Of all animals of its kind it is the least capable of enduring extreme cold, which circumstance will account for the fact that the animal is not found on the shores of the Euxine, nor in Scythia.

**26** · Elephants suffer from flatulence and then can void neither solid nor [25] liquid residuum. If the elephant swallows earth it suffers from relaxation; but if it goes on taking it steadily, it will experience no harm. From time to time it takes to swallowing stones. It suffers also from diarrhoea: in this case they administer draughts of lukewarm water and dip its fodder in honey, and either one or the other prescription will prove a costive. When they are exhausted from insomnia, they will [30] be restored to health if their shoulders be rubbed with salt, olive-oil, and warm water; when they have aches in their shoulders they will derive great benefit from [605<sup>b</sup>1] the application of roast pork. Some elephants like olive-oil, and others do not. If there is a bit of iron in the inside of an elephant it is said that it will pass out if the animal takes a drink of olive-oil; if the animal refuses olive-oil, they soak a root in the oil and give it the root to swallow. [5]

So much, then, for quadrupeds.

**27** · Insects, as a general rule, thrive best in the time of year in which they come into being, especially if the season be moist and warm, as in spring.

In bee-hives are found creatures that do great damage to the combs; for instance, the grub that spins a web and ruins the honey-comb: it is called the [10] ‘cleros’, and by some the ‘pyraustes’. It engenders an insect like itself, of a spider-shape, and brings disease into the swarm. There is another insect resembling the moth that flies about a lighted candle; this creature engenders a brood full of a fine down. It is never stung by a bee, and can only be got out of a hive by fumigation. [15] A caterpillar also is engendered in hives [called a ‘borer’]<sup>26</sup> with which the bee never interferes. Bees suffer most when flowers are covered with mildew, or in seasons of drought.

All insects die if they be smeared over with oil; and they die all the more [20] rapidly if you smear their head with the oil and lay them out in the sun.

28 · Variety in animal life may be produced by variety of locality:

thus in one place an animal will not be found at all, in another it will be small, or short-lived, or will not thrive. Sometimes this sort of difference is observed in closely [25] adjacent districts. Thus, in the territory of Miletus, in one district cicadas are found while there are none in the district adjoining; and in Cephalenia there is a river on one side of which the cicada is found and not on the other. In Pordoselene there is a public road on one side of which the weasel is found but not on the other. In Boeotia [30] the mole is found in great abundance in the neighborhood of Orchomenus, but there are none in Lebadia, though it is in the immediate vicinity, and if a mole be [606<sup>a</sup>1] transported from the one district to the other it will refuse to burrow in the soil. The hare cannot live in Ithaca if introduced there; in fact it will be found dead, turned towards the point of the beach where it was landed. The winged ant is not found in [5] Sicily; the croaking frog has only recently appeared in the neighbourhood of Cyrene. In the whole of Libya there is neither wild boar, nor stag, nor wild goat; and in India, according to Ctesias—no very good authority, by the way—there are no swine, wild or tame, but animals that are devoid of blood and tessellates are all of [10] immense size there. In the Euxine there are no cephalopods nor testaceans, except a few here and there; but in the Red Sea all the testaceans are exceedingly large. In Syria the sheep have tails a cubit in breadth; the goats have ears a span and a palm [15] long, and some have ears that flap down to the ground; and the cattle have humps on their shoulders, like the camel. In Lycia goats are shorn, just as sheep are in all other countries. In Libya horned animals are born with horns, and not the ram only, [20] as Homer words it, but others as well; in Pontus, on the confines of Scythia, it is the other way about—they are born without horns.

In Egypt animals, as a rule, are larger than in Greece, as the cow and the sheep; but some are less, as the dog, the wolf, the hare, the fox, the raven, and the [25] hawk; others are of pretty much the same size, as the crow and the goat. The difference is attributed to the food, as being abundant in one case and insufficient in another, for instance for the wolf and the hawk; for provision is scanty for the [606<sup>b</sup>1] carnivorous animals, small birds being scarce; food is scanty also for the hare and for all non-carnivorous animals, because neither the nuts nor the fruit last long.

In many places the climate will account for peculiarities; thus in Illyria, Thrace and Epirus the ass is small, and in Gaul and in Scythia the ass is not found at [5] all owing to the coldness of the climate of these

countries. In Arabia the lizard is more than a cubit in length, and the mouse is much larger than our field-mouse, with its hind-legs a span long and its front legs the length of the first finger-joint. In [10] Libya, according to accounts, the length of the serpents is something appalling; some say that they once put ashore and saw the bones of a number of oxen, and that they were sure that the oxen had been devoured by serpents, for, just as they were putting out to sea, serpents came chasing their galleys at full speed and overturned one galley and set upon the crew. Again, lions are more numerous in Libya, and in [15] that district of Europe that lies between the Achelous and the Nessus; the leopard is more abundant in Asia Minor, and is not found in Europe at all. As a general rule, wild animals are at their wildest in Asia, at their boldest in Europe, and most [20] diverse in form in Libya; in fact, there is an old saying, 'Always something fresh in Libya.'

It would appear that in that country animals of diverse species meet, on account of the rainless climate, at the watering-places, and there pair together; and that such pairs will breed if they be nearly of the same size and have periods of gestation of the same length. For they are tamed down in their behaviour towards each other by extremity of thirst. And, by the way, unlike animals elsewhere, they [25] require to drink more in winter-time than in summer; for they acquire the habit of not drinking in summer, owing to the circumstance that there is usually no water [607<sup>a</sup>1] then; and the mice, if they drink, die. Elsewhere also offspring are born to heterogeneous pairs; thus in Cyrene the wolf and the bitch will couple and breed; and the Laconian hound is a cross between the fox and the dog. They say that the Indian dog is a cross between the tiger and the bitch, not the first cross, but a cross [5] in the third generation; for they say that the first cross is a savage creature. They take the bitch to a lonely spot and tie her up—and many are eaten, unless the beast is eager to mate.

**29** · Locality will differentiate habits also: for instance, rugged highlands will not produce the same results as the soft lowlands. The animals of the highlands [10] look fiercer and bolder, as is seen in the swine of Mount Athos; for a lowland boar is no match even for a mountain sow.

Again, locality is an important element in regard to the bite of an animal. Thus, in Pharos and other places, the bite of the scorpion is not dangerous; [15] elsewhere—in Scythia, for instance,—where scorpions

are venomous as well as plentiful and of large size, the sting is fatal to man or beast, even to the pig, and especially to the black pig, though the pig is in general most indifferent to the bite of any other creature. If a pig goes into water after being struck, it will surely die. [20] There is great variety in the bites of serpents. The asp is found in Libya; the so-called 'septic' drug is made from the animal, and is the only remedy known for the bite of the original. Among the silphium, also, a snake is found, for the bite of which a certain stone is said to be cure: a stone that is brought from the grave of an [25] ancient king, put into water and drunk off. In certain parts of Italy the bite of the gecko is fatal. But the deadliest of all bites of venomous creatures is when one venomous animal has bitten another; as, for instance, a viper's after it has bitten a scorpion. To the great majority of such creatures man's spittle is fatal. There is a [30] very little snake, by some entitled the 'holy-snake', which is dreaded by even the largest serpents. It is about an ell long, and hairy-looking; whenever it bites an animal, the flesh all round the wound will at once mortify. There is in India a small snake which is exceptional in this respect, that for its bite no specific is known.

**30** · Animals also vary as to their condition of health in connexion with [607<sup>b</sup>1] their pregnancy.

Testaceans, such as scallops and all the oyster-family, and crustaceans, such as the crayfish-family, are best when with spawn. Even in the case of the testacean we speak of spawning; but whereas the crustaceans may be seen coupling and laying [5] their spawn, this is never the case with testaceans. Cephalopods are best in the breeding time, as the calamary, the cuttlefish, and the octopus.

Fishes, when they begin to breed, are nearly all good for the table; but after the female has gone long with spawn they are good in some cases, and in others are out of season. The maenis, for instance, is good at the breeding time. The female of this fish is round, the male longer and flatter; when the female is beginning to breed the [10] male turns black and mottled, and is quite unfit for the table; at this period he is nicknamed the 'goat'.

The fish called the owzel and the thrush have different [15] colours at different seasons, as is the case with certain birds; that is to say, they become black in the spring and after the spring get white again. The phycis also changes its hue: in general it is white, but in spring it is mottled; it is the only sea-fish which is said to make a bed for itself, and



the female lays her spawn in this bed. The maenis, as was [20] observed, changes its colour as does the smaris, and in summer-time changes back from whitish to black, the change being especially marked about the fins and gills. The coracine, like the maenis, is in best condition at breeding time; the mullet, the [25] basse, and scaly fishes in general are in bad condition at this period. A few fish are in much the same condition whether with spawn or not, as the glaucus. Old fishes also are bad eating; the old tunny is unfit even for pickling, as a great part of its flesh [30] wastes away with age, and the same is observed in other fishes. The age of a scaly fish may be told by the size and the hardness of its scales. An old tunny has been caught weighing fifteen talents, with the span of its tail two cubits and a palm broad.

[608<sup>a</sup>1] River-fish and lake-fish are best after they have discharged the spawn and the milt; that is, when they have fully recovered. Some are good in the breeding time, as the saperdis, and some bad, as the sheat-fish. As a general rule, the male fish is [5] better eating than the female; but the reverse holds good of the sheat-fish. The eels that are called females are the better—people call them females though they are not so but look different.



## BOOK IX

[10] 1 · Of the animals that are comparatively obscure and short-lived the characters are not so obvious to our perception as are those of animals that are longer-lived. These latter animals appear to have a natural capacity corresponding to each of the passions of the soul: to good sense or simplicity, courage or timidity, to good temper or to bad, and to other similar dispositions.

[15] Some also are capable of giving or receiving instruction—of receiving it from one another or from man: those that have the faculty of hearing—not merely of hearing sounds but of distinguishing the differences of signs.

In all genera in which the distinction of male and female is found, nature [20] makes a similar differentiation in the characteristics of the two sexes. This differentiation is the most obvious in the case of human kind and in that of the larger animals and the viviparous quadrupeds. For the female is softer in character, is the sooner tamed, admits more readily of caressing, is more apt in the way of [25] learning; as, for instance, in the Laconian breed of dogs the female is cleverer than the male. Of the Molossian breed of dogs, such as are employed in the chase are pretty much the same as those elsewhere; but the sheep-dogs of this breed are superior to the others in size, and in the courage with which they face the attacks of wild animals.

[30] Dogs that are born of a mixed breed between these two kinds are remarkable for courage and endurance of hard labour.

In all cases, excepting those of the bear and leopard, the female is less spirited than the male; in regard to the two exceptional cases, the superiority in courage [608<sup>b</sup>1] rests with the female. With all other animals the female is softer in disposition, is more mischievous, less simple, more impulsive, and more attentive to the nurture of the young; the male, on the other hand, is more spirited, more savage, more simple [5] and less cunning. The traces of these characteristics are more or less visible everywhere, but they are especially visible where character is the more developed, and most of all in man.

The fact is, the nature of man is the most rounded off and complete,

and consequently in man the qualities above referred to are found most clearly. Hence woman is more compassionate than man, more easily moved to tears, at the same time is more jealous, more querulous, more apt to scold and to strike. She is, [10] furthermore, more prone to despondency and less hopeful than the man, more void of shame, more false of speech, more deceptive, and of more retentive memory. She is also more wakeful, more shrinking, more difficult to rouse to action, and requires a smaller quantity of nutriment.

As was previously stated, the male is more courageous than the female, and more sympathetic in the way of standing by to help. Even in the case of [15] cephalopods, when the cuttlefish is struck with the trident the male stands by to help the female; but when the male is struck the female runs away.

There is enmity between such animals as dwell in the same localities or subsist [20] on the same food. If the means of subsistence run short, creatures of like kind will fight together. Thus it is said that seals which inhabit one and the same district will fight, male with male, and female with female, until one combatant kills the other, or one is driven away by the other; and their young do in like manner. [25]

All creatures are at enmity with the carnivores, and the carnivores with all the rest, for they all subsist on living creatures. Soothsayers take notice of cases where animals keep apart from one another, and cases where they congregate together; calling those that live at war with one another 'dissociates', and those that dwell in peace with one another 'associates'. One may go so far as to say that if there were no lack or stint of food, then those animals that are now feared and are wild by nature would be tame towards man and in like manner towards one another. This is shown [30] by the way animals are treated in Egypt, for owing to the fact that food is constantly supplied to them the very fiercest creatures live peaceably together. The fact is they are tamed by being benefited, and in some places crocodiles are tame to their [609<sup>a</sup>1] priestly keeper from being fed by him. And elsewhere also the same phenomenon is to be observed.<sup>1</sup>

The eagle and the snake are enemies, for the eagle lives on snakes; so are the ichneumon and the venom-spider, for the ichneumon preys upon the latter. In the [5] case of birds, there is mutual enmity between the poecilis, the crested lark, the woodpecker, and the chloreus, for they devour one another's eggs; so also between the crow and the owl; for, owing to the fact that the owl is dim-sighted by day, the crow at midday preys upon the owl's eggs, and the owl at night upon the crow's, the [10]

one getting the better during the day, the other at night.

There is enmity also between the owl and the wren; for the latter also devours the owl's eggs. In the daytime all other little birds flutter round the owl—a practice which is popularly termed 'admiring him'—buffet him, and pluck out his feathers; [15] in consequence of this habit, birdcatchers use the owl as a decoy for catching little birds of all kinds.

The so-called presbys is at war with the weasel and the crow, for they prey on her eggs and her brood; and so the turtle-dove with the pyralis, for they live in the same districts and on the same food; and so with the green woodpecker and the [20] libyus; and so with the kite and the raven, for, owing to his having the advantage from stronger talons and more rapid flight the former can steal whatever the latter is holding, so that it is food also that makes enemies of these. In like manner there is war between birds that get their living from the sea, as between the brenthus, the gull, and the harpe; and so between the buzzard on one side and the toad and snake [25] on the other, for the buzzard preys upon the eggs of the two others; and so between the turtle-dove and the chloreus; the chloreus kills the dove, and the crow kills the so-called drummer-bird.

The aegolius, and birds of prey in general, prey upon the calaris, and consequently there is war between it and them; and so is there war between the [30] gecko-lizard and the spider, for the former preys upon the latter; and so between the woodpecker and the heron, for the former preys upon the eggs and brood of the latter. And so between the aegithus and the ass, owing to the fact that the ass, in passing, rubs its sore parts against the prickles; by so doing, and all the more if it brays, it topples the eggs and the brood out of the nest, the young ones tumble out in fright, and the mother-bird, to avenge this wrong, flies at the beast and pecks at his sore places.

[609<sup>b1</sup>] The wolf is at war with the ass, the bull, and the fox, for as being a carnivore, he attacks these other animals; and so for the same reason with the fox and the circus, for the circus, being carnivorous and furnished with crooked talons, attacks [5] and maims the animal. And so the raven is at war with the bull and the ass, for it flies at them, and strikes them, and pecks at their eyes; and so with the eagle and the heron, for the former, having crooked talons, attacks the latter, and the latter usually succumbs to the attack; and so the merlin with the vulture; and the crex with [10] the eleus-owl, the blackbird, and the oriole (of this latter bird some tell the story that he was originally born out of a funeral pyre): the cause of warfare is that the crex injures both them and their young. The nuthatch and the wren are at war with the eagle; the nuthatch

breaks the eagle's eggs, so the eagle is at war with it both for this reason and because, as a bird of prey, it carries on a general war all round. The horse and the anthus are enemies, and the horse will drive the bird out of the field [15] where he is grazing: the bird feeds on grass, and sees very dimly; it mimics the whinnying of the horse, flies at him, and tries to frighten him away; but the horse drives the bird away, and whenever he catches it he kills it: this bird lives beside rivers or on marsh ground; it has pretty plumage, and finds its food without trouble. [20] The ass is at enmity with the lizard, for the lizard sleeps in his manger, gets into his nostril, and prevents his eating.

Of herons there are three kinds: the ash-coloured, the white, and the starry heron. Of these the first mentioned submits with reluctance to the duties of incubation, or to union of the sexes; in fact, it screams during the union, and it is [25] said drips blood from its eyes; it lays its eggs also in an awkward manner, not unattended with pain. It is at war with certain creatures that do it injury: with the eagle for robbing it, with the fox for worrying it at night, and with the lark for stealing its eggs.

The snake is at war with the weasel and the pig; with the weasel when they are both at home, for they live on the same food; with the pig for preying on her kind. [30] The merlin is at war with the fox; it strikes and claws it, and, as it has crooked talons, it kills the animal's young. The raven and the fox are good friends, for the raven is at enmity with the merlin; and so when the merlin assails the fox the raven comes and helps the animal. The vulture and the merlin are mutual enemies, as being both furnished with crooked talons. The vulture fights with the eagle, and so [610<sup>a</sup>1] does the swan; and the swan is often victorious: moreover, of all birds swans are most prone to eating one another.

In regard to wild creatures, some sets are at enmity with other sets at all times; others, as in the case of man and man, under incidental circumstances. The ass and the acanthis are enemies; for the bird lives on thistles, and the ass browses on thistles [5] when they are young and tender. The anthus, the acanthis, and the aegithus are at enmity with one another; it is said that the blood of the anthus will not mix with the blood of the aegithus. The crow and the heron are friends, as also are the sedge-bird and lark, the laedus and the green woodpecker; the woodpecker lives on the banks of rivers and beside brakes, the laedus lives on rocks and hills, and is greatly attached [10] to its nesting-place. The piphinx, the harpe, and the kite are friends; as are the fox and the snake, for both burrow underground; so also are the blackbird and the turtle-dove. The lion and the jackal are enemies, for both are carnivorous and live on the

same food.

Elephants fight fiercely with one another, and stab one another with their [15] tusks; of two combatants the beaten one gets completely cowed, and dreads the sound of his conqueror's voice. These animals differ from one another to an extraordinary extent in the way of courage. Indians employ these animals for war purposes, irrespective of sex; the females, however, are less in size and much inferior [20] in point of spirit. An elephant by pushing with his big tusks can batter down a wall, and will butt with his forehead at a palm until he brings it down, when he stamps on it and lays it on the ground. Men hunt the elephant in the following way: they mount tame elephants of approved spirit and proceed in quest of wild animals; when they [25] come up with these they bid the tame brutes to beat the wild ones until they tire the latter completely. Hereupon the driver mounts a wild brute and guides him with the goad; after this the creature soon becomes tame, and obeys guidance. Now when the driver is on their back they are all tractable, but after he has dismounted, some are [30] tame and others vicious; in the case of these latter, they tie their front-legs with ropes to keep them quiet. The animal is hunted whether young or full grown.

Thus we see that in the case of the creatures above mentioned their mutual friendship or enmity is due to the food they feed on and the life they lead.

2 · Of fishes, some swim in shoals together and are friendly to one another; [610<sup>b1</sup>] such as do not so swim are enemies. Some fishes swarm during the spawning season; others after they have spawned. To state the matter comprehensively, we may say that the following are shoaling fish: the tunny, the maenis, the goby, the bogue, the [5] horse-mackerel, the coracine, the dentex, the red mullet, the sphyræna, the anthias, the eginus, the atherine, the sarginus, the gar-fish, the squid, the rainbow-wrasse, the pelamyd, the mackerel, the coly-mackerel. Of these some not only swim in shoals, but go in pairs inside the shoal; the rest all pair, but only swim in shoals at [10] certain periods: that is, as has been said, when they are heavy with spawn or after they have spawned.

The basse and the mullet are bitter enemies, but they shoal together at certain times; for at times not only do fishes of the same species swarm together, but also those whose feeding-grounds are identical or adjacent, if the food-supply be [15] abundant. The grey mullet is often found alive with its tail lopped off, and the conger with all that part of its body

removed that lies to the rear of the vent; in the case of the mullet the injury is wrought by the basse, in that of the conger-eel by the muraena. There is war between the larger and the lesser fishes; for the big fishes prey on the little ones. So much on the subject of marine animals.

[20] **3** · The characters of animals, as has been observed, differ in respect to timidity, to gentleness, to courage, to tameness, to intelligence, and to stupidity.

The sheep is said to be dull and stupid. Of all quadrupeds it is the most foolish: it will saunter away to lonely places with no object in view; often in stormy weather [25] it will stray from shelter; if it be overtaken by a snowstorm, it will stand still unless the shepherd sets it in motion; it will stay behind and perish unless the shepherd brings up the rams; it will then follow home.

If you<sup>2</sup> catch hold of a goat's beard at the extremity—the beard is of a [30] substance resembling hair—all the companion goats will stand stock still, staring at this particular goat in a kind of dumbfounderment.

You will have a warmer bed in amongst the goats than among the sheep, because the goats will be quieter and will creep up towards you; for the goat is more impatient of cold than the sheep.

Shepherds train sheep to close in together at a clap of their hands, for if, when a thunderstorm come on, a ewe stays behind without closing in, it will miscarry if it [611<sup>a</sup>1] be with young; consequently if a sudden clap or noise is made, they close in together within the sheepfold by reason of their training.

Even bulls, when they are roaming by themselves apart from the herd, are killed by wild animals.

Sheep and goats lie crowded together, kin by kin. As soon as the sun turns, the [5] herdsmen say that goats lie no longer face to face, but back to back.

**4** · Cattle at pasture keep together in their accustomed herds, and if one animal strays away the rest will follow; consequently if the herdsmen lose one particular animal, they at once look out for all the rest.

[10] When mares pasture together in the same field, if one dies the others will take up the rearing of the colt. In point of fact, the mare appears to be singularly prone by nature to maternal fondness; in proof whereof a barren mare will steal the foal from its dam, will tend it with



all the solicitude of a mother, but, as it will be unprovided with mother's milk, its solicitude will prove fatal to its charge.

5 · Among wild quadrupeds the hind appears to be pre-eminently intelligent; [15] for example, in its habit of bringing forth its young on the sides of public roads, where the fear of man forbids the approach of wild animals. Again, after parturition, it first swallows the afterbirth, then goes in quest of the seseli shrub, and after eating of it returns to its young. The mother takes its young to her lair, so [20] leading it to know its place of refuge; this lair is a precipitous rock, with only one approach, and there it is said to hold its own against all comers. The male when it gets fat, which it does in a high degree in autumn, disappears, abandoning its usual resorts, apparently under an idea that its fatness facilitates its capture. They shed [25] their horns in places difficult of access or discovery, whence the proverbial expression of 'the place where the stag sheds his horns'; the fact being that, as having parted with their weapons, they take care not to be seen. The saying is that no man has ever seen the animal's left horn; for the creature keeps it out of sight because it possesses some medicinal property. [30]

In their first year stags grow no horns, but only an excrescence indicating where horns will be, this excrescence being short and thick. In their second year they grow their horns for the first time, straight in shape, like pegs and on this account they are called pegs. In the third year the antlers are bifurcate; in the fourth year they are rougher; and so they go on increasing in complexity until the creature is six years old: after this they grow their horns without any differentiation, so that [611<sup>b1</sup>] you cannot by observation of them tell the animal's age. But the patriarchs of the herd may be told chiefly by two signs; in the first place they have few teeth or none at all, and, in the second place, they have ceased to grow the pointed tips to their antlers. The forward-pointing tips of the growing horns with which the animal meets attack, are termed its 'defenders'; with these the patriarchs are unprovided, [5] and their antlers merely grow straight upwards. Stags shed their horns annually, in the month of Thargelion; after shedding, they conceal themselves, it is said, during [10] the daytime, and, to avoid the flies, hide in thick copses; during this time, until they have grown their horns, they feed at night-time. The horns at first grow in a kind of skin envelope, and get rough by degrees; when they reach their full size the animal basks in the sun, to mature and dry them. When they need no longer rub them [15] against

tree-trunks they quit their hiding-places, from a sense of security based upon the possession of defensive weapons. An Achaeine stag has been caught with a quantity of green ivy grown over its horns, it having grown apparently, as on fresh green wood, when the horns were young and tender. When a stag is stung by a [20] venom-spider or similar insect, it gathers crabs and eats them; it is said to be a good thing for man to drink the juice, but the taste is disagreeable. The hinds after parturition at once swallow the afterbirth, and it is impossible to secure it, for the hind catches it before it falls to the ground: now this substance is supposed to have [25] medicinal properties. When hunted the creatures are caught by singing or pipe-playing on the part of the hunters; they are so pleased with the music that they lie down on the grass. If there be two hunters, one before their eyes sings or plays the pipe, the other keeps out of sight and shoots, at a signal given by the confederate. If [30] the animal has its ears cocked, it can hear well and you cannot escape its ken; if its ears are down, you can.

6 · When bears are running away from their pursuers they push their cubs in front of them, or take them up and carry them; when they are being overtaken they climb up a tree. When emerging from their winter-den, they at once take to eating [612<sup>a</sup>1] cuckoo-pint, as has been said, and chew sticks of wood as though they were cutting teeth.

Many other quadrupeds help themselves in clever ways. Wild goats in Crete are said, when wounded by arrows, to go in search of dittany, which is supposed to [5] have the property of ejecting arrows in the body. Dogs, when they are ill, eat some kind of grass and produce vomiting. The panther, after eating panther's-bane, tries to find some human excrement, which is said to heal its pain. This panther's-bane [10] kills lions as well. Hunters hang up excrement in a vessel attached to the boughs of a tree, to keep the animal from straying to any distance; the animal meets its end in leaping up to the branch and trying to get at the medicine. They say that the panther has found out that wild animals are fond of the scent it emits; that, when it [15] goes a-hunting, it hides itself; that the other animals come nearer and nearer, and that by this stratagem it can catch even stags.

The Egyptian ichneumon, when it sees the serpent called the asp, does not attack it until it has called in other ichneumons to help; to meet the blows and bites of their enemy the assailants beplaster themselves with mud, by first soaking in the [20] river and then rolling on the

ground.

When the crocodile yawns, the trochilus flies into his mouth and cleans his teeth. The trochilus gets his food thereby, and the crocodile, perceiving that it is being benefitted, does not harm it; but, when it wants it to go, it shakes its neck, lest it should bite the bird.

[25] The tortoise, when it has partaken of a viper, eats marjoram; this action has been actually observed. A man saw a tortoise perform this operation over and over again, and every time it plucked up some marjoram go back to the viper; he thereupon pulled the marjoram up by the roots, and the consequence was the tortoise died. The weasel, when it fights with a snake, first eats wild rue, the smell of [30] which is noxious to the snake. The dragon, when it eats fruit, swallows endive-juice; it has been seen in the act. Dogs, when they suffer from worms, eat the standing corn. Storks, and all other birds, when they get a wound fighting, apply marjoram to the place injured.

Many have seen the locust, when fighting with the snake, get a tight hold of the [612<sup>b</sup>1] snake by the neck. The weasel has a clever way of getting the better of birds; it tears their throats open, as wolves do with sheep. Weasels fight desperately with mice-catching snakes, as they both prey on the same animal.

In regard to the perception of hedgehogs, it has been observed in many places [5] that, when the wind is shifting from north to south, and from south to north, they shift the outlook of their earth-holes, and those that are kept in domestication shift over from one wall to the other. The story goes that a man in Byzantium got into high repute for foretelling a change of weather, all owing to his having noticed this habit of the hedgehog.

The marten is about as large as the smaller breed of Maltese dogs. In the [10] thickness of its fur, in its look, in the white of its belly, and in its love of mischief, it resembles the weasel; it is easily tamed; from its liking for honey it is a plague to bee-hives; it preys on birds like the cat. Its genital organ, as has been said, consists [15] of bone: the organ of the male is supposed to be a cure for strangury; doctors scrape it into powder, and administer it in that form.

7 · In a general way in the lives of animals many resemblances to human life may be observed. Acute intelligence will be seen more in small creatures than in [20] large ones, as is exemplified in the case of birds by the nest-building of the swallow. In the same way as men do, the

bird mixes mud and chaff together; if it runs short of mud, it souses its body in water and rolls about in the dust with wet feathers; furthermore, just as man does, it makes a bed of straw, putting hard material below [25] for a foundation, and adapting all to suit its own size. Both parents co-operate in the rearing of the young; each of the parents will detect, with practised eye, the young one that has had a helping, and will take care it is not helped twice over; at first the parents will rid the nest of excrement, but, when the young are grown, they will [30] teach their young to shift their position and let their excrement fall over the side of the nest.

Pigeons exhibit other phenomena of a similar kind. In pairing the same male and the same female keep together; and the union is only broken by the death of one of the two parties. At the time of parturition in the female the sympathetic attentions of the male are extraordinary; if the female is afraid on account of the [613<sup>a</sup>1] impending parturition to enter the nest, the male will beat her and force her to come in. When the young are born, he will take and masticate pieces of salty earth, will open the beaks of the fledglings, and inject these pieces, thus preparing them betimes to take food. When the male bird is about to expel the young ones from the [5] nest, he cohabits with them all. As a general rule these birds show this conjugal fidelity, but occasionally a female will cohabit with other than her mate. These birds are combative, and quarrel with one another, and enter each other's nests, though this occurs but seldom; at a distance from their nests this quarrelsomeness is [10] less marked, but in the close neighbourhood of their nests they will fight desperately. A peculiarity common to the pigeon, the ring-dove and the turtle-dove is that they do not lean the head back when they are in the act of drinking, but only when they have fully quenched their thirst. The turtle-dove and the ring-dove both have but one mate, and let no other come nigh; both sexes co-operate in the process [15] of incubation. It is difficult to distinguish between the sexes except by an examination of their interiors. Ring-doves are long-lived; cases have been known where such birds were twenty-five years old, thirty years old, and in some cases [20] forty. As they grow old their claws increase in size, and pigeon-fanciers cut the claws; as far as one can see, the birds suffer no other perceptible disfigurement by their increase in age. Turtle-doves and pigeons that are blinded by fanciers for use as decoys live for eight years. Partridges live for about fifteen years. Ring-doves and [25] turtle-doves always build their nests in the same place year after year. The male, as a general rule, is more long-lived than the female; but in the case of pigeons some assert

that the male dies before the female, taking their inference from the statements of persons who keep decoy-birds in captivity. Some declare that the male [30] sparrow lives only for a year, pointing to the fact that early in spring the male sparrow has no black beard, but has one later on, as though the black-bearded birds of the last year had all died out; they also say that the females are the longer lived, on the grounds that they are caught in amongst the young birds and that their age is [613<sup>b1</sup>] rendered manifest by the hardness about their beaks. Turtle-doves in summer live in cold places, and in warm places during the winter; chaffinches affect warm habitations in summer, and cold ones in winter.

[5] **8** · Birds of a heavy build, such as quails, partridges, and the like, build no nests; indeed, where they are incapable of flight, it would be of no use if they could do so. After scraping a hole on a level piece of ground—and it is only in such a place [10] that they lay their eggs—they cover it over with thorns and sticks for security against hawks and eagles, and there lay their eggs and hatch them; after the hatching is over, they at once lead the young out from the nest, as they are not able [15] to fly afield for food for them. Quails and partridges, like domestic hens, when they go to rest, gather their brood under their wings. They do not hatch and lay in the same place so that no-one may notice the spot from their sitting a long time in it. When a man comes by chance upon a young brood, and tries to catch them, the hen-bird rolls in front of the hunter, pretending to be palsied; the man every moment thinks he is on the point of catching her, and so she draws him on and on, [20] until every one of her brood has had time to escape; hereupon she returns to the nest and calls the young back. The partridge lays not less than ten eggs, and often lays as many as sixteen. As has been observed, the bird has mischievous and deceitful habits. In the spring-time, a noisy scrimmage takes place, out of which the [25] male-birds emerge each with a hen. Owing to the lecherous nature of the bird, and from a dislike to the hen sitting, the males, if they find any eggs, roll them over and over until they break them in pieces; to provide against this the female goes to a distance and lays the eggs, and often, under the stress of parturition, lays them in [30] any chance spot that offers; if the male bird is near at hand,<sup>3</sup> then to keep the eggs intact she refrains from visiting them. If she is seen by a man, then, just as with her fledged brood, she entices him away from the eggs by showing herself close at his feet until she has drawn him to a distance. When the females have run away and [614<sup>a1</sup>] taken to sitting, the males in a pack take to screaming and fighting; when thus engaged, they have

the nickname of 'widowers'. The bird who is beaten follows his victor, and submits to be covered by him only; and the beaten bird is covered by a second one or by any other, only clandestinely without the victor's knowledge; this is so, not at all times, but at a particular season of the year, and with quails as well as [5] with partridges. A similar proceeding takes place occasionally with domestic cocks: for in temples, where cocks are set apart as offerings without hens, they all as a matter of course tread any new-comer. Tame partridges tread wild birds, peck at their heads,<sup>4</sup> and treat them badly. The leader of the wild birds, with a counter-note [10] of challenge, pushes forward to attack the decoy-bird, and after he has been netted, another advances with a similar note. This is what is done if the decoy be a male; but if it be a female that is the decoy and gives the note, and the leader of the wild birds gives a counter one, the rest of the males set upon him and chase him away from the [15] female for making advances to her instead of to them; in consequence of this the male often advances without uttering any cry, so that no other may hear him and come and give him battle; and experienced fowlers assert that sometimes the male bird, when he approaches the female, makes her keep silence, to avoid having to give battle to other males who might have heard him. The partridge has not only the note [20] here referred to, but also a thin shrill cry and other notes. Often the hen-bird rises from off her brood when she sees the male showing attentions to the female decoy; she will give the counter-note and remain still, so as to be trodden by him and divert [25] him from the decoy. The quail and the partridge are so intent upon sexual union that they often come right in the way of the decoy-birds, and not seldom alight upon their heads. So much for the sexual proclivities of the partridge, for the way in which it is hunted, and the general wicked habits of the bird. [30]

As has been said, quails and partridges build their nests upon the ground, and so also do some of the birds that are capable of flight<sup>5</sup>. Further, for instance, of such birds, the lark and the woodcock, as well as the quail, do not perch on a branch, but squat upon the ground.

9 · The woodpecker does not squat on the ground, but pecks at the bark of trees to drive out from under it maggots and gnats; when they emerge, it licks them [614<sup>b</sup>1] up with its tongue, which is large and flat. It can run up and down a tree in any way, even with the head downwards, like the gecko-lizard. For secure hold upon a tree, its claws are better adapted than those of the daw; it makes its way by sticking

these [5] claws into the bark. One species of woodpecker is smaller than a blackbird, and has small reddish speckles; a second species is larger than the blackbird, and a third is not much smaller than a domestic hen. It builds a nest on trees, as has been said, on [10] olive trees amongst others. It feeds on the maggots and ants that are under the bark: it is so eager in the search for maggots that it is said sometimes to hollow a tree out to its downfall. A woodpecker once, in course of domestication, was seen to insert an almond into a hole in a piece of timber, so that it might remain steady under its [15] pecking; at the third peck it split the shell of the fruit, and then ate the kernel.

**10** · Many indications of intelligence are given by cranes. They will fly to a [20] great distance and high up in the air, to command an extensive view; if they see clouds and signs of bad weather they fly down again and remain still. They, furthermore, have a leader in their flight, and patrols that scream on the confines of the flock so as to be heard by all. When they settle down, the main body go to sleep with their heads under their wing, standing first on one leg and then on the other, [25] while their leader, with his head uncovered, keeps a sharp look out, and when he sees anything of importance signals it with a cry.

Pelicans that live beside rivers swallow the large smooth mussel-shells: after cooking them inside the crop that precedes the stomach, they spit them out, so that, [30] now when their shells are open, they may pick the flesh out and eat it.

**11** · Of wild birds, the nests are fashioned to meet the exigencies of existence and ensure the security of the young. Some of these birds are fond of their young and take great care of them, others are quite the reverse; some are clever in procuring subsistence, others are not so. Some of these birds build in ravines and [615<sup>a</sup>1] clefts, and on cliffs, as, for instance, the so-called stone-curlew; this bird is in no way noteworthy for plumage or voice; it makes an appearance at night, but in the daytime keeps out of sight.

The hawk also builds in inaccessible places. Although a carnivore, it will never [5] eat the heart of any bird it catches; this has been observed in the case of the quail, the thrush, and other birds. They modify their method of hunting, for in summer they do not grab their prey as they do at other seasons.

Of the vulture, it is said that no one has ever seen either its young or its nest; on [10] this account Herodorus, the father of Bryson the sophist, says that it belongs to some distant and elevated land—giving as his reason this, and also the fact that many of them suddenly appear without anyone knowing where from. The reason is that the bird has its nest on inaccessible crags, and is found only in a few localities. The female lays one egg as a rule, and two at the most.

[15] Some birds live on mountains or in forests, as the hoopoe and the brenthus; this latter bird finds his food with ease and has a musical voice. The wren lives in brakes and crevices; it is difficult to capture, keeps out of sight, is gentle of disposition, finds its food with ease, and is something of a mechanic. It goes by the nickname of ‘old man’ or ‘king’; and the story goes that for this reason the eagle is at war with him.

[20] **12** · Some birds live on the sea-shore, as the wagtail; the bird is of a mischievous nature, hard to capture, but when caught capable of complete domestication; it is a cripple, as being weak in its hinder quarters.

Web-footed birds without exception live near the sea or rivers or pools, as they [25] naturally resort to places adapted to their structure. Several birds, however, with cloven toes live near pools or marshes, as, for instance, the anthus lives by the side of rivers; the plumage of this bird is pretty, and it finds its food with ease. The catarrhactes lives near the sea; when it makes a dive, it will keep under water for as long as it would take a man to walk a furlong; it is smaller than the common hawk. [30] Swans are web-footed, and live near pools and marshes; they find their food with ease, are good-tempered, are fond of their young, and live to a green old age. If the eagle attacks them they will repel the attack and get the better of their assailant, [615<sup>b</sup>1] but they are never the first to attack. They are musical, and sing chiefly at the approach of death; at this time they fly out to sea, and men, when sailing past the coast of Libya, have fallen in with many of them out at sea singing in mournful strains, and have actually seen some of them dying. [5]

The cymindis is seldom seen, as it lives on mountains; it is black in colour, and about the size of the hawk called the ‘dove-killer’; it is long and slender in form. The Ionians call the bird by this name; Homer in the *Iliad* mentions it in the [10] line:<sup>6</sup>—

*Chalcis* its name with those of heav’nly birth,  
But called *Cymindis* by the sons of earth.



The hybris, said by some to be the same as the eagle-owl, is never seen by daylight, as it is dim-sighted, but during the night it hunts like the eared owl; it will fight the eared owl with such desperation that the two combatants are often captured alive by shepherds; it lays two eggs, and it too builds on rocks and in [15] caverns. Cranes also fight so desperately among themselves as to be caught when fighting, for they will not leave off; the crane too lays two eggs.

**13** · The jay has a great variety of notes: indeed, one might almost say it had [20] a different note for every day in the year. It lays about nine eggs; builds its nest on trees, out of hair and tags of wool; when acorns are getting scarce, it lays up a store of them in hiding.

It is a common story of the stork that the old birds are fed by their young. Some tell a similar story of the bee-eater, and declare that the parents are fed by their [25] young not only when growing old, but at an early period, as soon as the young are capable of feeding them; and the parent-birds stay inside the nest. The under part of the bird's wing is pale yellow; the upper part is dark blue, like that of the kingfisher; the tips of the wings are red. About autumn-time it lays six or seven eggs, in [30] overhanging banks where the soil is soft; there it burrows into the ground to a depth of six feet.

The greenfinch, so called from the colour of its belly, is as large as a lark; it lays four or five eggs, builds its nest out of the plant called comfrey, pulling it up by the [616<sup>a</sup>1] roots, and makes an under-mattress to lie on of hair and wool. The blackbird and the jay build their nests after the same fashion and construct the inside of them from those stuffs. The nest of the penduline tit shows great mechanical skill; it has [5] the appearance of a ball of flax, and the hole for entry is very small.

People who live where the bird comes from say that there exists a cinnamon bird which brings the cinnamon from some unknown localities, and builds its nest [10] out of it; it builds on high trees on the slender top branches. They say that the inhabitants attach leaden weights to the tips of their arrows and therewith bring down the nests, and from the debris collect the cinnamon sticks.

[15] **14** · The kingfisher is not much larger than the sparrow. Its colour is dark blue, green, and light purple; the whole body and wings, and the parts about the neck, show these colours in a mixed way, without

any colour being sharply defined; [20] the beak is light green, long and slender: such, then, is the look of the bird. Its nest is like sea-balls, i.e. the things that go by the name of sea-foam, only the colour is not the same. The colour of the nest is light red, and the shape is that of the long-necked gourd. The nests are larger than the largest sponge, though they vary in size; they [25] are roofed over, and great part of them is solid and great part hollow. If you use a sharp knife it is not easy to cut the nest through; but if you cut it, and at the same time bruise it with your hand, it will soon crumble to pieces, like sea-foam. The opening is small, just enough for a tiny entrance, so that even if the nest capsizes the [30] sea does not enter in; the hollow channels are like those in sponges. It is not known for certain of what material the nest is constructed; it is possibly made of the backbones of the gar-fish; for the bird lives on fish. It also ascends fresh-water streams. It lays generally about five eggs, and lays eggs all its life long, beginning to do so at the age of four months.

[616<sup>b1</sup>] **15** · The hoopoe usually constructs its nest out of human excrement. It changes its appearance in summer and in winter, as in fact do the great majority of wild birds. (The titmouse is said to lay a very large quantity of eggs: next to the [5] Libyan ostrich the blackheaded tit is said by some to lay the largest number of eggs; seventeen eggs have been seen; it lays, however, more than twenty; it is said always to lay an odd number. Like others we have mentioned, it builds in trees; it feeds on grubs.) A peculiarity of this bird and of the nightingale is that the outer extremity of the tongue is not sharp-pointed.

[10] The aegithus finds its food with ease, has many young, and walks with a limp. The golden oriole is apt at learning, is clever at making a living, but is awkward in flight and has an ugly plumage.

**16** · The reed-warbler makes its living as easily as any other bird, sits in summer in a shady spot facing the wind, in winter in a sunny and sheltered place [15] among reeds in a marsh; it is small in size, with a pleasant note. The so-called chatterer has a pleasant note, beautiful plumage, makes a living cleverly, and is graceful in form; it appears to be alien to our country; at all events it is seldom seen at a distance from its own immediate home.

**17** · The crane is quarrelsome, clever at making a living, but in other

ways [20] an unlucky bird. The bird called sitta is quarrelsome, but clever and tidy, makes its living with ease, and for its wide learning is called the wizard;<sup>7</sup> it has a numerous brood, of which it is fond, and lives by pecking the bark of trees. The aegolius-owl flies by night, is seldom seen by day; it too lives on cliffs or in caverns; it feeds on two [25] kinds of food; it has a strong hold on life and is full of resource. The tree-creeper is a little bird, of fearless disposition; it lives among trees, feeds on grubs, makes a living with ease, and has a clear note. The acanthis finds its food with difficulty; its [30] plumage is poor, but its note is musical.

18 · Of the herons, the ashen-coloured one, as has been said, unites with the female not without pain; it is full of resource, carries its food with it, is eager in the quest of it, and works by day; its plumage is poor, and its excrement is always wet. Of the other two species—for there are three in all—the white heron has handsome [617<sup>a</sup>1] plumage, unites without harm to itself with the female, builds a nest and lays its eggs neatly in trees; it frequents marshes and lakes and plains and meadow land. The speckled heron, which is nicknamed ‘the skulker’, is said in stories to be of [5] servile origin, and, as its nickname implies, it is the laziest bird of the three species. Such are the habits of herons. The bird that is called the poynx has this peculiarity, that it is more prone than any other bird to peck at the eyes; it is at war with the harpe, as the two birds live on the same food. [10]

19 · There are two kinds of owls; the one is black, and is found everywhere, the other is quite white, about the same size as the other, and with the same cry. This latter is found on Cyllene in Arcadia, and is found nowhere else. The blue-thrush is like the black owl, only a little smaller; it lives on cliffs or on tile [15] roofings; it has not a red beak as the black owl has.

20 · Of thrushes there are three species. One is the missel-thrush; it feeds only on mistletoe and resin; it is about the size of the jay. A second kind is the [20] song-thrush; it has a sharp pipe, and is about the size of the owl. There is another species called the illas; it is the smallest species of the three, and is less variegated in plumage than the others.

**21** · There is a bird that lives on rocks, called the blue-bird. It is comparatively common in Nisyros, and lives in rocky places. It is somewhat smaller than the owzel and a little bigger than the chaffinch. It has large claws, and climbs [25] on the face of the rocks. It is steel-blue all over; its beak is long and slender; its legs are short, like those of the woodpecker.

**22** · The oriole is yellow all over; it is not visible during winter, but puts in an appearance about the time of the summer solstice, and departs again at the rising of [30] Arcturus; it is the size of the turtle-dove. The so-called soft-head always settles on one and the same branch, where it falls a prey to the bird-catcher. Its head is big, [617<sup>b</sup>1] and composed of gristle; it is a little smaller than the thrush; its mouth is strong, small, and round; it is ashen-coloured all over; is fleet of foot, but slow of wing. The bird-catcher usually catches it by help of the owl. [5]

**23** · There is also the pardalus. As a rule, it is seen in flocks and not singly; it is ashen-coloured all over, and about the size of the birds last described; it is fleet of foot and strong of wing, and its pipe is loud and high-pitched. The collyrion feeds on [10] the same food as the owzel; is of the same size as the above-mentioned birds; and is trapped usually in the winter. All these birds are found at all times.<sup>8</sup> Further, there are the birds that live as a rule in towns, the raven and the crow. These also are visible at all seasons, never shift their place of abode, and never go into winter [15] quarters.

**24** · Of daws there are three species. One is the chough; it is as large as the crow, but has a red beak. There is another, called the 'wolf'; and further there is the little daw, called the 'railer'. There is another kind of daw found in Lydia and Phrygia, which is web-footed.

[20] **25** · Of larks there are two kinds. One lives on the ground and has a crest on its head; the other is gregarious, and not sporadic like the first; it is, however, of the same coloured plumage, but is smaller, and has no crest; it is an article of human food.

26 · The woodcock is caught with nets in gardens. It is about the size of a [25] domestic hen; it has a long beak, and in plumage is like the francolin-partridge. It runs quickly, and is pretty easily domesticated. The starling is speckled; it is of the same size as the owsel.

27 · Of the Egyptian ibis there are two kinds, the white and the black. The white ones are found all over Egypt, excepting in Pelusium; the black ones are found [30] in Pelusium, and nowhere else in Egypt.

28 · Of the little horned owls there are two kinds, and one is visible at all seasons, and for that reason has the nickname of ‘all-the-year-round owl’; it is not [618<sup>a</sup>1] sufficiently palatable to come to table; another species makes its appearance sometimes in the autumn, is seen for a single day or at the most for two days, and is regarded as a table delicacy; it scarcely differs from the first species save only in [5] being fatter; it has no note, but the other species has. With regard to their origin, nothing is known from ocular observation; the only fact known for certain is that they are first seen when a west wind is blowing.

29 · The cuckoo, as has been said elsewhere, makes no nest, but deposits its eggs in an alien nest, generally in the nest of the ring-dove, or on the ground in the [10] nest of the hypolais or lark, or on a tree in the nest of the green linnet. It lays only one egg and does not hatch it itself, but the mother-bird in whose nest it has deposited it hatches and rears it; and, as they say, this mother bird, when the young cuckoo has grown big, thrusts her own brood out of the nest and lets them perish; others say that this mother-bird kills her own brood and gives them to the alien to [15] devour, despising her own young owing to the beauty of the cuckoo. Eyewitnesses agree in telling most of these stories, but are not in agreement as to the destruction of the young. Some say that the cuckoo itself comes and devours the brood of the [20] rearing mother; others say that the young cuckoo from its superior size snaps up the food brought before the smaller brood have a chance, and that in consequence the smaller brood die of hunger; others say that, by its superior strength, it actually kills the other ones whilst it is being reared up with them. The cuckoo shows great [25] sagacity in the disposal of its progeny; the fact is, the mother-cuckoo is quite conscious of her own cowardice and of the fact that she could never help her young one in an emergency, and so, for the security of the

young one, she makes of him a supposititious child in an alien nest. The truth is, this bird is pre-eminent in the way of cowardice; it allows itself to be pecked at by little birds, and flies away from their [30] attacks.

**30** · It has already been stated that the footless bird, which some term the cypselus, resembles the swallow; indeed, it is not easy to distinguish between the two birds, excepting in the fact that the cypselus has feathers on the shank. These birds rear their young in long cells made of mud, and furnished with a hole just big [618<sup>b</sup>1] enough for entry; they build under cover of some roofing—under a rock or in a cavern—for protection against animals and men.

The so-called goat-sucker lives on mountains; it is a little larger than the owsel, and less than the cuckoo; it lays two eggs, or three at the most, and is of a sluggish [5] disposition. It flies up to the she-goat and sucks its milk, from which habit it derives its name; it is said that, after it has sucked the teat of the animal, the teat dries up and the animal goes blind. It is dim-sighted in the day-time, but sees well enough by night.

**31** · In districts where the food would be insufficient for more birds than [10] two, ravens are only found in isolated pairs; when their young are old enough to fly, the parent couple first eject them from the nest, and by and by chase them from the neighbourhood. The raven lays four or five eggs. About the time when the mercenaries under Medius were slaughtered at Pharsalus, the districts about Athens and the Peloponnese were left destitute of ravens, from which it would [15] appear that these birds have some means of intercommunicating with one another.

**32** · Of eagles there are several species. One of them, called ‘the white-tailed eagle’, is found on plains, in groves, and in the neighbourhood of cities; some call it [20] the ‘fawn-killer’. It is bold enough to fly to mountains and the interior of forests. The other eagles seldom visit groves or plains. There is another species called the ‘plangus’; it ranks second in point of size and strength; it lives in mountain combs and glens, and by marshy lakes, and goes by the name of ‘duck-killer’ and [25] ‘swart-eagle’. It is mentioned by Homer in his account of the visit made by Priam to the tent of Achilles.<sup>9</sup> There is another species with black plumage, the smallest but boldest of all the kinds. It dwells on mountains or in forests, and is called ‘the black-eagle’ or ‘the hare-killer’;

it is the only eagle that rears its young thoroughly and takes them out with it. It is swift of flight, is neat and tidy in its habits, without [30] jealousy, fearless, quarrelsome; it is also silent, for it neither whimpers nor screams. There is another species, the percnopterus, very large, with white head, very short wings, long tail-feathers, in appearance like a vulture. It goes by the name of 'mountain-stork' or 'half-eagle'. It lives in groves; has all the bad qualities of the [619<sup>a</sup>1] other species, and none of the good ones; for it lets itself be chased and caught by the raven and the other birds. It is clumsy in its movements, has difficulty in procuring its food, preys on dead animals, is always hungry, and at all times whining and screaming. There is another species, called the 'sea-eagle'. This bird has a large [5] thick neck, curved wings, and broad tail-feathers; it lives near the sea, grasps its prey with its talons, and often, from inability to carry it, tumbles down into the water. There is another species called the 'true-bred'; people say that these are the only true-bred birds to be found, that all other birds—eagles, hawks, and the [10] smallest birds—are all spoilt by the interbreeding of different species. The true-bred eagle is the largest of all eagles; it is larger than the phene; is half as large again as the ordinary eagle, and has yellow plumage; it is seldom seen, as is the case [15] with the so-called cymindis. The time for an eagle to be on the wing in search of prey is from midday to evening; in the morning until the market-hour it remains on the nest. In old age the upper beak of the eagle grows gradually longer and more crooked, and the bird dies eventually of starvation; there is a story that the eagle is [20] thus punished because it once was a man and refused entertainment to a stranger. The eagle puts aside its superfluous food for its young; for owing to the difficulty in procuring food day by day, it at times may come back to the nest with nothing. If it catch a man prowling about in the neighbourhood of its nest, it will strike him with [25] its wings and scratch him with its talons. The nest is built not on low ground but on an elevated spot, generally on an inaccessible ledge of a cliff; it does, however, build upon a tree. The young are fed until they can fly; hereupon the parent-birds topple them out of the nest, and chase them completely out of the locality. The fact is that [30] a pair of eagles demands an extensive space for its maintenance, and consequently cannot allow other birds to quarter themselves in close neighbourhood. They do not hunt in the vicinity of their nest, but go to a great distance to find their prey. When the eagle has captured a beast, it tries its weight without attempting to carry it off at once; if on trial it finds the burden too heavy, it will leave it. When it has spied a [619<sup>b</sup>1] hare, it does not swoop on it

at once, but lets it go on into the open ground; neither does it descend to the ground at one swoop, but goes gradually down from higher flights to lower and lower: these devices it adopts by way of security against the stratagem of the hunter. It alights on high places by reason of the difficulty it [5] experiences in soaring up from the level ground; it flies high in the air to have the more extensive view; hence it is said to be the only bird that resembles the gods. Birds of prey, as a rule, seldom alight upon rock, as the crookedness of their talons prevents a stable footing on hard stone. The eagle hunts hares, fawns, foxes, and in [10] general all such animals as he can master with ease. It is a long-lived bird, and this fact might be inferred from the length of time during which the same nest is maintained in its place.

**33** · In Scythia there is found a bird as large as the great bustard. The female lays two eggs, but does not hatch them, but hides them in the skin of a hare or fox and leaves them there, and, when it is not in quest of prey, it keeps a watch on [15] them on a high tree; if any man tries to climb the tree, it fights and strikes him with its wing, just as eagles do.

**34** · The owl and the night-raven and all the birds that see poorly in the daytime seek their prey in the night, but not all the night through, but at evening [20] and dawn. Their food consists of mice, lizards, chafers and the like little creatures. The so-called phene is fond of its young, provides its food with ease, fetches food to its nest, and is of a kindly disposition. It rears its own young and those of the eagle as [25] well; for when the eagle ejects its young from the nest, this bird catches them and feeds them. For the eagle ejects the young birds prematurely, before they are able to feed themselves, or to fly. It appears to do so from jealousy; for it is by nature jealous, and is so ravenous as to grab furiously at its food; and when it does grab at [30] its food, it grabs it in large morsels. It is accordingly jealous of the young birds as they approach maturity, since they are getting good appetites, and so it scratches them with its talons. The young birds fight also with one another, to secure a morsel of food or a comfortable position, whereupon the mother-bird beats them and ejects them from the nest; the young ones scream at this treatment, and the phene hearing them catches them as they fall. The phene has a film over its eyes and sees badly, [620\*1] but the sea-eagle is very keen-sighted, and before its young are fledged tries to make them stare at the sun, and beats the one that refuses to do so, and twists him back in the sun's



direction; and if one of them gets watery eyes in the process, it kills him, [5] and rears the other. It lives near the sea, and feeds, as has been said, on sea-birds; when in pursuit of them it catches them one by one, watching the moment when the bird rises to the surface from its dive. When a sea-bird, emerging from the water, sees the sea-eagle, he in terror dives under, intending to rise again elsewhere; the [10] eagle, however, owing to its keenness of vision, keeps flying after him until he either drowns the bird or catches him on the surface. The eagle never attacks these birds when they are in a swarm, for they keep him off by raising a shower of water-drops with their wings.

**35** · The cepphus is caught by means of sea-foam; the bird snaps at the foam, and consequently fishermen catch it by sluicing with showers of sea-water. These birds grow to be plump and fat; their flesh has a good odour, excepting the [15] hinder quarters, which smell of shore-weed.

**36** · Of hawks, the strongest is the buzzard; the next in point of courage is the merlin; and the circus ranks third; other diverse kinds are the asterias, the pigeon-hawk, and the pternis; the broader-winged hawk is called the half-buzzard; [20] others go by the name of hobby-hawk, or sparrow-hawk, or marsh-hawk, or 'toad-catcher'. Birds of this latter species find their food with very little difficulty, and flutter along the ground. Some say that there are ten species of hawks, all differing from one another. One hawk, they say, will strike and grab the pigeon as it [25] rests on the ground, but never touch it while it is in flight; another hawk attacks the pigeon when it is perched upon a tree or any elevation, but never touches it when it is on the ground or on the wing; other hawks attack their prey only when it is on the wing and do not touch it when it is on the ground or perching anywhere else. They [30] say that pigeons can distinguish the various species: so that, when a hawk is an assailant, if it be one that attacks its prey when the prey is on the wing, the pigeon will sit still; if it be one that attacks sitting prey, the pigeon will rise up and fly away.

In Thrace, in the district sometimes called that of Cedriopolis, men hunt for little birds in the marshes with the aid of hawks. The men with sticks in their hands [620<sup>b</sup>1] go beating at the reeds and brushwood to frighten the birds out, and the hawks show themselves overhead and pursue them down. In fear, they fly down to the ground again, where the men strike them with their sticks and capture them. They give a portion

of their booty to the hawks; that is, they throw some of the birds up in the [5] air, and the hawks catch them.

In the neighbourhood of Lake Maeotis, it is said, wolves act in concert with the fishermen, and if the fishermen decline to share with them, they tear their nets in pieces as they lie drying on the shore.

### 37 · So much for the habits of birds.

[10] In marine creatures, also, one may observe many ingenious devices adapted to the circumstances of their lives. For the accounts commonly given of the so-called fishing-frog are quite true; as are also those given of the torpedo. The fishing-frog hunts little fish with a set of filaments that project in front of its eyes; they are long [15] and thin like hairs, and are round at the tips; they lie on either side, and are used as baits. Accordingly, when the animal stirs up a place full of sand and mud and conceals itself therein, it raises the filaments, and, when the little fish strike against them, it draws them in underneath into its mouth. The torpedo narcotizes the [20] creatures that it wants to catch, overpowering them by the power of shock<sup>10</sup> that is resident in its body, and feeds upon them; it also hides in the sand and mud, and catches all the creatures that swim in its way and come under its narcotizing influence. This phenomenon has been actually observed in operation. The sting-ray also conceals itself, but not exactly in the same way. That the creatures get their [25] living by this means is obvious from the fact that, whereas they are peculiarly slow, they are often caught with mullets in their interior, the swiftest of fishes. Furthermore, the fishing-frog is unusually thin when he is caught after losing the tips of his filaments, and the torpedo is known to cause a numbness even in human beings. Again, the hake, the ray, the flat-fish, and the angel-fish burrow in the sand, [30] and after concealing themselves angle with the filaments on their mouths, that fishermen call their fishing-rods, and the little creatures on which they feed swim up to the filaments taking them for bits of sea-weed, such as they feed upon.

Wherever an anthias-fish is seen, there will be no dangerous creatures in the vicinity, and sponge-divers will dive in security, and they call these 'holy-fish'. It is a sort of coincidence, like the fact that wherever snails are present you may be sure there is neither pig nor partridge in the neighbourhood; for both pig and partridge [621<sup>a</sup>1] eat up the snails.

The sea-serpent resembles the conger in colour and shape, but is of lesser bulk and more rapid in its movements. If it is caught<sup>11</sup> and thrown

away, it will bore a hole with its snout and burrow rapidly in the sand; its snout is sharper than that of [5] ordinary serpents. The so-called sea-scolopendra, after swallowing the hook, turns itself inside out until it ejects it, and then it again turns itself outside in. The sea-scolopendra, like the land-scolopendra, will come to a savoury bait; the creature [10] does not bite with its teeth, but stings by contact with its entire body like the so-called sea-nettle. The so-called fox-shark, when it finds it has swallowed the hook, tries to get rid of it as the scolopendra does: it runs up the fishing-line, and bites it off short; it is caught in some districts in deep and rapid waters, with [15] night-lines.

The bonitos swarm together when they espy a dangerous creature, and the largest of them swim round it, and if it touches one of the shoal they try to repel it; they have strong teeth. Amongst other fish, a lamia-shark, after falling in amongst [20] a shoal, has been seen to be covered with wounds.

Of river-fish, the male of the sheat-fish is remarkably attentive to the young. The female after parturition goes away; the male stays and keeps on guard where the spawn is most abundant, contenting himself with keeping off all other little fishes that might steal the spawn, and this he does for forty or fifty days, until the [25] young are sufficiently grown to make away from the other fishes for themselves. The fishermen can tell where he is on guard; for, in warding off the little fishes, he makes a rush in the water and gives utterance to a kind of muttering noise. He is so earnest in the performance of his parental duties that the fishermen at times, if the [30] eggs be attached to the roots of water-plants deep in the water, drag them into as shallow a place as possible; the male fish will still keep by the eggs, and, if it is young, will be caught by the hook when snapping at the little fish that come by; if, however, he be sensible by experience of the danger of the hook, he will still keep by [621<sup>b</sup>1] his charge, and with his extremely strong teeth will bite the hook in pieces.

All fishes, both those that wander about and those that are stationary, occupy the districts where they were born or very similar places, for their natural food is found there. Carnivorous fish wander most; and all fish are carnivorous with the [5] exception of a few, such as the mullet, the saupe, the red mullet, and the chalcis. The so-called pholis gives out a mucous discharge, which envelops the creature in a [10] kind of nest. Of shell-fish, and fish that have no feet, the scallop moves with greatest force and to the greatest distance, impelled along by some internal energy; the murex, and others that resemble it, move hardly at all. Out of the lagoon of Pyrrha all the fishes swim in winter-time, except the sea-gudgeon; they

swim out owing to the cold, for the narrow waters are colder than the outer sea, and on the return of [15] the early summer they all swim back again. In the lagoon no scarus is found, nor thritta, nor any other species of the spiny fish, no spotted dogfish, no spiny dogfish, no crayfish, no octopus either of the common or the musky kinds, and certain other fish are also absent; but of fish that are found in the lagoon the white gudgeon is not [20] a marine fish. Of fishes the oviparous are in their prime in the early summer until the spawning time; the viviparous in the autumn, as is also the case with the mullet, the red mullet, and all such fish. All the fishes of the outer sea or of the lagoon bring forth their eggs or young in the lagoon; sexual union takes place in the autumn, and [25] parturition in the spring. With the selachia, the males and females swarm together in the autumn for the sake of sexual union; in the spring they come swimming in, and keep apart until after parturition; the two sexes are often taken linked together in sexual union.

Of cephalopods, the cuttlefish is the most cunning, and is the only species that [30] employs its dark liquid for the sake of concealment as well as from fear: the octopus and calamary make the discharge solely from fear. These creatures never discharge the pigment in its entirety; and after a discharge the pigment accumulates again. The cuttlefish, as has been said, often uses its colouring pigment for concealment; it [622<sup>a</sup>1] shows itself in front of the pigment and then retreats back into it; it also hunts with its long tentacles not only little fishes, but often even mullets. The octopus is a stupid creature, for it will approach a man's hand if it be lowered in the water; but it [5] is thrifty in its habits: that is, it lays up stores in its nest, and, after eating up all that is eatable, it ejects the shells and sheaths of crabs and shell-fish, and the skeletons of little fishes. It seeks its prey by so changing its colour as to render it like the colour [10] of the stones adjacent to it; it does so also when alarmed. By some the cuttlefish is said to perform the same trick; that is, they say it can change its colour so as to make it resemble the colour of its habitat. The only fish that can do this is the angel-fish, that is, it can change its colour like the octopus. The octopus as a rule does not live [15] the year out. It has a natural tendency to run off its liquid; for, if kneaded, it keeps losing substance and at last disappears. The female after parturition is peculiarly subject to this: it becomes stupid; if tossed about by waves, it submits impassively; a man, if he dived, could catch it with the hand; it gets covered over with slime, and [20] makes no effort to catch its wonted prey. The male becomes leathery and clammy. As a proof that they do not live into a second year there is the fact that, after the birth of the little

octopuses in the late summer or beginning of autumn, it is seldom that a large-sized octopus is visible, whereas a little before this time of year the [25] creature is at its largest. After the eggs are laid, they say that both the male and the female grow so old and feeble that they are preyed upon by little fish, and with ease dragged from their holes; and that this could not have been done previously; they say also that this is not the case with the small and young octopus, but that the [30] young creature is much stronger than the grown-up one. Neither does the cuttlefish live into a second year. The octopus is the only cephalopod that ventures on to dry land; it walks on rough ground and avoids what is smooth; it is firm all over when you squeeze it, excepting in the neck. So much for the cephalopods.<sup>12</sup> [622<sup>b</sup>1]

It is also said that they make a thin rough shell about them like a hard sheath, and that this is made larger as the animal grows larger, and that it comes out of the sheath as though out of a den or dwelling-place.

The nautilus is an octopus, but one peculiar both in its nature and its habits. It [5] rises up from deep water and swims on the surface; it rises with its shell down-turned in order that it may rise the more easily and swim with it empty, but after reaching the surface it shifts the position of the shell. In between its tentacles it [10] has a certain amount of web-growth, resembling the substance between the toes of web-footed birds; only that with these latter the substance is thick, while with the nautilus it is thin and like a spider's web. It uses this structure, when a breeze is blowing, for a sail, and lets down two of its feelers alongside as rudder-oars. If it be frightened, it fills its shell with water and sinks. With regard to the mode of [15] generation and the growth of the shell knowledge from observation is not yet satisfactory; it does not appear to be produced by copulation, but to grow like other shell-fish; neither is it ascertained for certain whether the animal can live when stripped of the shell.

**38** · Of all insects, one may almost say of all living creatures, the most [20] industrious are the ant, the bee, the hornet, the wasp, and in point of fact all creatures akin to these; of spiders some are more skilful and more resourceful than others. The way in which ants work is open to ordinary observation; how they all march one after the other when they are engaged in putting away and storing up [25] their food; all this may be seen, for they carry on their work even during bright moonlight nights.

**39** · Of spiders and phalangia there are many species. Of the

venomous phalangia there are two; one that resembles the so-called wolf-spider, small, speckled, and tapering to a point; it moves with leaps, and is nicknamed 'the flea'; [30] the other kind is large, black in colour, with long front legs; it is heavy in its movements, walks slowly, is not very strong, and never leaps. (Of all the other species wherewith druggists supply themselves, some give a weak bite, and others [623<sup>a</sup>1] never bite at all. There is another kind, comprising the so-called wolf-spiders.) Of these spiders the small one weaves no web, and the large weaves a rude and poorly built one on the ground or on dry stone walls. It always builds its web over hollow places inside of which it keeps a watch on the end-threads, until some creature gets [5] into the web and begins to struggle, when out the spider pounces. The speckled kind makes a little shabby web under trees.

There is a third species of this animal, pre-eminently clever and artistic. It first weaves a thread stretching to all the exterior ends of the future web; then from the [10] centre, which it hits upon with some accuracy, it stretches the warp; on the warp it puts what corresponds to the woof, and then weaves the whole together. It sleeps and stores its food away from the centre, but it is at the centre that it keeps watch for its prey. Then, when any creature touches the web and the centre is set in [15] motion, it first ties and wraps the creature round with threads until it renders it helpless, then lifts it and carries it off, and, if it happens to be hungry, sucks out the life-juices—for that is the way it feeds; but, if it be not hungry, it first mends any damage done and then hastens again to its quest of prey. If something comes meanwhile into the net, the spider at first makes for the centre, and then goes back [20] to its entangled prey as from a fixed starting-point. If any one injures a portion of the web, it recommences weaving at sunrise or at sunset, because it is chiefly at these periods that creatures are caught in the web. It is the female that does the weaving and the hunting, but the male takes a share of the booty captured.

[25] Of the skilful spiders, weaving a substantial web, there are two kinds, the larger and the smaller. The one has long legs and keeps watch while swinging downwards from the web, so that its prey may not be frightened off, but may strike upon the web's upper surface (because of its size, the spider cannot easily hide itself); the less awkwardly formed one lies in wait on the top, using a little hole for a [30] lurking-place. Spiders can spin webs from the time of their birth, not from their interior as an excretion, as Democritus avers, but off their body as a kind of tree-bark, like the creatures that shoot out with their hair, as for instance the

porcupine. The creature can attack animals larger than itself, and enwrap them [623<sup>b</sup>1] with its threads: it will attack a small lizard, run round and draw threads about its body until it closes the mouth up; then it comes up and bites it.

[5] **40** · So much for the spider. Of insects, there is a genus that has no one name, though all are akin to one another in form; it consists of all the insects that construct a honeycomb: to wit, the bee, and all the insects that resemble it in form. There are nine varieties, of which six are gregarious—the bee, the king-bee, the [10] drone-bee, the annual wasp, and, furthermore, the hornet, and the groundwasp; three are solitary—the smaller siren, of a dun colour, the larger siren, black and speckled, and the third, the largest of all, that is called the humble-bee. Now ants never go a-hunting, but gather up what is ready to hand; the spider makes nothing, [15] and lays up no store, but simply goes a-hunting for its food; while the bee—for we shall by and by treat of the other eight varieties—does not go a-hunting, but makes its food and stores it away, for honey is the bee's food. This fact is shown by the bee-keepers' attempt to remove the combs; for the bees, when they are fumigated, [20] and are suffering great distress from the smoke, then devour the honey most ravenously, whereas at other times they are never observed to be so greedy, but apparently are thrifty and disposed to lay by for their future sustenance. They have also another food which is called bee-bread; this is scarcer than honey and has a [25] sweet fig-like taste; this they carry as they do the wax on their legs.

Very remarkable diversity is observed in their methods of working and their general habits. When the hive has been delivered to them clean, they build their waxen cells, bringing in the juice of flowers<sup>13</sup> and the 'tears' of trees, such as willows and elms and such others as are particularly given to the exudation of gum. With [30] this material they besmear the ground-work, to provide against attacks of other creatures; the bee-keepers call this stuff 'stop-wax'.<sup>14</sup> They also narrow by side-building the entrances to the hive if they are too wide. They first build cells for themselves; then for the so-called kings and the drones; for themselves they are always building, for the kings only when the brood of young is numerous, and cells [624<sup>a</sup>1] for the drones they build if a superabundance of honey should suggest their doing so. They build the royal cells next to their own, and they are of small bulk; the drones' cells they build near by, and these latter are less in bulk than the bees' cells.

They begin building the combs downwards from the top of the hive, and go down [5] and down building many combs connected together until they reach the bottom. The cells, both those for the honey and those also for the grubs, are double-doored; for two cells are ranged about a single base, one pointing one way and one the other, after the manner of a double goblet. The cells that lie at the commencement of the [10] combs and are attached to the hives, to the extent of two or three concentric circular rows, are small and devoid of honey; the cells that are well filled with honey are most thoroughly smeared with wax. At the entry to the hive the aperture of the doorway is smeared with mitys; this substance is a deep black, and is a sort of residual by-product of wax; it has a pungent odour, and is a cure for bruises and [15] suppurating sores. The greasy stuff that comes next is pitch-wax; it has a less pungent odour and is less medicinal than the mitys. Some say that the drones construct combs by themselves in the same hive and in the same comb that they [20] share with the bees; but that they make no honey, but subsist, they and their grubs also, on the honey made by the bees. The drones, as a rule, keep inside the hive; when they go out of doors, they soar up in the air in a stream, whirling round and round in a kind of gymnastic exercise; when this is over, they come inside the hive [25] and feast themselves. The kings never quit the hive, except in conjunction with the entire swarm, either for food or for any other reason. They say that, if a swarm goes astray,<sup>15</sup> it will turn back upon its route and by the aid of scent seek out its leader. It is said that if he is unable to fly he is carried by the swarm, and that if he dies the [30] swarm perishes; and that, if this swarm outlives the king for a while and constructs combs, no honey is produced and the bees soon die out. Bees scramble up the stalks of flowers and rapidly gather the bees-wax with their front legs; the front legs wipe it off on to the middle legs, and these pass it on to the hollow curves of the hind-legs; [624<sup>b</sup>1] when thus laden, they fly away home, and one may see plainly that their load is a heavy one. On each expedition the bee does not fly from a flower of one kind to a flower of another, but flies from one violet, say, to another violet, and never meddles [5] with another flower until it has got back to the hive; on reaching the hive they throw off their load, and each bee on his return is accompanied by three or four companions. One cannot well tell what is the substance they gather, nor the exact [10] process of their work. Their mode of gathering wax has been observed on olive-trees, as owing to the thickness of the leaves the bees remain stationary for a considerable while. After this work is over, they attend to the grubs. There is nothing to prevent grubs, honey, and



drones being all found in one and the same comb. As long as the leader is alive, the drones are said to be produced apart by themselves; if he be no [15] longer living, they are said to be reared by the bees in their own cells, and under the circumstances to become more spirited: for this reason they are called 'sting-drones', not that they really have stings, but that they have the wish, without the power, to use such weapons. The cells for the drones are larger than the others; [20] sometimes the bees construct cells for the drones apart, but usually they put them in amongst their own; and when this is the case the bee-keepers cut the drone-cells out of the combs. There are several species of bees, as has been said; two of 'kings', the better kind red, the other black and variegated, and twice as big as the working-bee. [25] The best working-bee is small, round, and speckled: another kind is long and like a hornet; another kind is what is called the robber-bee, black and flat-bellied; then there is the drone, the largest of all, but devoid of sting, and lazy. There is a difference between the progeny of bees that inhabit cultivated land and of those [30] from the mountains: the forest-bees are more shaggy, smaller, more industrious and more fierce. Working-bees make their combs all even, with the surface covering quite smooth. Each comb is of one kind only: that is, it contains either honey only, or grubs only, or drones only; if it happen, however, that they make in one and the same comb all these kinds of cells, each separate kind will be built in a continuous [625<sup>a</sup>1] row right through.<sup>16</sup> The long bees build uneven combs, with the lids of the cells protuberant, like those of the hornet; grubs and everything else have no fixed places, but are put anywhere; from these bees come inferior kings, a large quantity of [5] drones, and the so-called robber-bee; they produce either no honey at all, or honey in very small quantities. Bees brood over the combs and so mature them; if they fail to do so, the combs are said to go bad and to get covered with a sort of spider's web. If they can keep brooding over the part undamaged, the damaged part simply eats itself away; if they cannot so brood, the entire comb perishes; in the damaged combs [10] small grubs are engendered, which take on wings and fly away. When the combs keep settling down, the bees restore the level surface, and put props underneath the combs to give themselves free passage-room; for if such free passage be lacking they cannot brood, and the cobwebs come on. When the robber-bee and the drone [15] appear, not only do they do no work themselves, but they actually damage the work of the other bees; if they are caught in the act, they are killed by the working-bees. These bees also kill without mercy most of their kings, and especially kings of the inferior sort; and this they do for fear a multiplicity

of kings should lead to a dismemberment of the hive. They kill them especially when the hive is deficient in [20] grubs, and a swarm is not likely to take place; under these circumstances they destroy the cells of the kings if they have been prepared, on the ground that these kings are always ready to lead out swarms. They destroy also the combs of the drones if a failure in the honey supply be threatening and the hive runs short of provisions; under such circumstances they fight desperately with all who try to take their honey, and eject from the hive all the resident drones; and oftentimes the [25] drones are to be seen sitting apart in the hive. The little bees fight vigorously with the long kind, and try to banish them from the hives; if they succeed, the hive will be unusually productive, but if the bigger bees get left masters of the field they pass the time in idleness, and do no good at all but die out before the autumn. Whenever the [30] working-bees kill an enemy they try to do so out of doors; and whenever one dies indoors, they carry it out of doors also. The so-called robber-bees spoil their own combs, and, if they can do so unnoticed, enter the combs of other bees; if they are [625<sup>b</sup>1] caught in the act they are put to death. It is no easy task for them to escape detection, for there are sentinels on guard at every entry; and, even if they do escape detection on entering, afterwards from a surfeit of food they cannot fly, but go rolling about in front of the hive, so that their chances of escape are small indeed. [5] The kings are never themselves seen outside the hive except with a swarm in flight: during which time all the other bees cluster around them. When the flight of a swarm is imminent, a monotonous and quite peculiar sound is heard for several days, and for two or three days in advance a few bees are seen flying round the hive; [10] it has never as yet been ascertained, owing to the difficulty of the observation, whether or no the king is among these. When they have swarmed, they fly away and separate off to each of the kings; if a small swarm happens to settle near to a large one, it will shift to join this large one, and if the king whom they have abandoned [15] follows them, they put him to death. So much for the quitting of the hive and the swarm-flight. Separate detachments of bees are told off for diverse operations; that is, some carry flower-produce, others carry water, others smooth and arrange the combs. A bee carries water when it is rearing grubs. No bee ever settles on the flesh [20] of any creature, or ever eats animal food. They have no fixed date for commencing work; but when their provender is forthcoming and they are in comfortable trim, and by preference in summer, they set to work, and when the weather is fine they work incessantly. The bee, when quite young and in fact only

three days old, after [25] shedding its chrysalis-case, begins to work if it be well fed. When a swarm is settling, some bees detach themselves in search of food and return back to the swarm. In hives that are in good condition the production of young bees is discontinued only for the forty days that follow the winter solstice. When the grubs are grown, the bees put food beside them and cover them with a coating of wax; and, [30] as soon as the grub is strong enough, he of his own accord breaks the lid and comes out. Creatures that make their appearance in hives and spoil the combs the working-bees clear out, but the other bees from sheer laziness look with indifference on damage done to their produce. When the bee-keepers take out the combs, they [626<sup>a</sup>1] leave enough food behind for winter use; if it be sufficient in quantity, the occupants of the hive will survive; if it be insufficient, then, if the weather be rough, they die on the spot, but if it be fair, they fly away and desert the hive. They feed on honey [5] summer and winter; but they store up another article of food resembling wax in hardness, which by some is called bee-bread. Their worst enemies are wasps and the birds named titmice, and furthermore the swallow and the bee-eater. The frogs in the marsh also catch them if they come in their way by the water-side, and for this [10] reason bee-keepers chase the frogs from the ponds from which the bees take water; they destroy also wasps' nests, and the nests of swallows, in the neighbourhood of the hives, and also the nests of bee-eaters. Bees have fear only of one another. They [15] fight with one another and with wasps. Away from the hive they attack neither their own species nor any other creature, but in the close proximity of the hive they kill whatever they get hold of. Bees that sting die from their inability to extract the sting without at the same time extracting their intestines—but not always, for they often [20] recover, if the person stung takes the trouble to press the sting out; but once it loses its sting the bee must die. They can kill with their stings even large animals; in fact, a horse has been known to have been stung to death by them. The kings are the least disposed to show anger or to inflict a sting. Bees that die are removed from the hive, and in every way the creature is remarkable for its cleanly habits; in point of fact, [25] they often fly away to a distance to void their excrement because it is malodorous; and, as has been said, they are annoyed by all bad smells and by the scent of perfumes, so much so that they sting people that use perfumes. They perish from a number of accidental causes, and when their kings become too numerous and try [30] each to carry away a portion of the swarm. The toad also kills bees; he comes to the doorway of the hive, puffs himself out as he sits on the watch, and

devours the creatures as they come flying out; the bees can in no way retaliate, but the [626<sup>b</sup>1] bee-keeper makes a point of killing him. As for the class of bee that has been spoken of as inferior and as constructing its combs so roughly, some bee-keepers say that it is the young bees that act so from inexperience; and the bees of the current year are termed young. The young bees do not sting as the others do; and it is for this reason [5] that swarms may be safely carried, as it is of young bees that they are composed. When honey runs short they expel the drones, and the bee-keepers supply the bees with figs and sweet-tasting articles of food. The elder bees do the indoor work, and are rough and hairy from staying indoors; the young bees do the outer carrying, and [10] are comparatively smooth. They kill the drones also when in their work they are confined for room; the drones live in the innermost recess of the hive. On one occasion, when a hive was in a poor condition, some of the occupants assailed a foreign hive; proving victorious in a combat they took to carrying off the honey; when the bee-keeper tried to kill them, the other bees came out and tried to beat off [15] the enemy but made no attempt to sting the man. The diseases that chiefly attack prosperous hives are first of all the clerus—this consists in a growth of little grubs on the floor, from which, as they develop, a kind of cobweb grows over the entire hive, and the combs decay; another diseased condition is indicated in a lassitude on the [20] part of the bees and in malodorousness of the hive. Bees feed on thyme; and the white thyme is better than the red. In summer the place for the hive should be cool, and in winter warm. They are very apt to fall sick if the plant they are at work on be mildewed. In a high wind they carry a stone by way of ballast to steady them. If a [25] stream be near at hand, they drink from it and from it only, but before they drink they first deposit their load; if there be not water near at hand, they disgorge their honey as they drink elsewhere, and again make off to work. There are two seasons for making honey, spring and autumn; the spring honey is sweeter, whiter, and in every way better than the autumn honey. Superior honey comes from fresh comb, [30] and from young shoots; the red honey is inferior because of the comb in which it is deposited, just as wine is apt to be spoiled by its cask; consequently, one should have it dried. When the thyme is in flower and the comb is full, the honey does not [627<sup>a</sup>1] harden. The honey that is golden in hue is excellent. White honey does not come from thyme pure and simple; it is good as a salve for sore eyes and wounds. Poor honey always floats on the surface and should be skimmed off; the clear honey rests below. When the floral world is in full bloom, then they make wax; consequently [5]

you must then take the wax out of the hive, for they go to work on new wax at once. The flowers from which they gather honey are as follows: the spindle-tree, the melilot-clover, king's-spear, myrtle, flowering-reed, withy, and broom. When they work at thyme, they mix in water before sealing up the comb. As has been already [10] stated, they all either fly to a distance to discharge their excrement or make the discharge into one single comb. The little bees, as has been said, are more industrious than the big ones; their wings are battered; their colour is black, and they have a burnt-up aspect. Gaudy and showy bees, like gaudy and showy women, [15] are idle. Bees seem to take a pleasure in listening to a rattling noise; and consequently men say that they can muster them into a hive by rattling with crockery or stones; it is uncertain, however, whether or no they can hear the noise at all, and also whether their procedure is due to pleasure or alarm. They expel from the hive all idlers and unthrifths. As has been said, they differentiate their work; [20] some make wax,<sup>17</sup> some make honey, some make bee-bread, some shape and mould combs, some bring water to the cells and mingle it with the honey, some engage in out-of-door work. At early dawn they make no noise, until some one particular bee makes a buzzing noise two or three times and thereby awakes the rest; hereupon [25] they all fly in a body to work. By and by they return and at first are noisy; then the noise gradually decreases, until at last some one bee flies round about, making a buzzing noise, and apparently calling on the others to go to sleep; then all of a sudden there is silence. The hive is known to be in good condition if the noise heard within it is loud, and if the bees make a flutter as they go out and in; for at this time they are constructing brood-cells. They suffer most from hunger when they [30] recommence work after winter. They become somewhat lazy if the bee-keeper, in drawing the honey, leaves behind too much; still one should leave cells numerous in proportion to the population, for the bees work in a spiritless way if too few combs [627<sup>b</sup>1] are left. They become idle also, as being dispirited, if the hive is too big. A hive yields to the bee-keeper six or nine pints of honey; a prosperous hive will yield twelve or fifteen pints, exceptionally good hives eighteen. Sheep and, as has been said, [5] wasps are enemies to the bees. Bee-keepers entrap the latter, by putting a flat dish on the ground with pieces of meat on it; when a number of the wasps settle on it, they cover them with a lid and put the dish and its contents on the fire. It is a good thing to have a few drones in a hive, as their presence increases the industry of the [10] workers. Bees can tell the approach of rough weather or of rain; and the proof is that they will not fly far, but even while it is as yet fine

they go fluttering about within a restricted space, and the bee-keeper knows from this that they are expecting bad weather. When the bees inside the hive hang clustering to one another, it is a sign [15] that the swarm is about to quit; consequently, bee-keepers, on seeing this, besprinkle the hive with sweet wine. It is advisable to plant about the hives pear-trees, beans, Median-grass, Syrian-grass, yellow pulse, myrtle, poppies, creeping-thyme, and almond-trees. Some bee-keepers sprinkle their bees with flour, [20] and can distinguish them from others when they are at work out of doors. If the spring be late, or if there be drought or blight, then grubs are all the fewer in the hives. So much for the habits of bees.

41 · Of wasps, there are two kinds. Of these kinds one is wild and scarce, [25] lives on the mountains, engenders grubs not underground but on oak-trees, is larger, longer, and blacker than the other kind, is invariably speckled and furnished with a sting, and is remarkably courageous. The pain from its sting is more severe than that caused by the others, for the sting is larger, in proportion to its own larger size. These wild wasps live over into a second year, and in winter time, when oaks are in [30] course of felling, they may be seen coming out and flying away. They lie concealed during the winter, and live in the interior of logs of wood. Some of them are mother-wasps and some are workers, as with the tamer kind; and it is by observation of the tame wasps that one may learn the nature of the mothers and the workers. [628<sup>a</sup>1] For in the case of the tame wasps also there are two kinds; one consists of leaders, who are called mothers, and the other of workers. The leaders are far larger and milder-tempered than the others. The workers do not live over into a second year, [5] but all die when winter comes on; and this can be proved, for at the commencement of winter the workers become drowsy, and about the time of the winter solstice they are never seen at all. The leaders, the so-called mothers, are seen all through the [10] winter, and live in holes underground; for men when ploughing or digging in winter have often come upon mother-wasps, but never upon workers. The mode of reproduction of wasps is as follows. At the approach of summer, when the leaders have found a sheltered spot, they take to moulding their combs, and construct the so-called *sphecons*,—little nests containing four cells or thereabouts, and in these [15] are produced working-wasps but not mothers. When these are grown up, then they construct other larger combs upon the first, and then again in like manner others; so that by the close of autumn there are numerous large combs, in which the leader, the

so-called mother, engenders no longer working-wasps but mothers. These [20] develop high up in the nest as large grubs, in cells that occur in groups of four or rather more, pretty much in the same way as the grubs of the king-bees are produced in their cells. After the birth of the working-grubs in the cells, the leaders do nothing and the workers have to supply them with nourishment; and this is clear [25] from the fact that the leaders of the working-wasps no longer fly out at this time, but rest quietly indoors. Whether the leaders of last year after engendering new leaders are killed by the new brood, and whether this occurs invariably or whether they can live for a longer time, has not been ascertained by actual observation; neither can we speak from observation as to the age attained by the mother-wasp or [30] by the wild wasps, or as to any other similar phenomenon. The mother-wasp is broad and heavy, fatter and larger than the ordinary wasp, and from its weight not very strong on the wing; these wasps cannot fly far, and for this reason they always rest inside the nest, building and managing its indoor arrangements. The so-called mother-wasps are found in most of the nests; it is a matter of doubt whether or no [628<sup>b</sup>1] they are provided with stings; in all probability, like the king-bees, they have stings, but never protrude them for offence. Of the ordinary wasps some are destitute of stings, like the drone-bees, and some are provided with them. Those unprovided [5] therewith are smaller and less spirited and never fight, while the others are big and courageous; and these latter, by some, are called males, and the stingless, females. At the approach of winter many of the wasps that have stings appear to lose them; but we have never met an eyewitness of this phenomenon. Wasps are more abundant in times of drought and in wild localities. They live underground, their [10] combs they mould out of rubbish and earth, each comb from a single origin, as if from a root. They feed on certain flowers and fruits, but for the most part on animal food. Some of the tame wasps have been observed when sexually united, but it was [15] not determined whether both, or neither, had stings, or whether one had a sting and the other had not; wild wasps have been seen under similar circumstances, when one was seen to have a sting but the case of the other was left undetermined. The wasp-grub does not appear to come into existence by parturition, for at the outset the grub is too big to be the offspring of a wasp. If you take a wasp by the feet and let [20] him buzz with his wings, wasps that have no stings will fly towards it, and wasps that have stings will not; from which fact it is inferred by some that one set are males and the other females. In the winter, wasps are found in caves, some with stings, and some without. Some build cells, small and

few in number; others build [25] many and large ones. The so-called mothers are caught at the change of season, mostly on elm-trees, while gathering a substance sticky and gumlike. A large number of mother-wasps are found when in the previous year wasps have been numerous and the weather rainy; they are captured in precipitous places, or in [30] vertical clefts in the ground, and they all appear to be furnished with stings.

## 42 · So much for the habits of wasps.

Hornets do not subsist by culling from flowers as bees do, but for the most part on animal food: for this reason they hover about dung; for they chase the large flies, [35] and after catching them lop off their heads and fly away with the rest of the carcasses; they are furthermore fond of sweet fruits. Such is their food. They have [629<sup>a</sup>1] also leaders like bees and wasps; and their leaders are larger in proportion to themselves than are wasp-kings to wasps or bee-kings to bees. The hornet-king, like [5] the wasp-king, lives indoors. Hornets build their nests underground, scraping out the soil like ants; for neither hornets nor wasps go off in swarms as bees do, but successive generations of young keep to the same habitat, and go on enlarging their [10] nest by scraping out more and more of soil. The nest accordingly attains a great size; in fact, from a particularly prosperous nest have been removed three and even four baskets full of combs. They do not, like bees, store up food, but pass the winter in a [15] torpid condition; the greater part of them die in the winter, but it is uncertain whether that can be said of them all. In the hives of bees several kings are found and they lead off detachments in swarms, but in the hornet's nest only one king is found. When individual hornets have strayed from their nest, they cluster on a tree and [20] construct combs, as may be often seen above-ground, and in this nest they produce a king; when the king is full-grown,<sup>18</sup> he leads them away and settles them along with himself in a nest. With regard to their sexual unions, and the method of their reproduction, nothing is known from actual observation. Among bees both the [25] drones and the kings are stingless, and so are certain wasps, as has been said; but hornets appear to be all furnished with stings: though it would well be worth while to carry out investigation as to whether the hornet-king has a sting or not.

[30] 43 · Bumble-bees produce their young under a stone, right on the ground, in a couple of cells or little more; in these cells is found an



attempt at honey, of a poor description. The tenthredon is like the hornet, but speckled, and about as broad as a bee. Being epicures as to their food, they fly, one at a time, into kitchens and on to slices of fish and the like dainties. The tenthredon gives birth like the wasp, [629<sup>b</sup>1] underground, and is very prolific; its nest is much bigger and longer than that of the wasp. So much for the methods of working and the habits of life of the bee, the wasp, and all the other similar insects.

[5] **44** · As regards the disposition of animals, as has been previously observed, one may detect great differences in respect to courage and timidity, as also, even among wild animals, in regard to tameness and wildness. The lion, while he is eating, is most ferocious; but when he is not hungry and has had a good meal, he is [10] quite gentle. He is totally devoid of suspicion or nervous fear, is fond of romping with animals that have been reared along with him and to whom he is accustomed, and manifests great affection towards them. In the chase, as long as he is in view, he makes no attempt to run and shows no fear, but even if he be compelled by the [15] multitude of the hunters to retreat, he withdraws deliberately, step by step, every now and then turning his head to regard his pursuers. If, however, he reach wooded cover, then he runs at full speed, until he comes to open ground, when he resumes his leisurely retreat. When, in the open, he is forced by the number of the hunters to run while in full view, he does run at the top of his speed, but without leaping and bounding. This running of his is evenly and continuously kept up like the running of [20] a dog; but when he is in pursuit of his prey and is close behind, he makes a sudden spring upon it. The two statements made regarding him are quite true; the one that he is especially afraid of fire, as Homer pictures him in the line—‘and glowing torches, which, though fierce, he dreads,’<sup>19</sup>—and the other, that he keeps a steady eye upon the hunter who hits him, and flings himself upon him. If a hunter hit him, [25] without hurting him, then if with a bound he gets hold of him, he will do him no harm, not even with his claws, but after shaking him and giving him a fright will let him go again. They invade towns and attack human beings when they are grown old and so by reason of old age and the diseased condition of their teeth are unable to pursue their wonted prey. They live to a good old age. The lion who was captured [30] when lame, had a number of his teeth broken; which fact was regarded by some as a proof of the longevity of lions, as he could hardly have been reduced to this condition except at an advanced age. There are two species of lions, the plump, curly-maned, and the long-

bodied, straight-maned; the latter kind is courageous, and the former comparatively timid; sometimes they run away with their tail between their legs, [630<sup>a</sup>1] like a dog. A lion was once seen to be on the point of attacking a boar, but to run away when the boar stiffened his bristles in defence. It is susceptible of hurt from a wound in the flank, but on any other part of its frame will endure any number of blows, and its head is especially hard. Whenever it inflicts a wound, either by its [5] teeth or its claws, there flows from the wounded parts suppurating matter, quite yellow, and not to be staunched by bandage or sponge; the treatment for such a wound is the same as that for the bite of a dog.

The civet is fond of man's company; it does him no harm and is not much [10] afraid of him, but it is an enemy to the dog and the lion, and consequently is not found in the same habitat with them. The little ones are best. Some say that there are two species of the animal, and some say, three; there are probably not more than three, but, as in the case with certain of the fishes, birds, and quadrupeds, this [15] animal changes in appearance with the change of season. His colour in winter is not the same as it is in summer; in summer the animal is smooth-haired, in winter he is shaggy.

45 · The bison is found in Paeonia on Mount Messapium, which separates Paeonia from Maedica; and the Paeonians call it the *monapos*. It is the size of a [20] bull, but stouter in build than the ox—for it is not long in the body; its skin, stretched tight on a frame, would give sitting room for seven people. In general it resembles the ox in appearance, except that it has a mane that reaches down to the point of the shoulder, as that of the horse; but the hair in its mane is softer than the [25] hair in the horse's mane, and clings more closely. The colour is brown-yellow; the mane reaches down to the eyes, and is deep and thick. The colour of the hair is midway between red and ash-grey, like that of the so-called chestnut horse; it is [30] rough on top, woolly underneath. The animal is not found either very black or very red. It has the bellow of a bull. Its horns are crooked, turned inwards toward each other and useless for purposes of self-defence; they are a span broad, or a little more, and in volume each horn would hold about three pints of liquid; the black colour of the horn is beautiful and bright. The tuft of hair on the forehead reaches down to [630<sup>b</sup>1] the eyes, so that the animal sees objects on either flank better than objects right in front. It has no upper teeth, as is the case also with cattle and all other horned animals. Its legs are hairy; it

is cloven-footed, and the tail, which resembles that of the ox, seems not big enough for the size of its body. It tosses up dust and digs the [5] ground like the bull. Its skin is impervious to blows. Owing to the savour of its flesh it is sought for in the chase. When it is wounded it runs away, and stops only when thoroughly exhausted. It defends itself against an assailant by kicking and [10] projecting its excrement to a distance of eight yards; this device it can easily adopt over and over again, and the excrement is so pungent that the hair of hunting-dogs is burnt off by it. It is only when the animal is disturbed or alarmed that the dung has this property; when the animal is undisturbed it has no blistering effect. So [15] much for the shape and habits of the animal. When the season comes for parturition the mothers give birth to their young in troops upon the mountains. Before dropping their young they scatter their dung about the place, making a kind of circular rampart around them; for the animal has the faculty of ejecting excrement in most extraordinary quantities.

**46** · Of all wild animals the most easily tamed and the gentlest is the [20] elephant. It can be taught a number of things, and it understands them; as, for instance, it can be taught to kneel in presence of the king. It is very sensitive, and possessed of an intelligence superior to that of other animals. When the male has had sexual union with the female, and the female has conceived, the male has no further intercourse with her.

Some say that the elephant lives for two hundred years; others, for one hundred [25] and twenty; that the female lives nearly as long as the male; that they reach their prime about the age of sixty, and that they are sensitive to inclement weather and frost. The elephant is found by the banks of rivers, but he is not a river animal; he can make his way through water, as long as the tip of his trunk can be above the [30] surface, for he blows with his trunk and breathes through it. The animal is a poor swimmer owing to the heavy weight of his body.

**47** · The male camel declines intercourse with its mother; if his keeper tries compulsion, he evinces disinclination. On one occasion, when there was no stallion at hand, the keeper covered over the mother and put her foal to her; but, when after the intercourse<sup>20</sup> the wrapping had been removed, though the operation was [631<sup>a</sup>1] completed, still by and by he bit his keeper to death. A story goes that the king of Scythia had a highly-bred mare, and that all her foals were splendid; that wishing to mate the best of the young males with the mother,<sup>21</sup> he had him brought

to the stall for the purpose; that the young horse declined; that, after the mother's head had [5] been concealed in a wrapper he, in ignorance, had intercourse; and that, when immediately afterwards the wrapper was removed and the head of the mare was rendered visible, the young horse ran away and hurled himself down a precipice.

48 · Among the sea-fishes many stories are told about the dolphin, [10] indicative of his gentle and kindly nature, and of manifestations of passionate attachment to boys, in and about Tarentum, Caria, and other places. The story goes that, after a dolphin had been caught and wounded off the coast of Caria, a shoal of dolphins came into the harbour and stopped there until the fisherman let his captive go free; whereupon the shoal departed. A shoal of young dolphins is always, by way [15] of protection, followed by a large one. On one occasion a shoal of dolphins, large and small, was seen, and certain of them, going at a little distance away, appeared swimming in underneath a little dead dolphin when it was sinking, and supporting it on their backs, trying out of compassion to prevent its being devoured by some other [20] beast. Incredible stories are told regarding the rapidity of movement of this creature. It appears to be the fleetest of all animals, marine and terrestrial, and it can leap over the masts of large vessels. This is chiefly manifested when they are pursuing a fish for food; then, if the fish endeavours to escape, they pursue him in [25] their hunger down to deep waters; but, when the return swim is getting too long, they hold in their breath, as though calculating the length of it, and then draw themselves together and shoot up like arrows, trying to make the long ascent rapidly in order to breathe, and in the effort they spring right over a ship's masts if a ship be [30] in the vicinity. This same phenomenon is observed in divers, when they have plunged into deep water; that is, they pull themselves together and rise with a speed proportional to their strength. Dolphins live together in pairs, male and female. It is [631<sup>b1</sup>] not known for what reason they run themselves aground on dry land; at all events, it is said that they do so at times, and for no reason.

49 · Just as with all animals a change of action follows a change of circumstance, so also a change of [5] character follows a change of action, and often some portions of the physical frame undergo a change, as occurs in the case of birds. Hens, for instance, when they have beaten the cock in a fight, will crow like the cock and endeavour to tread him;

the crest rises up on their head and the tail-feathers on [10] the rump, so that it becomes difficult to recognize that they are hens; in some cases there is a growth of small spurs. On the death of a hen a cock has been seen to undertake the maternal duties, leading the chickens about and providing them with [15] food, and so intent upon these duties as to cease crowing and indulging in his sexual propensities. Some cock-birds are congenitally so feminine that they will submit to other males who attempt to tread them.

50 · Some animals change their form and character, not only at certain ages [20] and at certain seasons, but in consequence of being castrated; and all animals possessed of testicles may be submitted to this operation. Birds have their testicles inside, and oviparous quadrupeds close to the loins; and of viviparous animals that walk some have them inside, and most have them outside, but all have them at the lower end of the belly. Birds are castrated at the rump at the part where the two [25] sexes unite in copulation. If you burn this twice or thrice with hot irons, then, if the bird be full-grown, his crest grows fallow, he ceases to crow, and foregoes sexual activity; but if you cauterize the bird when young, none of these male attributes or propensities will come to him as he grows up. The case is the same with men: if you [30] mutilate them in boyhood, the later-growing hair never comes, and the voice never changes but remains high-pitched; if they be mutilated in early manhood, the late [632<sup>a</sup>1] growths of hair quit them except the growth on the groin, and that diminishes but does not entirely depart. The congenital growths of hair never fall out, for a eunuch [5] never goes bald. In the case of all castrated or mutilated male quadrupeds the voice changes to the feminine voice. All other quadrupeds when castrated, unless the operation be performed when they are young, invariably die; but in the case of boars, and in their case only, the age at which the operation is performed produces no difference. All animals, if operated on when they are young, become bigger and [10] better looking than their un mutilated fellows; if they be mutilated when full-grown, they do not take on any increase of size. If stags be mutilated when, by reason of their age, they have as yet no horns, they never grow horns at all; if they be mutilated when they have horns, the horns remain unchanged in size, and the animal does not lose them. Calves are mutilated when a year old; otherwise, they [15] turn out uglier and smaller. Steers are mutilated in the following way: they turn the animal over on its back, cut a little off the scrotum at the lower end, and squeeze out the testicles, then push

back the roots of them as far as they can, and stop up the [20] incision with hair to give an outlet to suppurating matter; if inflammation ensues, they cauterize the scrotum and put on a plaster. If a full-grown bull be mutilated, he can still apparently generate off-spring. The ovaries of sows are excised with the view of quenching in them sexual appetites and of stimulating fatness. The sow has first to be kept two days without food, and, after being hung up by the hind legs, it is [25] operated on; they cut the lower belly, about the place where the boars have their testicles, for it is there that the ovary grows, adhering to the two divisions of the womb; they cut off a little piece and stitch up the incision. Female camels are mutilated when they are wanted for war purposes, and are mutilated to prevent [30] their being got with young. Some of the inhabitants of the interior have as many as three thousand camels: when they run, they run, in consequence of the length of their stride, much quicker than the horses of Nisaea. As a general rule, mutilated animals grow to a greater length than the un mutilated.

[632<sup>b1</sup>] All animals that ruminate derive profit and pleasure from the process of rumination, as they do from the process of eating. It is the animals that lack the upper teeth that ruminate, such as cattle, sheep, and goats. In the case of wild animals no observation has yet been made, except in the case of animals that are occasionally domesticated, such as the stag, and it chews the cud. All animals that [5] ruminate generally do so when lying down on the ground. They carry on the process to the greatest extent in winter, and stall-fed ruminants carry it on for about seven months in the year; beasts that go in herds, as they get their food out of doors, ruminate to a lesser degree and over a lesser period. Some ambidentates also [10] ruminate; as, for instance, the Pontic mice, and the fish which from the habit is by some called 'the Ruminant', as well as other fish.

Long-limbed animals have loose faeces, and broadchested animals vomit with comparative facility, and these remarks are, in a general way, applicable to quadrupeds, birds, and men.

[15] **49B** · A considerable number of birds change according to season the colour of their plumage and their note; as, for instance, the owzel becomes yellow instead of black, and its note gets altered, for in summer it has a musical note and in winter a discordant chatter. The thrush also changes its colour; about the throat it is marked in winter with speckles, in summer spotted: however, it never alters its note. [20]

The nightingale, when the hills are taking on verdure, sings continually for fifteen days and fifteen nights; afterwards it sings, but not continuously.<sup>22</sup> As summer advances it has a different song, not so varied as before, nor so quick and modulated, but simple; it also changes its colour, and in Italy about this season it goes by [25] a different name. It goes into hiding, and is consequently visible only for a brief period.

The redbreast and the so-called redstart change into one another; the former is a winter bird, the latter a summer one, and the difference between them is [30] practically limited to the coloration of their plumage. In the same way with the beccafico and the blackcap; these change into one another. The beccafico appears about autumn, and the blackcap as soon as autumn has ended. These birds, also, [633<sup>a</sup>1] differ from one another only in colour and note; that it is the same bird is shown by the fact that at the period when the change is in progress each one has been seen with the change as yet incomplete and not yet gone over to the other kind. It is not so [5] very strange that in these cases there is a change in note and in plumage, for even the ring-dove ceases to coo in winter, and recommences cooing when spring comes in; in winter, however, when fine weather has succeeded to very stormy weather, this bird has been known to give its cooing note, to the astonishment of the experts. As a general rule, birds sing most loudly and most diversely in the pairing season. [10] The cuckoo changes its colour, and its note is not<sup>23</sup> clearly heard for a short time previous to its departure. It departs about the rising of the dog-star, and it reappears from springtime to the rising of the dog-star. At the rise of this star the bird called by some oenanthe disappears, and reappears when it is setting: thus [15] keeping clear at one time of cold, and at another time of heat. The hoopoe also changes its colour and appearance, as Aeschylus has represented in the following lines:—

The Hoopoe, witness to his own distress, [20]  
Is clad by Zeus in variable dress:—  
Now a brave mountain-bird, with knightly crest,  
Now in the white hawk's silver plumage drest;  
For, timely changing, on the hawk's white wing  
He greets the apparition of the Spring.  
Thus twofold form and colour are conferred,  
In youth and age, upon the selfsame bird. [25]

The spangled raiment marks his youthful days,  
The argent his maturity displays;  
And when the fields are yellow with ripe corn  
Again his particoloured plumes are worn.  
But evermore, in sullen discontent,  
He seeks the lonely hills, in self-sought banishment.

[30] Of birds, some take a dust-bath, some take a water-bath, and some take neither the one bath nor the other. Birds that do not fly but keep on the ground take [633<sup>b</sup>1] the dust-bath, as for instance the hen, the partridge, the francolin, the lark, the pheasant; some of the straight-taloned birds, such as live on the banks of a river, in marshes, or by the sea, take a water-bath; some birds take both the dust-bath and the water-bath, as for instance the pigeon and the sparrow; of the crooked-taloned [5] birds the greater part take neither. So much for the ways of the above-mentioned,—but some birds have a peculiar habit of making a noise at their hinder quarters, as, for instance, the turtle-dove; and they make a violent movement of their tails at the same time that they produce this sound.



## BOOK X<sup>1</sup>

[10] <sup>1</sup> · As a man and a woman advance in age, they may continue to have intercourse with one another and yet produce no children; the cause of this is to be found sometimes in both partners, sometimes in one only. First, in the case of the female, the state of the womb must be considered so that if the cause lies there the [15] womb may receive treatment, and if it does not attention may be paid to another one of the causes.

Now in the case of any other part, it is plain that<sup>2</sup> it is healthy if it performs its function satisfactorily and gives no pain and is not exhausted after functioning: e.g. an eye is healthy when it does not produce pus and can see and after seeing is not disturbed and incapable of seeing again. Thus the womb too is healthy if it does not [20] cause pain and performs its proper function satisfactorily and after functioning is not incapacitated or exhausted.

It is said that even a womb not in good condition may nevertheless be able to [25] perform its function well and painlessly, if it is not impaired in respect of its function—just as nothing prevents<sup>3</sup> an eye from seeing accurately even when not all its parts are in a good condition or there is a sty in it. Similarly, if a womb is in good condition in its essential region, it will not be harmed with regard to its function.

[634<sup>a1</sup>] Now if the womb is to be in good condition, it must, first of all, not move from place to place but be in a uniform position; but it must be able to move further away without being affected or giving pain, and not be too insensitive to the touch. It is [5] not difficult to decide if this is the case. That the womb should have such a character is clear from the following considerations: if it does not come close enough, it will not be capable of drawing matter up (for the place from which it must receive the matter will be distant from it); but if it remains close and is not capable of receding further away, it will be less responsive because of being [10] continually touched, so that it will not open quickly—something which it must do vigorously and with prompt obedience.

The womb must have these characteristics, and a womb which lacks them requires some form of treatment. In addition, menstruation must occur properly, i.e. at equidistant intervals and not irregularly, and with the body in a healthy state; for when it occurs in this way it indicates that

the womb is well adapted to opening [15] and to receiving fluid from the body whenever the body provides it. When menstruation occurs too frequently or too infrequently or irregularly, and the rest of the body is healthy and does not act as a contributory cause, this condition must be due to the womb: either the womb is unresponsive and so does not open at the proper [20] time and admits only a little fluid, or else it draws in too much because of some inflammation, thus showing that it requires treatment—just like the eyes, the bladder, the stomach, and the rest. For all these parts, when inflamed, draw in the fluid which is naturally secreted in those places, but not in the proper condition or [25] amount. Similarly, when the womb releases too much fluid, that indicates an inflamed condition—if the fluid is similar to but more abundant than what is normal. If it is dissimilar from and more putrid than that which flows in healthy women, then that is quite clearly an affliction; for certain pains will necessarily [30] appear as symptoms when the womb is not in the right condition. (But even in healthy women the ‘whites’ flow in putrid form, in some cases at the start of the menstrual period but usually at its end.) If a woman’s menstrual fluids are more putrid than those of healthy women, or are disorderly—too much or too little—she [35] is in need of treatment; for these conditions are obstacles to reproduction. But if the periods are simply irregular and not equidistant, the condition is less of an impediment, although it indicates that the state of the womb is changing and not always remaining uniform. That condition can harm women who are of good constitution with regard to conception, but it is not a disease; it is the sort of condition which will right itself even without treatment, provided that the woman [634<sup>b</sup>1] herself does not do anything to exacerbate it.

If the menstrual flow changes in frequency or in amount while the rest of the body is not in a constant state but sometimes more moist and sometimes more dry, then the womb is not the cause but is bound itself to follow the state of the body, [5] admitting and releasing its fluids in proportion. If the womb does this when the body is healthy but changing, no treatment is required; and if the body is in poor health, and the womb either releases too little (because the residue is expended elsewhere, where the body ails) or ejects too much (because the body discharges [10] there), then this signifies not that the womb itself requires treatment, but that the body does. For when the menstrual flow changes with the condition of the body, that shows that the cause does not lie in the womb but that the womb remains healthy.

The womb is sometimes weaker, sometimes stronger; it is sometimes

more [15] moist, sometimes more dry. The menstrual flow is greater when the body of the womb is greater, less when it is less, more watery when it is moist, more bloody when it is dry. The flow begins with milky 'whites', which remain odourless; but the rest of [20] it is red, becoming whiter at the end when the flow is just about to cease.<sup>4</sup> The 'whites' then have an odour, but not of putrefaction—it is more acrid and heavy—nor of pus; and there is no decay, though there is a high temperature, when the signs [25] occur in this way. Women in whom menstruation occurs in this fashion have their wombs in the right state for reproduction.

2 · We must first see if these conditions are satisfactorily met, and then consider the condition of the neck of the womb. This must be straight, otherwise the [30] womb will not draw the semen into itself; for women too emit into the region in front of the womb, as is clear when they have complete erotic dreams. For then that part needs treatment, being in a moist state just as if they had been with a man—for the man too emits here, into the same place and not into the inside of the womb. But [35] when emission takes place here, the womb, like a nose, draws it in with the breath. That is why women may conceive while copulating in any of the positions; for in every case<sup>5</sup> the semen is emitted, both by them and by men, into the region in front [40] of the womb, whereas if it were emitted into the womb, they would not conceive after every form of copulation.

But if the womb does not look straight forward, but inclines towards the [635a1] buttocks or the groin or the abdomen, it is impossible to conceive for the aforementioned reason—it could not draw up the semen. If the womb is firmly set in such a position, either by nature or as the result of disease, the condition is incurable; but if there is a rupture, either natural or caused by some disease which [5] has contracted the womb as the result of inflammation, the condition. . .<sup>6</sup>

If a woman is going to become pregnant, the neck of the womb must, as we have said, be straight; and in addition the womb must open properly. By properly I mean that it should be such that when menstruation begins the neck is softer to the [10] touch than before and is not noticeably dilated. But if . . .<sup>7</sup> when it is in this state, the first signs, the 'whites', should show themselves. When the signs are somewhat fleshy in colour, the womb will be noticeably distended without any pain, whether it is touched or not, and it will neither be unresponsive nor have its neck in an unusual [15] condition. When menstruation ceases, the

neck should be very dilated and dry (but not hard) for a full day and a half or even for two days. For when menstruation occurs in this way, it indicates that the womb is in a proper condition and is performing its function, and also, because the neck is not immediately distended but [20] becomes soft, that it relaxes at the same time as the rest of the body, and does not impede but first expels the fluid from the neck itself; but when the body emits a greater amount, it is distended—and that is a mark of a healthy condition of the [25] neck. When the signs have ceased, the womb indicates, by not closing up at once, that . . .<sup>8</sup> it is becoming empty, dry, and parched, and that there is nothing left in the passage.

Thus the womb, having the power to draw up the semen, indicates that it is in a proper condition to conceive during intercourse whenever it is in that state without [30] pain or insensitivity. And it is good that the neck is not in an unusual condition; for this indicates that there is nothing to prevent the womb from closing up when necessary.

**3** · These, then, are the points to observe in order to tell whether or not the neck of the womb is in the right condition. As to the womb itself, it should behave as follows after menstruation: first, the woman should dream that she is with a man and her emissions should come easily, as if she were actually having intercourse— [35] and the more often this happens the better; and when she wakes up she should sometimes need the treatment she requires when she has actually had intercourse with a man, and sometimes be dry. But this dryness should not continue long; but later, after waking, she should grow moist again, sometimes quickly, sometimes more slowly, . . .<sup>9</sup> and the moisture should be of the sort which occurs after she has [635<sup>b</sup>1] had intercourse with a man. For all this indicates that the womb can receive what it is offered, and that the cotyledons can draw up and retain what they receive and will not readily give it up.

Again, wind should be produced without any affliction, as in the stomach, and [5] this should be released, whether in large or small quantity, without disease; for this shows that the womb is not more solid than it should be and that it is not unresponsive, either by nature or by disease, but can make room for the growth of whatever it receives. And<sup>10</sup> it also possesses elasticity. When this does not occur, the [10] womb is either too close-textured or too insensitive, whether by nature or by disease. That is why it cannot nourish the embryo but may actually

destroy it—when the embryo is still small, if the condition is severe, when it is larger if less severe; and if the condition is very mild, offspring are produced in a rather poor state, as though [15] nourished in a poor container.

Again, the right and the left parts of the womb should be level to the touch; and so too with the rest. And during intercourse with a man, the womb should become moist, but not often nor excessively. This affection is a sort of local sweating—just as we often emit saliva at the mouth on the approach of food and when we are [20] talking or working too hard; again, tears fall from our eyes when we look at objects that are too bright, or under the influence of cold or great heat which those organs master when they are somewhat moist.<sup>11</sup> Similarly, the womb too grows moist [25] during its work, when it is in a somewhat moist condition. This occurs even in wombs which are naturally in an excellent state. Hence women always need treatment, in greater or less degree, just as the mouth needs to spit. But in some there is so much moisture that they cannot draw up the man's emission in a pure [30] form, because it is mixed with the moisture from the woman.

In addition to those affections, one should observe what happens when a woman dreams she is having intercourse with a man, and what state she is in when she wakes up—e.g. is she weaker?) is she always so, or<sup>12</sup> sometimes so and [35] sometimes not so? or is she sometimes actually stronger? If not, is the womb drier at first, later growing moist? For this should occur if the woman is fertile. For the exhaustion indicates that the body is continually emitting semen, and the woman who has emissions and . . .<sup>13</sup> is made weaker. That this affection is not accompanied by any disease indicates that the emission occurs naturally and in the right manner. [636<sup>a</sup>1] Otherwise, the weakness would be morbid. If sometimes she becomes stronger, and her womb is dry and then grows moist, that is a sign that her body as a whole is receiving and absorbing, and that it is not the womb only but the body too which is [5] strong. For it is by breath that the womb draws in what comes to it from outside, as we said earlier. For the woman emits not into the womb but at the place where the man's emission also falls. And everything done by the breath is done by strength; hence it is clear that in such women the body too has the power of drawing matter up.

Some women suffer from what is known as wind-pregnancy: that too is [10] something which women should not experience. The affection is of the following sort: when they are with a man, they neither clearly emit the semen nor become pregnant; and so it is called a wind-pregnancy.

The cause of the affection is the womb, when it is too dry. For having drawn the fluid up into itself, it ejects it;<sup>14</sup> but [15] the fluid dries up and, becoming reduced in quantity, it leaves the womb but is not observed to do so because there is little of it. When the womb is severely affected in this way, and becomes excessively dry, it loses the fluid quickly and the woman is quickly seen not to be pregnant. But if it does not do this very quickly, the woman [20] seems to be pregnant during the intervening time until the womb loses whatever it holds in itself. Such women soon experience symptoms similar to those of genuine pregnancy; and if the condition lasts for a long time, the womb expands, so that the woman seems evidently pregnant until the fluid leaves; and then it becomes just as it [25] was before. They ascribe this affection to the supernatural. It can be treated unless the woman is naturally of this sort<sup>15</sup> and suffers severely from the affection. It is an indication that women are<sup>16</sup> of this nature if they plainly do not emit when they have received from the man and yet do not conceive.

4 · The womb is also impeded if it suffers from spasms. Spasms occur either [30] if the womb is distended by inflammation or if in child-birth a large quantity of fluid suddenly collects and the neck does not open—then spasms are caused by the distention. It is an indication that the womb does not suffer from spasms if it clearly [35] is not inflamed when performing its functions; for if it suffered from spasms it would sometimes become inflamed.

Again, if there is a growth on the neck and the neck is severely ulcerated, that impedes conception. It is an indication that this is not so if the womb is seen to open [636<sup>b</sup>1] and close properly during menstruation and sexual intercourse.

Again, in some women the neck is somehow knitted together, sometimes from birth, sometimes as the result of disease. This is in some cases curable, in others not. The condition is not difficult to recognise; for the woman is unable to receive [5] anything of what she should or to emit anything. Hence if she is seen to receive from the man and to emit, it is clear that she does not suffer from the affection.

When a woman is not impeded in any of these ways but is in the condition we have said she should be in, then unless the man is a cause of childlessness or they are capable of having children together but are not in harmony by having their [10] emissions at the same time but differ widely, they will have children.

5 · There are various signs by which you can tell that the man is not responsible; and it is very easy<sup>17</sup> to tell this if he has intercourse with other women and produces children. And it is a sign that they do not keep pace with one another if, although all the conditions described are met, he does not produce children.<sup>18</sup> For [15] it is plain that this alone is the cause; for if the woman too contributes something to the semen and to the process of generation, it is plain that the partners must keep pace with one another. Thus if the man ejaculates quickly and the woman with difficulty (for women are for the most part slower), that prevents conception; and that is why partners who do not produce children with one another *do* produce [20] children when they meet with partners who keep pace with them during intercourse. For if the woman is excited and prepared and has the appropriate thoughts, and the man has previously been pained and has grown cold, they must necessarily then keep pace with one another.

Again, it sometimes happens that women who have had erotic dreams and men [25] who have made love are more vigorous—not in strength but in health. This occurs when a large quantity of semen has gathered at the place from which it is emitted: if it is then ejected, women do not become weaker; for they are not always exhausted after ejection, provided that what remains is sufficient. Nor are they exhausted if [30] what is ejected is useless—indeed,<sup>19</sup> they are actually more at ease, as though relieved of a surplus. That is why they become more vigorous, not through strength but through lightness. (But when an emission detracts from an amount which the body needs, then it makes them weaker. But this is quickly over if the body is otherwise in good health and of an age which quickly produces semen; for semen is [35] something which can grow and which does grow quickly.)<sup>20</sup> And it is then especially that women conceive without realising it; for they do not think that they have conceived if they are not aware of their emission, and they actually suppose that the emissions must occur in both partners, the man and the woman, at the same time. Unnoticed conception occurs especially in women who think that it is impossible to [637<sup>a</sup>1] conceive unless they become dry and the fluid they have received has plainly been absorbed. But it sometimes happens that both the woman and the man emit more than she can absorb and more than enough for conception. Thus when enough is drawn up but a great quantity remains, they conceive without realising it. That such [5] a thing is possible and that conception does not require all the semen is shown by those animals that produce many young from a single act of copulation, and by the generation of twins

when they develop from a single act. For it is clear that generation did not require all the semen, but that the region received a part of it and left a much larger part behind. (Again, if many young are generated by a single act [10] of copulation—something which evidently occurs in the case of pigs, and sometimes with twins—it is clear that the semen does not proceed from the whole body but that it divides up according to each form.) For it is possible for some to be separated off [15] from the whole, and for the whole to be divided into many parts; but<sup>21</sup> it is impossible for it to act as a whole on different parts at the same time.

Again, the woman emits into the area in front of the neck of the womb, where the man too emits when he has intercourse. For from there the womb draws it up with the aid of the breath, as with the mouth or the nostrils. For everything that is [20] not pulled forward by instruments either is light and has a nature such as to travel upwards or else is drawn upwards from that place by breath. That is why women take care that the place is as dry as it was before the act took place.

The path along which the semen passes in women is of the following nature: they possess a tube—like the penis of the male, but inside of the body—and they [25] breathe through this by a small duct which is placed above the place through which women urinate. That is why, when they are eager to make love, this place is not in the same state as it was before they were excited. Now the semen escapes from this tube, and the area in front of the womb is much larger than the path by which the [30] semen escaped into this region. In this respect the part is like a nose; for the nose has a duct leading inside to the larynx and outside to the air: in the same way this place too has a very small and narrow duct outside<sup>22</sup>—just large enough to let the air out—whereas that which leads to the region in front of the womb is broad and open; [35] just as in the nose the passage leading to the air is larger than that leading to the mouth and larynx. Similarly, in women the duct leading to the area in front of the womb is larger and broader than the one leading out.<sup>23</sup>

Whatever is contributed to this place produces the same affections,<sup>24</sup> because [40] the woman too emits generative material. And if the causes are the same the results are the same. For those who think that one thing can be the cause either of disease [637<sup>b</sup>1] or of death do not<sup>25</sup> consider the last factor in the direction of the principles, which they should look to. For in some cases all the primary causes are the same,<sup>26</sup> in some none are, and in others<sup>27</sup> some are the same and some are not. Thus the results [5] follow as they should: in some cases the affections passed through are all the same; in others most are the same, when most causes are the same;



in others a few; and in others none, when none are.<sup>28</sup>

6 · It is clear when animals need to be covered. For they pursue the males—e.g. the domestic hen pursues the cock and squats beneath him if he is not [10] excited. Other animals do this too. So if the same affections are evident in all animals as far as mating goes, it is clear that the same causes are present too. Now female *birds* desire not only to receive but also to emit. An indication of this is the fact that if a male is not about she squats under another female and becomes pregnant and produces a wind-egg, thereby showing that she wants then to emit, [15] and actually emitting—as happens when a man has intercourse with another male. Other animals do this too: a woman once made the test on singing crickets, which she caught while they were still young and then reared—when they had grown they became spontaneously pregnant. From this it is clear that every female contributes [20] something to the semen, if it has been seen to occur in the case of one genus. For a wind-egg differs from a fertile egg only in the fact that it does not generate an animal; and that is because it did not come from both partners. That is why not all male emissions seem to be fertile, but some are infertile, when they are not [25] harmonised in the right way from both partners.

Again, women have erotic dreams, and after the dream they experience the same conditions as when they have been with a man—relaxation and incapacity. Thus it is clear, if they are seen to emit something while dreaming, that they also contribute something then; for after the dream the same region is moist, and they [30] need to give themselves the same treatment as they do when they have been with a man. Thus it is clear that there is an emission of semen from both partners if the semen is going to be fertile.

The womb does not emit into itself, but outside, where the man too emits; and it then draws it from there into itself. How is it, then, that some females generate by [35] themselves, as birds produce wind-eggs, and others do not, e.g. horses and sheep? Is it because birds emit into the womb, there being no external place into which they—or the males—can emit? That is why if no cock is mating with it, the hen spills its semen onto the ground. But in quadrupeds there is another place outside the womb into which both the female and the male emit. What in other creatures is [638<sup>a</sup>1] mixed together with the other fluids and does not take form in the womb, which it does not enter, is in the case of birds received into the womb and concocted by it into a sort of body which is

like an animal in other respects but is not an animal because an animal must proceed from both partners. [5]

7 · We can determine whether those women tell the truth who say that when they have erotic dreams they wake up dry. For it is clear that the womb draws the fluid upwards; so why do females not produce offspring by themselves, since they draw up the male semen too when it is mixed with their own? Why do they not also draw up their own semen unmixed, if it extends into the outer part? ... [10]

. . .<sup>29</sup> to whom this affection occurs during pregnancy.<sup>30</sup> For they give birth to what is called a 'mole': it happened once to a woman who had been with a man and thought she had conceived; the bulk of her womb increased and at first everything else happened in the expected way. But when the time came for the birth, she did not give birth, nor did the bulk become less, but she continued in that state for three [15] or four years, until she fell ill of dysentery and, having been in some danger from it, gave birth to a sizable lump of flesh of the sort they call a mole. In some women this condition persists until they grow old and die. Does this condition come about [20] because of heat, when the womb happens to be hot and dry and therefore apt to draw matter into itself in such a way as to draw anything into itself and conserve it there? For it is when women are in this state and there is no mixture from both partners but, like a wind-egg, matter is received from one only, that the so-called [25] moles occur; and they are neither animals (for they do not come from both partners) nor yet inanimate (for what was received was animate), as in the case of wind-eggs. They remain for a considerable time, both because of the condition of the womb, and because, in the case of birds which produce many eggs in themselves, the womb is distended by them and the eggs are pushed forward and laid; and once the womb [30] is opened the last one comes out too. For there is nothing holding them in; but the body itself, having become prone to emission when it was being filled up, can no longer give the womb the power to hold on to the eggs. In viviparous animals, because their power changes as the embryo grows and they require different food at [35] different times, the womb becomes inflamed and brings about the birth at the appointed time. But the lump of flesh, since it is not an animal, is always uniform; and that is why it does not weigh down the womb or make it inflamed. Hence in some women the affliction lasts until they die, unless some fortunate weakness [638<sup>b</sup>1] strikes them, as it did the woman who was afflicted

with dysentery.

But does the condition occur because of heat, as we said, or rather because of moisture (for the growth is a sort of mucus)?<sup>31</sup> or when the womb is not so cold as to [5] expel it nor yet so hot as to concoct it? That is why the condition lasts so long, just as some things remain boiling for a long time while others boil quickly for a limited period. Wombs of that sort, being very slow<sup>32</sup> take a long time.

Again, since it is not an animal, it does not move and so does not bring on [10] labour; for it is the movement of the ligaments which is labour, and the embryo produces it because it is alive. And the hardness of the thing<sup>33</sup> is the result of parboiling; for it becomes so hard that it cannot be cut with an axe. Now things that are boiled, and all things that are concocted, become soft; but things that have been [15] parboiled are unconcocted and hard.

Many doctors are unaware of this, and call an affliction a mole on the basis of similarity, if they merely see the belly extended without any sign of dropsy and the menstrual flow suspended as the affliction continues. But that is wrong: in fact, the [20] so-called moles occur rarely. Sometimes there is a fluxion of cold, moist and watery residues, sometimes of thicker residues, into the region of the belly, if the region is of such a nature or is in such a condition. For these provide neither pain<sup>34</sup> nor heat [25] because of their coldness; and as they grow, some to a greater extent and some to a less, they do not induce any other disease apart from themselves but remain inactive like a sort of deformity. The failure to menstruate occurs because the residues are being expended here, just as happens in women who are nursing (for they too either do not menstruate at all or do so only a little). Sometimes there is a fluxion from the flesh into the region between the womb and the belly, and that seems to be a mole [30] when in fact it is not. It is not difficult to diagnose a mole, if she touches the womb. For if it is compact and not expanded, it is plain that it does not suffer from the affliction. But if it is in the same condition as when it contains a child, then it will be [35] hot and dry<sup>35</sup> because the fluids have been diverted towards the inside; and the neck will be in the same condition as when they are pregnant. But if the mass is anything else, it will be cold to the touch and not dry and the neck will always be uniform.

<sup>1</sup>The text of the parenthesis is uncertain, and Peck is perhaps right to excise it.

<sup>2</sup>Dittmeyer excises ‘for . . . develops’.

<sup>3</sup>ἄποδες = ‘the footless’; perhaps martins.

<sup>4</sup>Dittmeyer excises this sentence.

<sup>5</sup>Reading ὄνοι for ἄνθρωποι.

<sup>6</sup>Dittmeyer excises ‘and the hare’.

<sup>7</sup>Omitting Dittmeyer’s addition.

<sup>8</sup>Retaining καί.

<sup>9</sup>Retaining θυμικοί.

<sup>10</sup>Reading οἱ ἰκτῖνες.

<sup>11</sup>Dittmeyer excises this sentence.

<sup>12</sup>Dittmeyer excises the bracketed sentences: the text is plainly corrupt.

<sup>13</sup>The last two paragraphs are excised by Dittmeyer.

<sup>14</sup>Peck rightly excises the bracketed sentence.

<sup>15</sup>Reading αἰλούροις for λοφούροις.

<sup>16</sup>Dittmeyer excises ‘It has three cavities . . . with the aorta’.

<sup>17</sup>Omitting Dittmeyer’s addition.

<sup>18</sup>Dittmeyer excises this sentence.

<sup>19</sup>Reading ἔστιν ὅτε.

<sup>20</sup>Dittmeyer excises the description of the martichoras.

<sup>21</sup>Dittmeyer excises the paragraph.

<sup>22</sup>There is a lacuna in the MSS: Dittmeyer suggests adding ‘in others, tapering’.

<sup>23</sup>Dittmeyer excises the whole of ch. 14 up to this point.

<sup>24</sup>Reading τὰ τε ὠτόκα for ἄνθρωπός τε, and excising ἔτι ... τετραπόδων in line 29 (Balme).

<sup>25</sup>Reading ἄνθρωπος (Balme), for ὄφρις καὶ κροκόδειλος.

<sup>26</sup>Reading καρδία ἰδιόν τι.

<sup>27</sup>Dittmeyer excises this paragraph.

<sup>28</sup>Dittmeyer excises this paragraph.

<sup>29</sup>Dittmeyer excises the bracketed sentence.

<sup>30</sup>Reading κατὰ τοῦ στομάχου τὴν θέσιν καὶ σύντρησιν.

<sup>31</sup>Dittmeyer excises this paragraph.

<sup>32</sup>Reading ἐντεροειδῆ.

<sup>33</sup>Reading γαλῆ.

<sup>34</sup>Dittmeyer excises the bird.

<sup>35</sup>Dittmeyer excises this paragraph.

<sup>36</sup>Dittmeyer excises ‘which . . . aorta’.

<sup>37</sup>Transferring κάτωθεν ἀρξαμένη from line 8.

<sup>38</sup>Reading ἔστι for ξ τι.

<sup>39</sup>Reading στενὴ for τείνει.

<sup>40</sup>Retaining καί.

<sup>41</sup>Dittmeyer excises this paragraph.

<sup>42</sup>Reading πόδα, καθάπερ αἱ.

<sup>43</sup>This sentence has been transposed from line 8, where in the MSS it follows ‘left to right’.

<sup>44</sup>*Iliad* XIII 546.

<sup>45</sup>Dittmeyer excises lines 34 (‘. . . and there are other ducts . . .’) to 2 (‘. . . flank.’).

<sup>46</sup>Dittmeyer excises ‘the bladder and also’.

<sup>47</sup>Dittmeyer excises these sentences: see 492<sup>b</sup>23.

<sup>48</sup>Reading ἄνω δὲ τῆς ῥάχεως ἧ περαίνει.

<sup>49</sup>Dittmeyer excises “while a part of the same . . . ankle”.

<sup>50</sup>Omitting αὐτῶν ἐν τοῖς πλατέσι.

<sup>51</sup>Dittmeyer excises ‘and toes that have feet’.

<sup>52</sup>Dittmeyer excises this sentence.

<sup>53</sup>Dittmeyer excises this sentence.

<sup>54</sup>Dittmeyer excises this sentence.

<sup>55</sup>Dittmeyer excises the passage on the effects of water on procreation.

<sup>56</sup>Reading μυστακόκητος.

<sup>57</sup>Dittmeyer excises this clause.

<sup>58</sup>Reading πῦρ ὃ ἐκ τῆς.

<sup>59</sup>See Herodotus III 101.

<sup>60</sup>Reading τοῖς δὲ πτερυγίοις ἄ.

<sup>61</sup>Dittmeyer excises ‘or the *pontilus* . . . octopus’).

<sup>62</sup>Reading συμφυῆς.

<sup>63</sup>Dittmeyer excises.

<sup>64</sup>Dittmeyer excises the parenthetical sentence.

<sup>65</sup>Omitting ἦ

<sup>66</sup>Dittmeyer excises this paragraph.

<sup>67</sup>Reading ἀπὸ τοῦ ... κηρυκώδους.

<sup>68</sup>Dittmeyer excises this paragraph.

<sup>69</sup>Reading ἦ τε κεφαλῇ.

<sup>70</sup>Reading ἀπηθῶν τοῖς ἐπικαλύμμασιν.

<sup>71</sup>Dittmeyer excises this sentence.

<sup>72</sup>Dittmeyer excises.

<sup>73</sup>This sentence is excised by Dittmeyer.

<sup>74</sup>Dittmeyer excises this clause.

<sup>75</sup>Dittmeyer excises.

<sup>76</sup>Reading θαλαττίοις for ἄλλοις.

<sup>77</sup>Excised by Dittmeyer.

<sup>78</sup>Dittmeyer excises this paragraph and the next.

<sup>79</sup>Reading κόγχαις.

<sup>80</sup>Dittmeyer excises ‘and this is a character . . . flesh within’.

<sup>81</sup>Dittmeyer excises.

<sup>82</sup>Reading σῶμα.

<sup>83</sup>Excised by Dittmeyer.

<sup>84</sup>Excised by Dittmeyer.

<sup>85</sup>Excised by Dittmeyer.

<sup>86</sup>Reading καὶ γὰρ ἔχει καὶ ὁσπρησιν.

<sup>87</sup>Omitting Dittmeyer’s ἡ ἄποδαά.

<sup>88</sup>Dittmeyer excises this clause.

<sup>89</sup>Excised by Dittmeyer.

<sup>90</sup>Excised by Dittmeyer.

<sup>91</sup>There is a lacuna in the text at this point.

<sup>92</sup>Reading φρῦνοι for τρυγόνες.

<sup>93</sup>Dittmeyer excises ‘as is also . . . group’.

<sup>94</sup>Omitting ἔξω.

<sup>95</sup>Dittmeyer excises this paragraph.

<sup>96</sup>Dittmeyer excises the lobster and the carid.

<sup>97</sup>Excised by Dittmeyer.

<sup>98</sup>Dittmeyer excises this paragraph.

<sup>99</sup>The text of this sentence is uncertain.

<sup>100</sup>Dittmeyer excises the bracketed sentences.

<sup>101</sup>Dittmeyer excises this sentence.

<sup>102</sup>Dittmeyer excises.

<sup>103</sup>Dittmeyer excises.

<sup>104</sup>Dittmeyer excises.

<sup>105</sup>Dittmeyer excises.

<sup>106</sup>Dittmeyer excises.

<sup>107</sup>Omitting μή.

<sup>108</sup>Reading τοῦ ὧοῦ for τούτου.

<sup>109</sup>Dittmeyer excises this paragraph.

<sup>110</sup>Omitting ἄ.

<sup>111</sup>The text is uncertain.

<sup>112</sup>The three paragraphs from 552<sup>b</sup>5 are excised by Dittmeyer.

<sup>113</sup>Dittmeyer excises the last two paragraphs of this chapter.

<sup>114</sup>Dittmeyer marks a lacuna at this point.

<sup>115</sup>Excised by Dittmeyer.

<sup>116</sup>Dittmeyer excises.

<sup>117</sup>Reading ἐναφίησι δ' ὁ ἄρρην εἰς τὴν θήλειαν, οὐχ ἡ θήλεια εἰς τὸν ἄρρην, ὥσπερ τᾶλλα ἔντομα · ἔχει δ' ἡ θήλεια αἰδοῖον εἰς ὃ ἀφίησιν ὁ ἄρρην.

<sup>118</sup>Reading τὰ ἔντομα.

<sup>119</sup>Reading ἐν πικερύῳ.

<sup>120</sup>Reading διὰ στομάτων, καί...

<sup>121</sup>Reading ἢ οὐκ ἂν ὀχεύσειεν.

<sup>122</sup>Dittmeyer excises.

<sup>123</sup>Dittmeyer excises.

<sup>124</sup>Dittmeyer excises.

<sup>125</sup>Dittmeyer excises.

<sup>126</sup>There is a lacuna in the text here.



<sup>127</sup>Reading τὸν τείνοντα.

<sup>128</sup>Excised by d'Arcy Thompson.

<sup>129</sup>‘Πινόβατος from ῥίνη (angel-fish) and βάτος (ray).

<sup>130</sup>Reading τοῦτο δ' ἐνφαίνεται.

<sup>131</sup>Excised by Dittmeyer.

<sup>132</sup>Excised by Dittmeyer.

<sup>133</sup>Dittmeyer excises this sentence.

<sup>134</sup>Reading ὅμως δὲ καὶ τούτων.

<sup>135</sup>Excised by Dittmeyer.

<sup>136</sup>Excised by Dittmeyer.

<sup>137</sup>Dittmeyer excises this sentence.

<sup>138</sup>Excised by Dittmeyer.

<sup>139</sup>Reading ἀμβλίσκει.

<sup>140</sup>There is a lacuna in the text at this point.

<sup>141</sup>Excised by Dittmeyer.

<sup>142</sup>Omitting μή.

<sup>143</sup>Reading ἀφώριστα.

<sup>144</sup>Excised by Dittmeyer.

<sup>145</sup>See *Iliad* IX 539 and *Odyssey* IX 190.

<sup>146</sup>Reading ἢ μή ἐστίν.

<sup>147</sup>Reading ᾧως.

<sup>148</sup>Reading ἢ ὅσον for οὔ.

<sup>149</sup>The text of this sentence is corrupt.

<sup>150</sup>Reading τρόπων.

<sup>151</sup>Reading τὰ δὲ πλεῖστα γίγνεται ὁλόκληρα.

<sup>152</sup>Reading προσούσης.

<sup>153</sup>Reading διχῶς.

<sup>154</sup>Excised by Dittmeyer.

<sup>155</sup>Dittmeyer excises ‘including . . . resemble it’.

<sup>156</sup>This sentence is transposed from line 21.

<sup>157</sup>Dittmeyer excises this sentence.

<sup>158</sup>Reading πράσον.

<sup>159</sup>Retaining μαλακία.

<sup>160</sup>Retaining τοῖς φέρουσιν.

<sup>161</sup>Excised by Dittmeyer.

<sup>162</sup>Excised by Dittmeyer.

<sup>163</sup>Excised by Dittmeyer.

<sup>164</sup>Excised by Dittmeyer.

<sup>165</sup>Reading ἀσταφίσι τοῦ οἴνου.

<sup>166</sup>Excised by Dittmeyer.

<sup>167</sup>Excised by Dittmeyer.

<sup>168</sup>Excised by Dittmeyer.

<sup>169</sup>Excised by Dittmeyer.

<sup>170</sup>Retaining τοῖς ἀγρίοις—but the text of this sentence is uncertain.

<sup>171</sup>Excised by Dittmeyer.

<sup>172</sup>Reading ἐαρινήν.

<sup>173</sup>Excised by Dittmeyer.

<sup>174</sup>Excised by Dittmeyer.

<sup>175</sup>Reading λευκή γάρ.

<sup>176</sup>Retaining περιελόντες τοὺς λίθους.

<sup>177</sup>Excised by Dittmeyer.

<sup>178</sup>Omitting καὶ κατὰ μόρια τούτων.

<sup>179</sup>Reading μιᾷς.

<sup>180</sup>Reading κἄν παρῇ ὁ ἄρρηγν, ὅπως.

<sup>181</sup>Reading ἐπικορρίζουσι.

<sup>182</sup>Omitting μή.

<sup>183</sup>*lliad* XIV 291.

<sup>184</sup>Reading φαρμακίς.

<sup>185</sup>Reading πάντα διὰ πάντος.

<sup>186</sup>*lliad* XXIV 316.

<sup>187</sup>Reading τῷ τρόμῳ (but the text is doubtful).

<sup>188</sup>Reading ληφθῇ.

<sup>189</sup>Dittmeyer marks a lacuna here.

<sup>190</sup>Reading τὸν χυμὸν τῶν ἀνθέων.

<sup>191</sup>Reading κόμμωσιν.

<sup>192</sup>Retaining ὁ ἄφεσμός

<sup>193</sup>Reading διὰ τέλους.

<sup>194</sup>Reading κηρόν.

<sup>195</sup>Reading ἐπὶ ἀύξηθῇ, ἀπάγει.

<sup>196</sup>*Iliad* XI 553.

<sup>197</sup>Retaining ὁχεύσαντος.

<sup>198</sup>Reading τούτων for τούτον, and rejecting γεννηθέντα.

<sup>199</sup>Reading ταχεῖαν.

<sup>200</sup>Retaining οὐ.

<sup>201</sup>Translated by Jonathan Barnes.

<sup>202</sup>Reading ὅτι for εἰ.

<sup>203</sup>Reading οὐδὲν κωλύει for ἰσχύει.

<sup>204</sup>Retaining καταλήξεως.

<sup>205</sup>Reading πάντως for παντελῶς, and omitting ἡστωσοῦν ἀ ἐχούσης.

<sup>206</sup>Text uncertain.

<sup>207</sup>There appears to be a lacuna in the text at this point.

<sup>208</sup>Text uncertain.

<sup>209</sup>Text uncertain.

<sup>210</sup>Retaining δέ.

<sup>211</sup>Retaining ἥς κρατεῖ.

<sup>212</sup>Reading ἥ for μή.

<sup>213</sup>Text uncertain.

<sup>214</sup>Omitting Dittmeyer's οὐκ.

<sup>215</sup>Omitting Dittmeyer's ἡ.

<sup>216</sup>Omitting μή.

<sup>217</sup>Text uncertain.

<sup>218</sup>Reading γεννῶν for γεννῶσιν.

<sup>219</sup>Reading ἀλλά for αἶμα ἡδέα.

<sup>220</sup>Text uncertain.

<sup>221</sup>Reading αἷ δὲ πᾶν αἶμα.

<sup>222</sup>Retaining ἔξω.

<sup>223</sup>Retaining ἔξω.

<sup>224</sup>Omitting Dittmeyer's πίστιν τῇ ἰπαρξει.

<sup>225</sup>Omitting ἡ ἑτερον προὰ ἑτέρου, and adding οὐ before θεωροῦσι.

<sup>226</sup>Reading πάντα ταῦτά for ταῦτα.

<sup>227</sup>Reading τοῖς for τῶν.

<sup>228</sup>The text of this whole paragraph is uncertain.

<sup>229</sup>There is a lacuna in the text here.

<sup>230</sup>Omitting ἔτη πολλά.

<sup>231</sup>Omitting Dittmeyer's ἄτε, and reading οἷν μιξα.

<sup>232</sup>Reading ἀργότατοι.

<sup>233</sup>Retaining πράγματος

<sup>234</sup>Reading ὁδὴνμα παρέχει.

<sup>235</sup>Reading παιδίον ἔχει [μύλην], θερθή τε καὶ [ψυχρὰ καὶ] ξηρά.

# PARTS OF ANIMALS\*\*

*W. Ogle*

## BOOK I

[639<sup>a</sup>1] 1 · Every study and investigation, the humblest and the noblest alike, seems to admit of two kinds of proficiency; one of which may be properly called educated knowledge of the subject, while the other is a kind of acquaintance with it. For an [5] educated man should be able to form a fair judgement as to the goodness or badness of an exposition. To be educated is in fact to be able to do this; and the man of general education we take to be such. It will, however, of course, be understood that we only ascribe universal education to one who in his own individual person is thus [10] able to judge nearly all branches of knowledge, and not to one who has a like ability merely in some special subject. For it is possible for a man to have this competence in some one branch of knowledge.

It is plain then that, in the science which inquires into nature, there must be certain canons, by reference to which a hearer shall be able to criticize the method of a professed exposition, quite independently of the question whether the [15] statements made be true or false. Ought we, for instance (to give an illustration of what I mean), to begin by discussing each separate substance—man, lion, ox, and the like—taking each kind in hand independently of the rest, or ought we rather to lay down the attributes which they have in common in virtue of some common [20] element of their nature? For genera that are quite distinct present many identical phenomena, sleep, for instance, respiration, growth, decay, death, and other similar affections and conditions that may remain; for at present it is an obscure and indeterminate business to discuss them. Now it is plain that if we deal with each species independently of the rest, we shall frequently be obliged to repeat the same [25] statements over and over again; for horse and dog and man

present every one of the phenomena just enumerated. A discussion therefore of the attributes of each such species separately would necessarily involve frequent repetitions as to characters, themselves identical but recurring in animals specifically distinct. (Very possibly also there may be other characters which, though they present specific differences, yet come under one and the same category. For instance, flying, swimming, [639<sup>b</sup>1] walking, creeping, are plainly specifically distinct, but yet are all forms of animal progression.) We must, then, have some clear understanding as to the manner in which our investigation is to be conducted; whether, I mean, we are first to deal with the common or generic characters, and afterwards to take into consideration special [5] peculiarities; or whether we are to start straight off with the particular species. For as yet no definite rule has been laid down in this matter. So also there is a like uncertainty as to another point now to be mentioned. Ought the student of nature follow the plan adopted by the mathematicians in their astronomical demonstrations, and after considering the phenomena presented by animals, and their several parts, proceed subsequently to treat of the causes and the reason why; or ought he to [10] follow some other method? Furthermore, the causes concerned in natural generation are, as we see, more than one. There is the cause for the sake of which, and the cause whence the beginning of motion comes. Now we must decide which of these two causes comes first, which second. Plainly, however, that cause is the first which we call that for the sake of which. For this is the account of the thing, and the [15] account forms the starting-point, alike in the works of art and in works of nature. For the doctor and the builder define health or house, either by the intellect or by perception, and then proceed to give the accounts and the causes of each of the things they do and of why they should do it thus. Now in the works of nature the good and that for the sake of which is still more dominant than in works of art, nor is [20] necessity a factor with the same significance in them all; though almost all writers try to refer their accounts to this, failing to distinguish the several ways in which necessity is spoken of. For there is absolute necessity, manifested in eternal phenomena; and there is hypothetical necessity, manifested in everything that is [25] generated as in everything that is produced by art, be it a house or what it may. For if a house or other such final object is to be realized, it is necessary that first this and then that shall be produced and set in motion, and so on in continuous succession, [30] until the end is reached, for the sake of which each prior thing is produced and exists. So also is it with the productions of nature. The mode of necessity,

however, [640<sup>a</sup>1] and the mode of demonstration are different in natural science from what they are in the theoretical sciences (we have spoken of this elsewhere). For in the latter the starting-point is that which is; in the former that which is to be. For since health, or a man, is of such and such a character, it is necessary for this or that to exist or be [5] produced; it is not the case that, since this or that exists or has been produced, that of necessity exists or will exist. Nor is it possible to trace back the necessity of demonstrations of this sort to a starting-point, of which you can say that, since this exists, that exists. These however, again, are matters that have been dealt with in another treatise, where it was stated where necessity is present, where it is [10] reciprocal and for what reason.<sup>1</sup>

Another matter which must not be passed over without consideration is, whether the proper subject of our exposition is that with which the earlier writers concerned themselves, namely, the way each thing is naturally generated, or rather the way it *is*. For there is no small difference between these two views. The best course appears to be that we should follow the method already mentioned—begin [15] with the phenomena presented by each group of animals, and, when this is done, proceed afterwards to state the causes of those phenomena—in the case of generation too. For in house building too, these things come about because the form of the house is such and such, rather than its being the case that the house is such and such because it comes about thus. For the generation is for the sake of the substance and not this for the sake of the generation. Empedocles, then, was in error [20] when he said that many of the characters presented by animals were merely the results of incidental occurrences during their development; for instance, that the backbone is as it is because it happened to be broken owing to the turning of the foetus in the womb. In so saying he overlooked the fact that propagation implies a creative seed endowed with certain powers. Secondly, he neglected another fact, namely, that the parent animal pre-exists, not only in account, but actually in time. [25] For man is generated from man; and thus it is because the parent is such and such that the generation of the child is thus and so. [The same statement holds good also for those which are apparently spontaneous, as also for the products of art. For the [30] same result as is produced by art may occur spontaneously, e.g. health. Those things whose agent is pre-existent, such as the statuary's art, cannot possibly be produced spontaneously. Art indeed consists in the account of the product without its matter. So too with chance products; for they are produced in the same way as products of art.]<sup>2</sup>



The fittest mode, then, of treatment is to say, a man has such and such parts, because the essence of man is such and such, and because they are necessary [35] conditions of his existence, or, if we cannot quite say this then the next thing to it, namely, that it is either quite impossible for a man to exist without them, or, at any [640<sup>b1</sup>] rate, that it is good that they should be there. And this follows: because man is such and such the process of his development is necessarily such as it is; and therefore this part is formed first, that next; and after a like fashion should we explain the generation of all other works of nature.

[5] Now that with which the ancient writers, who first philosophized about nature, busied themselves, was the material principle and the material cause. They inquired what this is, and what its character; how the universe is generated out of it, and by what motor influence, whether, for instance, by strife or love or mind or spontaneous action, the substratum of matter being assumed to have of necessity a certain nature—fire, for instance, to have a hot nature, earth a cold one; the former [10] to be light, the latter heavy. For even the genesis of the universe is thus explained by them. After a like fashion do they deal also with the development of plants and of animals. They say, for instance, that the water contained in the body causes by its currents the formation of the stomach and the other receptacles of food or of [15] excretion; and that the breath by its passage breaks open the outlets of the nostrils; air and water being the materials of which bodies are made; for all represent nature as composed of such or similar substances.

But if men and animals and their several parts are natural phenomena, then the natural philosopher must take into consideration flesh, bone, blood, and all the other homogeneous parts; not only these, but also the heterogeneous parts, such as [20] face, hand, foot; and must examine how each of these comes to be what it is, and in virtue of what force. For it is not enough to say what are the stuffs out of which an animal is formed, to state, for instance, that it is made of fire or earth—if we were discussing a couch or the like, we should try to determine its form rather than its matter (e.g. bronze or wood), or if not, we should give the matter of the *whole*. For a [25] couch is such and such a form embodied in this or that matter, or such and such a matter with this or that form; so that its shape and structure must be included in our description. For the formal nature is of greater importance than the material nature.

Does, then, configuration and colour constitute the essence of the various [30] animals and of their several parts? For if so, what

Democritus says will be correct. For such appears to have been his notion. At any rate he says that it is evident to every one what form it is that makes the man, seeing that he is recognizable by his shape and colour. And yet a dead body has exactly the same configuration as a [35] living one; but for all that is not a man. So also no hand of bronze or wood or constituted in any but the appropriate way can possibly be a hand in more than [641<sup>a</sup>1] name. For like a physician in a painting, or like a flute in a sculpture, it will be unable to perform its function. Precisely in the same way no part of a dead body, such I mean as its eye or its hand, is really an eye or a hand. What he says, then, is [5] too simple—it is much the same as if a woodcarver were to insist that the hand he had cut out was really a hand. Yet the physiologists, when they give an account of the development and causes of the animal form, speak very much like such a craftsman. What are the forces by which the hand or the body was fashioned into its shape? The woodcarver will perhaps say, by the axe or the auger; the physiologist, by air and by earth. Of these two answers the woodcarver's is the better. For it is not [10] enough for him to say that by the stroke of his tool this part was formed into a concavity, that into a flat surface; but he must state the reasons why he struck his blow in such a way as to effect this, and for the sake of what he did so; namely, that the piece of wood should develop eventually into this or that shape. It is plain, then, that they are wrong, and that the true method is to state what the characters are [15] that distinguish the animal—to explain what it is and what are its qualities—and to deal after the same fashion with its several parts; in fact, to proceed in exactly the same way as we should do, were we dealing with the form of a couch.

If now the form of the living being is the soul, or part of the soul, or something that without the soul cannot exist; as would seem to be the case, seeing at any rate that when the soul departs, what is left is no longer an animal, and that none of the parts remain what they were before, excepting in mere configuration, like the [20] animals that in the fable are turned into stone; if, I say, this is so, then it will come within the province of the natural scientist to inform himself concerning the soul, and to treat of it, either in its entirety, or, at any rate, of that part of it which constitutes the essential character of an animal; and it will be his duty to say what a soul or this part of a soul is; and to discuss the attributes that attach to this essential character, especially as nature is spoken of—and is—twofold, as matter and as [25] substance; nature as substance including both the motor cause and the final cause. Now it is in the latter of these two senses that either the whole soul or some part of it

constitutes the nature of an animal; and inasmuch as it is the presence of the soul that enables matter to constitute the animal nature, much more than it is the [30] presence of matter which so enables the soul, the inquirer into nature is bound to treat of the soul rather than of the matter. For though the wood of which they are made constitutes the couch and the tripod, it only does so because it is potentially such and such a form.

What has been said suggests the question, whether it is the whole soul or only some part of it, the consideration of which comes within the province of natural [35] science. Now if it be of the whole soul that this should treat, then there is no place for any other philosophy beside it. For as it belongs in all cases to one and the same science to deal with correlated subjects—one and the same science, for instance, deals with sensation and with the objects of sense—and as therefore the intelligent [645<sup>b</sup>1] soul and the objects of intellect, being correlated, must belong to one and the same science, it follows that natural science will have to include everything in its province. [5] But perhaps it is not the whole soul, nor all its parts collectively, that constitutes the source of motion; but there may be one part, identical with that in plants, which is the source of growth, another, namely the sensory part, which is the source of change of quality, while still another, and this not the intellectual part, is the source of locomotion. For other animals than man have the power of locomotion, but in none but him is there intellect. Thus then it is plain that it is not of the whole soul that we have to treat. For it is not the whole soul that constitutes the animal nature, [10] but only some part or parts of it. Moreover, it is impossible that any abstraction can form a subject of natural science, seeing that everything that nature makes is for the sake of something. For just as art is present in the products of art, so in the things [15] themselves there is evidently an analogous cause or principle derived like the hot and the cold from the environing universe. And that the heaven, if it had an origin, was generated and is maintained by such a cause, there is therefore even more reason to believe, than that mortal animals so originated. For order and definiteness are much more plainly manifest in the celestial bodies than in our own frame; while [20] change and chance are rather characteristic of the perishable things of earth. Yet there are some who, while they allow that every animal exists and was generated by nature, nevertheless hold that the heaven was constructed to be what it is by chance and spontaneity; the heaven, in which not the faintest sign of chance or of disorder is discernible. Again, whenever there is plainly some final end, to which a motion [25] tends

should nothing stand in the way, we always say that the one is for the sake of the other; and from this it is evident that there must be something of the kind, corresponding to what we call nature. For a given seed does not give rise to any chance living being, nor spring from any chance one; but each springs from a definite parent. And thus it is that from which the seed comes which is the origin and fabricator of its offspring. For these it is by nature, the offspring being at any [30] rate that which in nature will spring from it. At the same time the offspring is prior to the seed; for the seed is a coming into being, the end a substance. Prior, however, to both is the organism from which the seed was derived. For we speak of seeds in two ways, mentioning that from which it comes and that to which it gives rise: it is both the seed of that from which it came, of the horse, for instance, and the seed of the organism that will eventually arise from it, of the mule, for example—the seed [35] of both, though in different ways as here set forth. Moreover, the seed is potentially something, and the relation of potentiality to actuality we know.

There are then two causes, namely, necessity and the final end. For many [642<sup>a</sup>1] things are produced, simply as the results of necessity. It may, however, be asked, of what mode of necessity are we speaking when we say this. For it can be of neither of [5] those two modes which are set forth in the philosophical treatises. There is, however, the third mode, in such things at any rate as are generated. For instance, we say that food is necessary in neither of the two modes, but because an animal cannot possibly do without it. This third mode is what may be called hypothetical necessity. For if a piece of wood is to be split with an axe, the axe must of necessity [10] be hard; and, if hard, must of necessity be made of bronze or iron. Now exactly in the same way the body, since it is an instrument—for both the body as a whole and its several parts individually are for the sake of something—if it is to do its work, must of necessity be of such and such a character, and made of such and such materials.

It is plain then that there are two modes of causation, and that both of these must, so far as possible, be taken into account, or that at any rate an attempt must [15] be made to include them both; and that those who fail in this tell us in reality nothing about nature. For nature of an animal is a first principle rather than matter. There are indeed passages in which even Empedocles hits upon this, and following the guidance of fact, finds himself constrained to speak of the ratio as constituting [20] the substance and nature of things. Such, for instance, is the case when he explains what is a bone. For he does not say it is this one element, or

those two or three elements, or a compound of all the elements, but states the ratio of their combination. As with a bone, so manifestly is it with the flesh and all other similar parts.

The reason why our predecessors failed to hit on this method of treatment was, [25] that they were not in possession of the notion of essence, nor of any definition of substance. The first who came near it was Democritus, and he was far from adopting it as a necessary method in natural science, but was merely brought to it by constraint of facts. In the time of Socrates a nearer approach was made to the method. But at this period men gave up inquiring into nature, and philosophers diverted their attention to political science and to the virtues which benefit [30] mankind.

Of the method itself the following is an example. In dealing with respiration we must show that it takes place for such or such a final object; and we must also show that this and that part of the process is necessitated by this and that other stage of it. By necessity we shall sometimes mean that the requisite antecedents must be there, if the final end is to be reached; and sometimes that things are thus and so by nature. For the alternate discharge and re-entrance of heat and the inflow of air are necessary—that is necessary; and as the internal heat resists in the process of [642<sup>b</sup>1] cooling, the entrance and exit of the external air occur.

In the foregoing we have an example of the method which we must adopt, and also an example of the kind of phenomena, the causes of which we have to investigate.

[5] **2** · Some writers propose to reach the ultimate forms of animal life by dividing the genus into two differences. But this method is often difficult, and often impracticable.

Sometimes one differentia is sufficient by itself, and the others are mere surplusage. Thus in the series Footed, Two-footed, Cleft-footed, the last term alone is significant, and to append the others is only an idle iteration.

[10] Again it is not permissible to break up a natural group, Birds for instance, by putting its members under different bifurcations, as is done in the published dichotomies, where some birds are ranked with animals of the water, and others placed in a different class. The group Birds and the group Fishes happen to be named, while other natural groups have no names; for instance, the groups that we [15] may call Sanguineous and

Bloodless are not known popularly by any one name. If such natural groups are not to be broken up, the method of dichotomy cannot be employed, for it necessarily involves such breaking up and dislocation. The group of [20] the Many-footed, for instance, would have some of its kinds distributed among land animals, others among water animals.

3 · Again, privative terms inevitably form one branch of dichotomous division, as we see in the proposed dichotomies. But privative terms in their character of privatives admit of no subdivision. For there can be no specific forms of a negation, of Featherless for instance or of Footless, as there are of Feathered and [25] of Footed. Yet a generic differentia must be subdivisible; for otherwise what is there that makes it generic rather than specific? There are to be found generic, that is specifically subdivisible, differentiae; Feathered for instance and Footed. For feathers are divisible into Barbed and Unbarbed, and feet into Manycleft, and Twocleft, like those of animals with bifid hoofs, and Uncleft or Undivided, like [30] those of animals with solid hoofs. Now even with differentiae capable of this specific subdivision it is difficult enough so to make the classification that each animal shall be comprehended in some one subdivision and in not more than one (e.g. winged and wingless; for some are both—e.g. ants, glowworms, and some others); but far more [35] difficult, impossible, is it to do this, if we start with a dichotomy into two contradictories. For each differentia must be presented by some species. There must [643<sup>a</sup>1] be some species, therefore, under the privative heading. Now specifically distinct animals cannot present in their substance a common undifferentiated element, but any apparently common element must really be differentiated. (Bird and Man for instance are both Two-footed, but their two-footedness is diverse and differentiated. And if they are sanguineous they must have some difference in their blood, if their [5] blood is part of their substance.) From this it follows that one differentia will belong to two species; and if that is so, it is plain that a privative cannot be a differentia.

Again, if the species are indivisible and the differentiae are indivisible, and if no differentia be common to several groups, the number of differentiae must be equal to the number of species. If a differentia though not divisible could yet be common to several groups, then it is plain that in virtue of that common differentia [10] specifically distinct animals would fall into the same division. It is necessary then, if the differentiae, under which are ranged all the indivisible groups, are

specific characters, that none of them shall be common; for otherwise, as already said, specifically distinct animals will come into one and the same division. But no one indivisible group must be included in more than a single division; different groups must not be included in the same division; and every group must be found in some [15] division. It is plain then that we cannot get at the indivisible species of the animal, or any other, kingdom by bifurcate division. If we could, the number of ultimate differentiae would equal the number of indivisible animal species. For assume an [20] order of beings whose prime differentiae are White and Non-white. Each of these branches will bifurcate, and their branches again, and so on till we reach the differentiae, whose number will be four or some other power of two, and will also be the number of the ultimate species.

(A species is constituted by the combination of differentia and matter. For no part of an animal is purely material or purely immaterial; nor can a body, [25] independently of its condition, constitute an animal or any of its parts, as has repeatedly been observed.)

Further, the differentiae must be elements of the substance, and not merely essential attributes. Thus if Figure is the term to be divided, it must not be divided into figures whose angles are equal to two right angles, and figures whose angles are together greater than two right angles. For it is only an attribute of a triangle that [30] its angles are equal to two right angles.

Again, the bifurcations must be opposites, for opposites are different from one another—e.g. White and Black, Straight and Bent; and if we characterize one branch by either term, we must characterize the other by its opposite, and not, for example, characterize one branch by a colour, the other by an inclination. [35]

Furthermore, living beings cannot be divided by the functions common to body and soul, by Flying, for instance, and Walking, as we see them divided in the dichotomies already referred to. For some groups, Ants for instance, fall under both [643<sup>b</sup>1] divisions, some ants flying while others do not. Similarly as regards the division into Wild and Tame; for it also would involve the disruption of a species into different groups. For in almost all species in which some members are tame, there are other [5] members that are wild. Such, for example, is the case with Men, Horses, Oxen, Dogs in India, Pigs, Goats, Sheep: groups which if they have the same name, have not been divided, and which, if single, prove that Wildness and Tamelessness do not amount to specific differences. And whatever differentia we take as a basis of division the same difficulty will

occur.

We must attempt to recognize the natural groups, following the indications [10] afforded by the instincts of mankind, which led them for instance to form the class of Birds and the class of Fishes, each of which groups combines a multitude of differentiae, and is not defined by a single one as in dichotomy. The method of dichotomy is either impossible (for it would put a single group under different [15] divisions or contrary groups under the same division), or it only furnishes a single differentia for each species, which either alone or in combination has to constitute the ultimate species.

If, again, they do not take a differentia of the differentia, they are bound to make their division continuous only in the sense in which a sentence is one by conjunction. For instance, suppose we have the bifurcation Feathered and Featherless, [20] and then divide Feathered into Wild and Tame, or into White and Black. Tame and White are not a differentiation of Feathered, but are the commencement of an independent bifurcation, and are here by accident.

As we said then, we must define at the outset by a multiplicity of differentiae. [25] If we do so, privative terms will be available, which are unavailable to the dichotomist.

The impossibility of reaching the definition of any of the ultimate forms by dichotomy of the larger group, as some propose, is manifest also from the following considerations. It is impossible that a single differentia, either by itself or in [30] combination shall express the whole of a species. [In saying a single differentia by itself I mean one which has no differentia as Cleft-footed; in saying a single differentia in combination I mean, to give an instance, Many-cleft-footed as related to Cleft-footed.]<sup>3</sup> The very continuity of a series of successive differentiae in a [35] division is intended to show that the whole is a unity. But one is misled by the usages of language into imagining that it is merely the final term of the series [Many-cleft-footed or Two-footed for instance]<sup>4</sup> that constitutes the whole differentia, [and [644<sup>a</sup>1] that Footed Cleft-footed, are superfluous]<sup>5</sup> Now it is evident that such a series cannot consist of many terms. For if one divides and subdivides, one soon reaches the final differential term, [but for all that will not have got to the ultimate division, [5] that is, to the species.]<sup>6</sup> Suppose, for example, Man to be the animal to be defined; the single differentia will be Cleft-footed, either by itself or with its antecedents, Footed and Two-footed. Now if man was nothing more than a Cleft-footed animal, this single differentia would duly represent his essence. But seeing that this is not the case, more



differentiae than this one will necessarily be required to define him; and these cannot come under one division; for each single branch of a dichotomy [10] ends in a single differentia, and cannot possibly include several differentiae belonging to one and the same animal.

It is impossible then to reach any of the ultimate animal forms by dichotomous division.

4 · It deserves inquiry why a single name denoting a higher group was not invented by mankind, as an appellation to comprehend the two groups of Water [15] animals and Winged animals. For even these have certain attributes in common. However, the present nomenclature is just. Groups that only differ in degree, and in the more or less of an identical element that they possess, are aggregated under a single class; groups whose attributes are only analogous are separated. For instance, bird differs from bird by gradation, or by excess and defect—some birds have long [20] feathers, others short ones. Bird and Fish only agree in having analogous organs; for what in the bird is feather, in the fish is scale. It is not easy to do this in all cases; for in most animals what is common is so by analogy.

Since the ultimate species are substances and individuals which do not differ in species are found in them (e.g. Socrates, Coriscus), we must either describe the [25] universal attributes first or else say the same thing many time over, as I said. (The universal attributes are common; for we call universal those which belong to more than one subject.)

One may wonder which of two courses to follow. For on the one hand it may be urged that as the ultimate species represent substances, it will be well, if practicable, to examine these ultimate species separately, as Man, and Bird—for [30] this genus contains species: about *every* indivisible species, then, e.g. Sparrow, Crane, and the like.

On the other hand, however, this course would involve repeated mention of the same attribute, as the same attribute is common to many species, and so far would be somewhat irrational and tedious. Perhaps, then, it will be best to treat generically [644<sup>b</sup>1] the universal attributes of the groups that have a common nature and contain closely allied subordinate forms, whether they are groups recognized by popular usage, such as Birds and Fishes, or groups not popularly known by a common [5] appellation, but composed of closely allied subordinate groups; and only to deal individually with the attributes of a single species, when such species—man, for instance, and any other such, if such there be—are not

of that sort.

It is generally similarity in the shape of particular organs, or of the whole body, that has determined the formation of the larger groups. It is in virtue of such a similarity that Birds, Fishes, Cephalopoda, and Testacea have been made to form [10] each a separate class. For within the limits of each such class, the parts do not differ in that they have no nearer resemblance than that of analogy—such as exists between the bone of man and the spine of fish—but differ merely in respect of such corporeal conditions as largeness smallness, softness hardness, smoothness roughness, and other similar oppositions, or, in one word, in respect of degree. [15]

We have now touched upon the canons for criticizing the method of natural science, and have considered what is the most systematic and easy course of investigation; we have also dealt with division, and the mode of conducting it so as best to attain the ends of science, and have shown why dichotomy is either impracticable or inefficacious for its professed purposes.

Having laid this foundation, let us pass on to our next topic. [20]

5 · Of substances constituted by nature some are ungenerated, imperishable, and eternal, while others are subject to generation and decay. The former are excellent and divine, but less accessible to knowledge. The evidence that might [25] throw light on them, and on the problems which we long to solve respecting them, is furnished but scantily by sensation; whereas respecting perishable plants and animals we have abundant information, living as we do in their midst, and ample [30] data may be collected concerning all their various kinds, if only we are willing to take sufficient pains. Both departments, however, have their special charm. The scanty conceptions to which we can attain of celestial things give us, from their excellence, more pleasure than all our knowledge of the world in which we live; just as a half glimpse of persons that we love is more delightful than an accurate view of [645<sup>a</sup>1] other things, whatever their number and dimensions. On the other hand, in certitude and in completeness our knowledge of terrestrial things has the advantage. Moreover, their greater nearness and affinity to us balances somewhat the loftier interest of the heavenly things that are the objects of the higher philosophy. Having [5] already treated of the celestial world, as far as our conjectures could reach, we proceed to treat of animals, without omitting, to the best of our ability, any member of the kingdom,

however ignoble. For if some have no graces to charm the sense, yet nature, which fashioned them, gives amazing pleasure in their study to all who can [10] trace links of causation, and are inclined to philosophy. Indeed, it would be strange if mimic representations of them were attractive, because they disclose the mimetic skill of the painter or sculptor, and the original realities themselves were not more [15] interesting, to all at any rate who have eyes to discern the causes. We therefore must not recoil with childish aversion from the examination of the humbler animals. Every realm of nature is marvellous: and as Heraclitus, when the strangers who came to visit him found him warming himself at the furnace in the kitchen and [20] hesitated to go in, is reported to have bidden them not to be afraid to enter, as even in that kitchen divinities were present, so we should venture on the study of every kind of animal without distaste; for each and all will reveal to us something natural and something beautiful. Absence of haphazard and conduciveness of everything to an end are to be found in nature's works in the highest degree, and the end for which [25] those works are put together and produced is a form of the beautiful.

If any person thinks the examination of the rest of the animal kingdom an unworthy task, he must hold in like disesteem the study of man. For no one can look at the elements of the human frame—blood, flesh, bones, vessels, and the [30] like—without much repugnance. Moreover, when any one of the parts or structures, be it which it may, is under discussion, it must not be supposed that it is its material composition to which attention is being directed or which is the object of the discussion, but rather the total form. Similarly, the true object of architecture is not bricks, mortar, or timber, but the house; and so the principal object of natural philosophy is not the material elements, but their composition, and the totality of [645<sup>b</sup>1] the substance, independently of which they have no existence.

The course of exposition must be first to state the essential attributes common to whole groups of animals, and then to attempt to give their explanation. Many groups, as already noticed, present common attributes, that is to say, in some cases [5] absolutely identical—feet, feathers, scales, and the like; while in other groups the affections and organs are analogous. For instance, some groups have lungs, others have no lung, but an organ analogous to a lung in its place; some have blood, others [10] have no blood, but a fluid analogous to blood, and with the same office. To treat of the common attributes separately in connexion with each individual group would involve, as already suggested, useless

iteration. For many groups have common attributes. So much for this topic.

As every instrument and every bodily member is for the sake of something, viz. [15] some action, so the whole body must evidently be for the sake of some complex action. Thus the saw is made for sawing, for sawing is a function, and not sawing for the saw. Similarly, the body too must somehow or other be made for the soul, and each part of it for some subordinate function, to which it is adapted. [20]

We have, then, first to describe the common functions, and those which belong to a genus or to a species. By 'common' I mean those which belong to all animals; by to a genus', those of animals whose differences from one another we see to be matters of degree—Bird is a genus. Man is a species, and so is everything not [25] differentiated into subordinate groups. In the first case the common attributes may be called analogous, in the second generic, in the third specific.

When a function is ancillary to another, a like relation manifestly obtains between the organs which discharge these functions; and similarly, if one function is prior to and the end of another, their respective organs will stand to each other in [30] the same relation. Thirdly, there are functions which are the necessary consequences of others.

Instances of what I mean by functions and affections are Reproduction, Growth, Copulation, Waking, Sleep, Locomotion, and other similar animal actions. Instances of what I mean by parts are Nose, Eye, Face, and other so-called [646<sup>a1</sup>] members; and similarly for the rest. So much for the method to be pursued. Let us now try to set forth the causes of all these things, both common and special, and in so doing let us follow that order of exposition which conforms, as we have indicated, to the order of nature.

## BOOK II

1 · The nature and the number of the parts of which animals are severally composed are matters which have already been set forth in detail in the book of *Histories* about animals. We have now to inquire what are the causes that in each [10] case have determined this composition, a subject quite distinct from that dealt with in the *Histories*.

Now there are three degrees of composition; and of these the first in order, as all will allow, is composition out of what some call the elements, such as earth, air, water, fire. Perhaps, however, it would be more accurate to say composition out of [15] the elementary forces; nor indeed out of all of these, as said elsewhere in previous treatises. For wet and dry, hot and cold, form the material of all composite bodies; and all other differences are secondary to these, such differences, that is, as heaviness or lightness, density or rarity, roughness or smoothness, and any other [20] such properties of bodies as there may be. The second degree of composition is that by which the homogeneous parts of animals, such as bone, flesh, and the like, are constituted out of the primary substances. The third and last stage is the composition which forms the heterogeneous parts, such as face, hand, and the rest.

[25] Now the order of development and the order of substance are always the inverse of each other. For that which is posterior in the order of development is antecedent in the order of nature, and that is genetically last which in nature is first.

(That this is so is manifest by induction; for a house does not exist for the sake of bricks and stones, but these materials for the sake of the house; and the same is [30] the case with the materials of other bodies. And the same thing can be shown by argument. For generation is a process from something to something, from a principle to a principle—from the primary efficient cause, which is something already endowed with a certain nature, to some definite form or similar end; for [35] man generates man, and plant generates plant, in each case out of the underlying material.)

[646<sup>b</sup>1] In order of time, then, the material and the generative process must necessarily be anterior; but in logical order the substance and form of each being precedes the material. This is evident if one only tries to define the process of formation. For the definition of house-

building includes that of the house; but the definition of the [5] house does not include that of house-building; and the same is true of all other productions. So that it must necessarily be that the elementary material exists for the sake of the homogeneous parts, seeing that these are genetically posterior to it, just as the heterogeneous parts are posterior genetically to them. For these heterogeneous parts have reached the end and goal, having the third degree of [10] composition, in which development often attains its final term.

Animals, then, are composed of homogeneous parts, and are also composed of heterogeneous parts. The former, however, exist for the sake of the latter. For the active functions and operations of the body are carried on by these; that is, by the heterogeneous parts, such as the eye, the nostril, the whole face, the fingers, the [15] hand, and the whole arm. But inasmuch as there is a great variety in the functions and motions not only of the whole animal but also of the individual organs, it is necessary that the substances out of which these are composed shall present a diversity of powers. For some purposes softness is advantageous, for others hardness; some parts must be capable of extension, others of flexion. Such powers, [20] then, are distributed separately to the different homogeneous parts, one being soft another hard, one wet another dry, one viscous another brittle; whereas each of the heterogeneous parts presents a combination of multifarious powers. For the hand, to take an example, requires one power to enable it to effect pressure, and another [25] for simple prehension. For this reason the instrumental parts of the body are compounded out of bones, sinews, flesh, and the like, but not these latter out of the former.

So far, then, as has yet been stated, the relations between these two orders of parts are determined by a final cause. We have, however, to inquire whether necessity may not also have a share in the matter; and it must be admitted that these [30] mutual relations could not from the very beginning have possibly been other than they are. For heterogeneous parts can be made up out of homogeneous parts, either from a plurality of them, or from a single one, as is the case with some of the viscera which, varying in configuration, are yet, to speak broadly, formed from a single homogeneous substance; but that homogeneous substances should be formed out of a combination of heterogeneous parts is clearly an impossibility—for then a homogeneous thing would consist of many heterogeneous things. For these causes, then, some parts of animals are simple and homogeneous, while others are [647<sup>a</sup>1] composite and heterogeneous; and dividing the parts into the instrumental and the

sensitive, each one of the former is, as before said, heterogeneous, and each one of [5] the latter homogeneous. For each sense is confined to a single order of sensibles, and its organ must be such as to admit that order. But that which is endowed with a property potentially acted on by that which has the like property actually, so that the two are the same in kind, and if the latter is single so also is the former. Thus it is [10] that while no physiologists ever dream of saying of the hand or face or other such part that one is earth, another water, another fire, they couple each separate sense-organ with a separate element, asserting this one to be air and that other to be fire.

Sensation, then, is confined to the simple or homogeneous parts. But, as might reasonably be expected, the organ of touch, though still homogeneous, is yet the [15] least simple of all the sense-organs. For touch more than any other sense appears to be correlated to several distinct kinds of objects, and to recognize more than one category of contrasts, heat and cold, for instance, dry and wet, and other similar oppositions. Accordingly, the organ which deals with these varied objects is of all the sense-organs the most corporeal, being either the flesh, or the substance which [20] in some animals takes the place of flesh.

Now as there cannot possibly be an animal without sensation, it follows as a necessary consequence that every animal must have some homogeneous parts; for these alone are capable of sensation, the heterogeneous parts serving for the active functions. Again, as the sensory faculty, the motor faculty, and the nutritive faculty [25] are all lodged in one and the same part of the body, as was stated in a former treatise, it is necessary that the part which is the primary seat of these principles shall on the one hand, in its character of general sensory recipient, be one of the simple parts; and on the other hand shall, in its motor and active character, be one of the heterogeneous parts. For this reason it is the heart which in sanguineous animals [30] constitutes this central part, and in bloodless animals it is that which takes the place of a heart. For the heart, like the other viscera, divides into homogeneous parts; but it is at the same time heterogeneous in virtue of its definite configuration. And the same is true of the other so-called viscera, which are indeed formed from the same material as the heart. For all these viscera have a sanguineous character owing to [647<sup>b</sup>1] their being situated upon vascular ducts and branches. For just as a stream of water deposits mud, so the various viscera, the heart excepted, are, as it were, deposits from the stream of blood in the vessels. And as to the heart, the very starting-point of the vessels, and the actual seat of the force by which the blood is

first fabricated, [5] it is as one would naturally expect, constituted out of the selfsame nutriment which it originates. Such, then, are the reasons why the viscera are of sanguineous aspect; and why in one point of view they are homogeneous, in another heterogeneous.

[10] **2** · Of the homogeneous parts of animals, some are soft and moist, others hard and dry; and of the former some are moist permanently, others only so long as they are in the living body. Such are blood, serum, lard, suet, marrow, semen, bile, milk when present, flesh, and their various analogues. For the parts enumerated are [15] not to be found in all animals, some animals only having parts analogous to them. Of the hard and dry homogeneous parts bone, fish-spine, sinew, blood-vessel, are examples. The last of these points to a sub-division that may be made in the class of homogeneous parts. For in some of them the whole and a portion of the whole in one sense are designated by the same term—as, for example, is the case with blood-vessel and bit of blood-vessel—while in another sense they are not; but a [20] portion of a heterogeneous part, such as face, in no sense has the same designation as the whole.

First, both the moist parts and the dry parts have causes of many kinds. Thus one set of homogeneous parts represent the material; for each separate organ is [25] constructed of bones, sinews, flesh, and the like; which contribute either to its substance or to the proper discharge of its function. A second set are the nutriment of the first, and are moist; for all growth comes from moisture; while a third set are the residue of the second. Such, for instance, are the dregs of the solid nutriment, and—in animals that have a bladder—those of the liquid.

Even the individual homogeneous parts present variations, which are in each [30] case for the sake of the better. The variations of the blood may be selected to illustrate this. For different bloods differ in their degrees of thinness or thickness, of clearness or turbidity, of coldness or heat; and this whether we compare the bloods from different parts of the same individual or the bloods of different animals. For all the differences just enumerated distinguish the blood of the upper and of the lower [648<sup>a</sup>1] halves of the body; and one section of animals is sanguineous, while the other has no blood, but only something resembling it in its place. The thicker and the hotter blood is, the more conducive is it to strength, while in proportion to its thinness and its coldness is its suitability for sensation and intelligence. A like distinction exists [5] also



in the fluid which is analogous to blood. This explains how it is that bees and other similar creatures are of a more intelligent nature than many sanguineous animals; and that, of sanguineous animals, those are the most intelligent whose blood is thin and cold. Best of all are those whose blood is hot, and at the same time [10] thin and clear. For such are suited alike for the development of courage and of intelligence. Accordingly, the upper parts are superior in these respects to the lower, the male superior to the female, and the right side to the left. As with the blood so [15] also with the other parts, homogeneous and heterogeneous alike. For here also such variations as occur must be held either to be related to the substance and the functions of the several animals, or, in other cases, to be matters of better or worse. Two animals, for instance, may have eyes. But in one these eyes may be of fluid consistency, while in the other they are hard; and in one there may be eyelids, in the other no such appendages. In both cases the difference contributes to greater accuracy of vision.

As to why all animals must of necessity have blood or something of a similar [20] character, and what the nature of blood may be, these are matters which can only be considered when we have first discussed hot and cold. For the natural properties of many substances are referable to these two elementary principles; and it is a matter of frequent dispute what animals or what parts of animals are hot and what cold. [25] For some maintain that water animals are hotter than such as live on land, asserting that their natural heat counterbalances the coldness of their medium; and again, that bloodless animals are hotter than those with blood, and females than males. Parmenides, for instance, and some others declare that women are hotter than men, and that it is the warmth and abundance of their blood which causes their [30] menstrual flow, while Empedocles maintains the opposite opinion. Again, comparing the blood and the bile, some speak of the former as hot and of the latter as cold, while others invert the description. If there be this endless disputing about hot and cold, which of all things that affect our senses are the most distinct, what are we to [35] think as to the rest?

The explanation of the difficulty appears to be that things are called hotter in several ways; for each appears to have something to say, although they are at odds [648<sup>b</sup>1] with one another. There ought, then, to be some clear understanding as to the sense in which natural substances are to be termed hot or cold, dry or moist. For it appears manifest that these are properties on which even life and death are largely dependent, and that they are moreover the causes of sleep and waking, of maturity [5] and old age, of health and disease; while no similar influence belongs

to roughness and smoothness, to heaviness and lightness, nor, in short, to any other such properties of matter. That this should be so is but in accordance with rational expectation. For hot and cold, dry and moist, as was stated in a former treatise, are [10] the principles of the natural elements.

Is then the term hot used in one way or in many? To answer this we must ascertain what special effect is attributed to a hotter substance, and if there be several such, how many these may be. A body then is in one sense said to be hotter than another, if it imparts a greater amount of heat to an object in contact with it. In a second sense, that is said to be hotter which causes the keener sensation when [15] touched, and especially if the sensation be attended with pain. This criterion, however, would seem sometimes to be a false one; for occasionally it is the condition of the individual that causes the sensation to be painful. Again, of two things, that is the hotter which the more readily melts a fusible substance, or sets on fire an inflammable one. Again, of two masses of one and the same substance, the larger is said to have more heat than the smaller. Again, of two bodies, that is said to be the [20] hotter which takes the longer time in cooling, as also we call that which is rapidly heated hotter in its nature than that which is long about it—as we call something contrary if it is at a distance, similar if it is nearby. The term hotter is used then in all the various senses that have been mentioned, and perhaps in still more. Now it is impossible for one body to be hotter than another in all these different fashions. [25] Boiling water for instance, though it is more scalding than flame, yet has no power of burning or melting combustible or fusible matter, while flame has. So again this boiling water is hotter than a small fire, and yet gets cold more rapidly and [30] completely. For in fact fire never becomes cold; whereas water invariably does so. Boiling water, again, is hotter to the touch than oil; yet it gets cold and solid more rapidly than this other fluid. Blood, again, is hotter to the touch than either water or oil, and yet coagulates before them. Iron, again, and stones and other similar bodies [35] are longer in getting heated than water, but when once heated burn other substances with a much greater intensity. Another distinction is this. In some of the [649<sup>a</sup>1] bodies which are called hot the heat is derived from without, while in others it belongs to the bodies themselves; and it makes a most important difference whether the heat has the former or the latter origin. For one of them comes close to being hot [5] accidentally and not in its own right—as if, finding that some man in a fever was a musician, one were to say that musicians are hotter than healthy men. Of that which is hot *per se* and

that which is hot *per accidens*, the former is the slower to cool, while not rarely the latter is the hotter to the touch. The former again is the [10] more burning of the two—flame, for instance, as compared with boiling water— while the latter, as the boiling water, which is hot *per accidens*, is the more heating to the touch. From all this it is clear that it is no simple matter to decide which of two bodies is the hotter. For the first may be the hotter in one sense, the second the [15] hotter in another. Indeed in some of these cases it is impossible to say simply even whether a thing is hot or not. For the actual substratum may not itself be hot, but may be hot when coupled with heat as an attribute, as would be the case if one attached a single name to hot water or hot iron. It is after this manner that blood is hot. In such cases—in those, that is, in which the substratum owes its heat to an [20] external influence—it is plain that cold is not a mere privation, but a fact of nature.

There is no knowing but that even fire may be another of these cases. For the substratum of fire may be smoke or charcoal, and though the former of these is always hot, smoke being an uprising vapour, yet the latter becomes cold when it is extinguished, as also would oil and pinewood under similar circumstances. But even [25] substances that have been burnt nearly all possess some heat, cinders, for example, and ashes, the waste-products of animals, and, among the excretions, bile; because some residue of heat has been left in them after their combustion. It is in another sense that pinewood and fat substances are hot; namely, because they rapidly assume the actuality of fire.

[30] Heat appears to cause both coagulation and melting. Now such things as are formed merely of water are solidified by cold, while such as are formed of nothing but earth are solidified by fire. Hot substances again are solidified by cold, and, when they consist chiefly of earth, the process of solidification is rapid, and the resulting substance is insoluble; but, when their main constituent is water, the solid matter is again soluble. What kinds of substances, however, admit of being solidified, and what are the causes of solidification, are questions that have already been dealt with more precisely in another treatise.

Now what is hot and what sort of thing is hotter are determined in a variety of ways, and those features do not belong to everything in the same way: rather, we [649<sup>b</sup>1] must specify that this substance is hotter *per se*, though that other is often hotter *per accidens*; or again, that this substance is potentially hot, that other actually so; or again, that this substance is hotter in the sense of causing a greater feeling of heat when touched, while that other is hotter in the sense of producing flame and

[5] burning. The term hot being used in all these various senses, it plainly follows that the term cold will also be used with like multiplicity.

So much then as to hot and cold, hotter and colder.

3 · In natural sequence we have next to treat of dry and moist. These terms [10] are used in various senses. Sometimes, for instance, they denote things that are potentially, at other times things that are actually, dry or moist. Ice for example, or any other solidified fluid, is spoken of as being actually and accidentally dry while potentially and essentially it is moist. Similarly earth and ashes and the like, when mixed with water, are actually and accidentally moist, but potentially and [15] essentially are dry. Now separate the constituents in such a mixture and you have on the one hand the watery components, which take their shape from their container, and these are both actually and potentially moist, and on the other hand the earthy components, and these are all dry; and it is to bodies of this sort that the term ‘dry’ is most properly and absolutely applicable. So also the opposite term ‘moist’ is strictly and absolutely applicable in an analogous way. The same remark applies also to hot bodies and to cold. [20]

These distinctions, then, being laid down, it is plain that blood is hot in *one* way;<sup>7</sup> for it is spoken of as boiling water would be were it denoted by a single term. But the substratum of blood, that which it is while it is blood is not hot. Blood then in a certain sense is essentially hot, and in another sense is not so. For heat is [25] included in the definition of blood, just as whiteness is included in the definition of a white man; but so far as blood becomes hot from some external influence, it is not hot essentially.

As with hot and cold, so also is it with dry and moist. We can therefore understand how some substances are hot and moist so long as they remain in the living body, but become perceptibly cold and coagulate so soon as they are [30] separated from it; while others are hot and consistent while in the body, but when withdrawn undergo a change to the opposite condition, and become cold and moist. Of the former blood is an example, of the latter bile; for while blood solidifies, yellow bile becomes more moist. We must attribute to such substances the possession of opposite properties in a greater or less degree.

In what sense, then, the blood is hot and in what sense fluid, and how far it [650<sup>a</sup>1] partakes of the opposite properties, has now been fairly explained. Now since everything that grows must take nourishment, and

nutriment in all cases consists of moist and dry substances, and since it is by the force of heat that these are [5] concocted and changed, it follows that all living things, animals and plants alike, must on this account, if on no other, have a natural source of heat; and this, like the working of the food,<sup>8</sup> must belong to many parts. For first of all there is the mouth [10] and the parts inside the mouth, on which the first share in the duty clearly devolves, in such animals at least as live on food which requires disintegration. The mouth, however, does not actually concoct the food, but merely facilitates concoction; for the subdivision of the food into small bits facilitates the action of heat upon it. After the mouth come the upper and the lower abdominal cavities, and here it is that [15] concoction is effected by the aid of natural heat. Again, just as there is a channel for the admission of the unconcocted food into the stomach, namely the mouth, and in some animals the so-called oesophagus, which is continuous with the mouth and reaches to the stomach, so must there also be other channels by which the nutriment [20] shall pass out of the stomach and intestines into the body at large, and to which these cavities shall serve as a kind of manger. For plants get their food from the earth by means of their roots; and this food is already elaborated when taken in, which is the reason why plants produce no excrement, the earth and its heat serving them in the place of a stomach. But animals, with scarcely an exception, and conspicuously all such as are capable of locomotion, are provided with a stomachal [25] sac, which is as it were an internal substitute for the earth. They must therefore have some instrument which shall correspond to the roots of plants, with which they may absorb their food from this sac, so that the proper end of the successive stages of concoction may be attained. The mouth then, its duty done, passes over the food to the stomach, and there must necessarily be something to receive it in turn from this. This something is furnished by the blood-vessels, which run throughout the [30] whole extent of the mesentery from its lowest part right up to the stomach. A description of these will be found in the *Anatomies* and in the *Natural History*. Now as there is a receptacle for the entire matter taken as food, and also a receptacle for its excremental residue, and again a third receptacle, namely the vessels, which serve as such for the blood, it is plain that this blood must be the final [35] nutritive material in such animals as have it; while in bloodless animals the same is the case with the analogous stuff. This explains why the blood diminishes in [650<sup>b</sup>1] quantity when no food is taken, and increases when much is consumed, and also why it becomes healthy and unhealthy according as the food is of the one or the other character.

These facts, then, and others of a like kind, make it plain that the purpose of the blood in sanguineous animals is to subserve the nutrition of the body. They also explain why no more sensation is produced by touching the blood than by [5] touching one of the excretions or the food, whereas when the flesh is touched sensation is produced. For the blood is not continuous nor united by growth with the flesh, but simply lies in its receptacle, that is in the heart and vessels. The manner in which the parts grow at the expense of the blood, and indeed the whole question of [10] nutrition, will find a more suitable place for exposition in the treatise on generation, and in other writings. For our present purpose all that need be said is that the blood exists for the sake of nutrition, that is the nutrition of the parts; and with this much let us therefore content ourselves.

4 · What are called fibres are found in the blood of some animals but not of all. There are none, for instance, in the blood of deer and of roes; and for this reason [15] the blood of such animals as these never coagulates. For one part of the blood consists mainly of water and therefore does not coagulate, this process occurring only in the other and earthy constituent, that is to say in the fibres, while the fluid part is evaporating.

Some at any rate of the animals with watery blood have a keener intellect. This [20] is due not to the coldness of their blood, but rather to its thinness and purity; neither of which qualities belongs to the earthy matter. For the thinner and purer its fluid is, the more easily affected is an animal's sensibility. Thus it is that some bloodless animals are more intelligent than some among the sanguineous kinds. Such for [25] instance, as already said, is the case with the bee and the tribe of ants, and whatever other animals there may be of a like nature. At the same time too great an excess of water makes animals timorous. For fear chills the body; so that in animals whose heart contains so watery a mixture the way is prepared for the operation of this emotion. For water is congealed by cold. This also explains why bloodless animals [30] are, as a general rule, more timorous than such as have blood, so that they remain motionless, when frightened, and discharge their excretions, and in some instances change colour. Such animals, on the other hand, as have thick and abundant fibres in their blood are of a more earthy nature, and of a choleric temperament, and liable to bursts of passion. For anger is productive of heat; and solids, when they have been made hot, give off

more heat than fluids. The fibres therefore, being earthy and [651<sup>a</sup>1] solid, are turned into so many hot embers in the blood and cause ebullition in the fits of passion.

This explains why bulls and boars are so choleric and so passionate. For their blood is exceedingly rich in fibres, and the bull's at any rate coagulates more rapidly than that of any other animal. If these fibres are taken out of the blood, it will no [5] longer coagulate; just as the watery residue of mud will not coagulate after removal of the earth—for the fibres consist of earth. But if the fibres are left the fluid coagulates, as also does mud, under the influence of cold. For when the heat is expelled by the cold, the fluid, as has been already stated, passes off with it by [10] evaporation, and the residue is dried up and solidified, not by heat but by cold. So long, however, as the blood is in the body, it is kept fluid by animal heat.

The character of the blood affects both the temperament and the sensory faculties of animals in many ways. This is indeed what might reasonably be expected, seeing that the blood is the material of which the whole body is made. For nutriment supplies the material, and the blood is the ultimate nutriment. It makes [15] then a considerable difference whether the blood be hot or cold, thin or thick, turbid or clear.

The watery part of the blood is serum; and it is watery, either owing to its not being yet concocted, or owing to its having become corrupted; so that one part of the serum is the resultant of a necessary process, while another part is for the sake of the blood.

[20] **5** · The differences between lard and suet correspond to differences of blood. For both are blood concocted into these forms as a result of abundant nutrition, being that surplus blood that is not expended on the fleshy part of the body, and is of an easily concocted and well-nourished character. This is shown by the greasiness of [25] these substances; for such grease in fluids is due to a combination of air and fire. It follows from what has been said that no non-sanguineous animals have either lard or suet; for they have no blood. Among sanguineous animals those whose blood is dense have suet rather than lard. For suet is of an earthy nature, that is to say, it contains but a small proportion of water and is chiefly composed of earth; and this it is that makes it coagulate, just as the fibrous matter of blood coagulates, or broths [30] which contain such fibrous matter. Thus it is that non-ambidentate horned animals possess suet. For the very fact that they have horns and

huckle-bones shows that their composition is rich in this earthy element; for all such appurtenances are solid and earthy in character. On the other hand in those hornless animals that are [35] ambidentate and possess toes, there is no suet, but in its place lard; and this, not being of an earthy character, neither coagulates nor splits when it dries.

Both lard and suet when present in moderate amount are beneficial; for they [651<sup>b</sup>1] contribute to health and strength, while they are no hindrance to sensation. But when they are present in great excess, they are injurious and destructive. For were the whole body formed of them it would perish. For an animal is an animal in virtue [5] of its sensory part, that is in virtue of its flesh, or of the substance analogous to flesh. But the blood, as before stated, is not sensitive; as therefore is neither lard nor suet, seeing that they are concocted blood. Were then the whole body composed of these substances, it would be utterly without sensation. Such animals, again, as are [10] excessively fat age rapidly. For so much of their blood is used in forming fat, that they have but little left; and when there is but little blood the way is already open for decay. For decay may be said to be deficiency of blood, the scantiness of which renders it liable, like all bodies of small bulk, to be affected by any chance excess of heat or cold. For the same reason fat animals are less fertile than others. For that [15] part of the blood which should go to form semen and seed is used up in the production of lard and suet, which are nothing but concocted blood; so that in these animals there is either no residue at all, or only a scanty amount.

6 · So much then for blood and serum, and for lard and suet. Each of these, and their causes, have been described.

[20] The marrow also is of the nature of blood, and not, as some think, the germinal force of the semen. That this is the case is quite evident in very young animals. For [25] in the embryo the marrow of the bones has a blood-like appearance, which is but natural, seeing that the parts are all constructed out of blood, and that it is on blood that the embryo is nourished. But, as the young animal grows up and ripens into maturity, the marrow changes its colour, just as do the parts and the viscera. For the viscera also in animals, so long as they are young, have each and all a blood-like look, owing to the large amount of this fluid which they contain.

In those animals which contain lard, the marrow is greasy and lard-like; but when the blood is converted by concoction into suet, and does



not assume the form [30] of lard, then the marrow also has a suety character. In those animals, therefore, that have horns and are not ambidentate, the marrow has the character of suet; while it takes the form of lard in those that are ambidentate and have the foot divided into toes. What has been said hardly applies to the spinal marrow. For it is necessary that this shall be continuous and extend without break through the whole backbone, inasmuch as this bone consists of separate vertebrae. But were the spinal marrow either greasy or of suet, it could not hold together in such a continuous mass as it [35] does, but would either be too fluid or too frangible.

There are some animals that can hardly be said to have any marrow. These are those whose bones are strong and solid, as is the case with the lion. For in this animal the marrow is so utterly insignificant that the bones look as though they had [652<sup>a</sup>1] none at all. However, as it is necessary that animals shall have bones or something analogous to them, such as the fish-spines of water-animals, it is also a matter of necessity that some of these bones shall contain marrow; for the substance [5] contained within the bones is the nutriment out of which these are formed. Now the universal nutriment, as already stated, is blood; and it is reasonable that marrow should be suety or fatty. For the blood within the bone, owing to the heat which is developed in it from its being thus surrounded, undergoes concoction, and self-concocted blood is suet or lard. So also it is easy to understand why, in those animals [10] that have strong and compact bones, some of these should be entirely void of marrow, while the rest contain but little of it; for here the nutriment is spent in forming the bones.

Those animals that have fish-spines in place of bones have no other marrow than that of the backbone. For in the first place they have naturally but a small amount of blood; and secondly the only hollow fish-spine is that of the backbone. In [15] this then marrow is formed; this being the only spine in which there is space for it, and, moreover, being the only one which owing to its division into parts requires a connecting bond. This too is the reason why the marrow here, as already mentioned, is somewhat different from that of other bones. For, having to act the part of a clasp, it must be of glutinous character and at the same time sinewy so as to admit of stretching.

Such then are the reasons for the existence of marrow, in those animals that [20] have any, and such its nature. It is evidently the surplus of the sanguineous nutriment apportioned to the bones and fish-spines, which has undergone concoction owing to its being enclosed within them.

7 · From the marrow we pass on in natural sequence to the brain. For there are many who think that the brain itself consists of marrow, and that it forms the [25] commencement of that substance, because they see that the spinal marrow is continuous with it. In reality the two may be said to be utterly opposite to each other in character. For of all the parts of the body there is none so cold as the brain; whereas the marrow is of a hot nature, as is plainly shown by its fat and greasy [30] character. Indeed this is the very reason why the brain and spinal marrow are continuous with each other. For, wherever the action of any part is in excess, nature so contrives as to set by it another part with an excess of contrary action, so that the excesses of the two may counterbalance each other. Now that the marrow is hot is [35] clearly shown by many indications. The coldness of the brain is also manifest enough even to the touch; and, secondly, of all the fluid parts of the body it is the driest and the one that has the least blood; for in fact it has no blood at all in its [652<sup>b</sup>1] proper substance. Thus brain is not residual matter, nor yet is it one of the parts which are continuous with each other; but it has a character peculiar to itself, as might indeed be expected. That it has no continuity with the organs of sense is plain [5] from simple inspection, and is still more clearly shown by the fact, that, when it is touched, no sensation is produced; in which respect it resembles the blood of animals and their excrement. The purpose of its presence in animals is no less than the preservation of the whole body. For some writers assert that the soul is fire or some such force. This, however, is but a crude assertion; and it would perhaps be better to say that the soul is incorporate in some substance of a fiery character. The [10] reason for this being so is that of all substances there is none so suitable for ministering to the operations of the soul as that which is possessed of heat. For nutrition and the imparting of motion are offices of the soul, and it is by heat that these are most readily effected. To say then that the soul is fire is much the same thing as to confound the auger or the saw with the carpenter or his craft, simply [15] because the work is done when the two are near one another. So far then this much is plain, that all animals must necessarily have a certain amount of heat. But as all influences require to be counterbalanced, so that they may be reduced to moderation and brought to the mean (for in the mean, and not in either extreme, lies their [20] substance and account), nature has contrived the brain as a counterpoise to the region of the heart with its contained heat, and has given it to animals to moderate the latter, combining in it the properties of earth and water. For this reason it is, that every sanguineous animal has a brain;

whereas no bloodless creature has such [25] an organ, unless indeed it be, as the octopus, by analogy. For where there is no blood, there in consequence is but little heat. The brain, then, tempers the heat and seething of the heart. In order, however, that it may itself have a moderate amount of heat, branches run from both blood-vessels, that is to say from the great vessel [30] and from what is called the aorta, and end in the membrane which surrounds the brain; while at the same time, in order to prevent any injury from the heat, these encompassing vessels, instead of being few and large, are numerous and small, and their blood scanty and clear, instead of being turbid and thick. We can now [35] understand why fluxes have their origin in the head, and occur whenever the parts about the brain have more than a due proportion of coldness. For when the [653<sup>a</sup>1] nutriment steams upwards through the blood-vessels, its refuse portion is chilled by the influence of this region, and forms fluxes of phlegm and serum. We must suppose, to compare small things with great, that the like happens here as occurs in [5] the production of showers. For when vapour steams up from the earth and is carried by the heat into the upper regions, so soon as it reaches the cold air that is above the earth, it condenses again into water owing to the refrigeration, and falls back to the earth as rain. These, however, are matters which may be suitably considered in the Principles of Diseases, so far as natural philosophy has anything to say to them. [10]

It is the brain again—or, in animals that have no brain, the part analogous to it—which is the cause of sleep. For either by chilling the blood that streams upwards after food, or by some other similar influences, it produces heaviness in the region in which it lies (which is the reason why drowsy persons hang the head), and [15] causes the heat to escape downwards in company with the blood. It is the accumulation of this in excess in the lower region that produces sleep, taking away the power of standing upright from those animals to whom that posture is natural, and from the rest the power of holding up the head. These, however, are matters which have been separately considered in the treatises on Sensation and on Sleep. [20] That the brain is a compound of earth and water is shown by what occurs when it is boiled. For, when so treated, it turns hard and dry, inasmuch as the water is evaporated by the heat, and leaves the earthy part behind. Just the same occurs when pulse and other fruits are boiled. For these also are hardened and become altogether earthy, because the water which enters into their composition is driven off and leaves the earth, which is their main constituent, behind. [25]

Of all animals, man has the largest brain in proportion to his size; and it is larger in men than in women. This is because the region of the heart and of the lung is hotter and richer in blood. This again explains why man, alone of animals, stands [30] erect. For the heat, overcoming any opposite inclination, makes growth take its own line of direction, which is from the centre of the body upwards. It is then as a counterpoise to his excessive heat that there is this superabundant fluidity and coldness; and it is again owing to this superabundance that the cranial bone which some call the *bregma* is the last to become solidified; so long does evaporation [35] continue to occur through it under the influence of heat. Man is the only sanguineous animal in which this takes place. Man, again, has more sutures in his skull than any other animal, and the male more than the female. The explanation [653<sup>b</sup>1] is again to be found in the greater size of the brain, which demands free ventilation, proportionate to its bulk. For if the brain be either too moist or too dry, it will not perform its office, but in the one case will freeze the blood, and in the other will not cool it at all; and thus will cause disease, madness, and death. For the cardiac heat [5] and the centre of life is most delicate in its sympathies, and is immediately sensitive to the slightest change or affection of the blood on the outer surface of the brain.

The fluids which are present in the animal body from the first have now nearly all been considered. Amongst those that appear only at a later period are the residua [10] of the food, which include the deposits of the belly and also those of the bladder. Besides these there is the semen and the milk, in those animals which are of such a nature as to have them. Of these fluids, the excremental residua of the food may be suitably discussed by themselves, when we come to examine and consider the subject of nutrition. Then will be the proper time to explain in what animals they [15] are found, and what are the reasons for their presence. Similarly all questions concerning the semen and the milk may be dealt with in the treatise on Generation, for the former of these fluids is the very starting-point of the generative process, and the latter exists for the sake of generation.

8 · We have now to consider the remaining homogeneous parts, and will [20] begin with flesh, and with the substance that, in animals that have no flesh, takes its place. The reason for so beginning is that flesh forms in animals both a principle and a body in itself. Its right to this precedence can also be demonstrated logically. For an animal is by our

definition something that has sensibility and chief of all the primary sensibility, which is that of touch; and it is the flesh, or analogous [25] substance, which is the organ of this sense—either the primary organ, in the same way as the pupil is the organ of sight, or it is the organ and the medium through which the object acts combined, comparable to the pupil with the whole transparent medium attached to it. Now in the case of the other senses it was impossible for nature to unite the medium with the sense-organ, nor would such a junction have served any purpose; but in the case of touch she was compelled by necessity to do so. For of all the sense-organs that of touch is the only one that has corporeal substance, [30] or at any rate it is more corporeal than any other.

It is obvious also to sense that it is for the sake of this that all the other parts exist. By the other parts I mean the bones, the skin, the sinews, and the blood-vessels, and, again, the hair and the various kinds of nails, and anything else there may be of a like character. Thus the bones are a contrivance to give security to [35] the soft parts, to which purpose they are adapted by their hardness; and in animals that have no bones the same office is fulfilled by some analogous substance, as by fish-spine in some fishes, and by cartilage in others.

Now in some animals this supporting substance is situated within the body, [654<sup>a</sup>1] while in some of the bloodless species it is placed on the outside. The latter is the case in all the Crustacea, as the crabs and the crayfish; it is the case also in the Testacea, as for instance in the several species known by the general name of oysters. For in all these animals the fleshy substance is within, and the earthy matter, which holds the soft parts together and keeps them from injury, is on the [5] outside. For the shell not only enables the soft parts to hold together, but also, as the animal is bloodless and so has but little natural warmth, surrounds it, as a chaufferette does the embers, and keeps in the smouldering heat. Similar to this seems to be the arrangement in another kind of animals, namely the tortoises and [10] the several kinds of water-tortoise. But in Insects and in Cephalopods the plan is entirely different, there being moreover a contrast between these two themselves. For in neither of these does there appear to be any bony or earthy part, worthy of notice, distinctly separated from the rest of the body. Thus in the Cephalopods the main bulk of the body consists of a soft flesh-like substance, or rather of a substance [15] which is intermediate between flesh and sinew, so as not to be so readily destructible as actual flesh. For it is soft like flesh, while it admits of stretching like the sinew. It splits not longitudinally, but into circular segments, like flesh, this being the most advantageous condition,

so far as strength is concerned. These animals have also a part inside them corresponding to the spinous bones of fishes. For instance, in the [20] cuttle-fishes there is what is known as the pounce, and in the calamaries there is the so-called pen. In the octopus, on the other hand, there is no such internal part, because the body, or, as it is termed in them, the head, forms but a short sac, whereas it is of considerable length in the other two; and it was this length which led nature to assign to them their hard support, so as to ensure their straightness and [25] inflexibility; just as she has assigned to sanguineous animals their bones or their fish-spines, as the case may be. To come now to Insects. In these the arrangement is quite different from that of the Cephalopods and from that which obtains in sanguineous animals, as indeed has been already stated. For in an insect there is no distinction into soft and hard parts, but the whole body is hard, the hardness, however, being of such a character as to be more flesh-like than bone, and more earthy and bone-like than flesh. The purpose of this is to make the body of the insect [30] less liable to get broken into pieces.

9 · There is a resemblance between the osseous and the vascular systems; for each has a central part in which it begins, and each forms a continuous whole. For no bone in the body exists as a separate thing in itself, but each is either a portion of [35] what may be considered a continuous whole, or at any rate is linked with the rest by contact and by attachments; so that nature may use adjoining bones either as though they were actually continuous and formed a single bone, or, for purposes of [654<sup>b</sup>1] flexure, as though they were two and distinct. And similarly no blood-vessel has in itself a separate individuality; but they all form parts of one whole. For an isolated bone, if such there were, would in the first place be unable to perform the office for the sake of which bones exist; for, were it discontinuous and separated from the rest [5] by a gap, it would be perfectly unable to produce either flexure or extension; nor only so, but it would actually be injurious, acting like a thorn or an arrow lodged in the flesh. Similarly if a vessel were isolated, and not continuous with the vascular origin, it would be unable to retain the blood within it in a proper state. For it is the warmth derived from this origin that hinders the blood from coagulating; indeed the [10] blood, when withdrawn from its influence, becomes manifestly putrid. Now the origin of the blood-vessels is the heart, and the origin of the bones, in all animals that have bones, is what is called the backbone. With this all the other bones of the body are in continuity; for it is the backbone that holds

together the whole length of an animal and preserves its straightness. But since it is necessary that the body of an [15] animal shall bend during locomotion, this is one in virtue of the continuity of its parts, yet by its division into vertebrae is made to consist of many segments. It is from this that the bones of the limbs, in such animals as have these parts, proceed, and with it they are continuous, some having their extremities adapted to each [20] other, either by the one being hollowed and the other rounded, or by both being hollowed and including between them a hucklebone, as a connected bolt, so as to allow of flexure and extension. For without some such arrangement these movements would be utterly impossible, or at any rate would be performed badly. There are some joints, again, in which the lower end of the one bone and the upper end of [25] the other are alike in shape; and cartilaginous pieces are interposed in the joint, to serve as a kind of padding, and prevent the two extremities from grating against each other.

Round about the bones, and attached to them by thin fibrous bands, grow the fleshy parts, for the sake of which the bones themselves exist. For just as an artist, [30] when he is moulding an animal out of clay or other soft substance, takes first some solid body as a basis, and round this moulds the clay, so also has nature acted in fashioning the animal body out of flesh. Thus we find all the fleshy parts, with one exception, supported by bones, which serve, when the parts are organs of motion, to facilitate flexure, and, when the parts are motionless, act as a protection. The ribs, [655<sup>a</sup>1] for example, which enclose the chest are intended to ensure the safety of the heart and neighbouring viscera. The exception is the belly. The walls of this are in all animals devoid of bones; in order that there may be no hindrance to the expansion which necessarily occurs in this part after a meal, nor, in females, any interference with the growth of the foetus, which is lodged here.

[5] Now the bones of viviparous animals, of such, that is, as are not merely externally but also internally viviparous, vary but very little from each other in point of strength. For they are all much greater, in proportion to the size of their bodies, than the non-viviparous animals. For in some places many Vivipara grow to [10] an enormous size, as is the case in Libya and in hot and dry countries generally. But the greater the bulk of an animal, the stronger, the bigger, and the harder, are the supports which it requires; and this requirement will be most marked in those that live a life of rapine. Thus it is that the bones of males are harder than those of females; and the bones of flesh-eaters, that get their food by fighting, are harder [15] than those of others. Of this the lion is

an example; for so hard are its bones, that, when struck, they give off sparks, as though they were stones. It may be mentioned also that the dolphin, inasmuch as it is viviparous, is provided with bones and not with fish-spines.

In those sanguineous animals, on the other hand, that are not viviparous, the bones present successive slight variations of character. Thus in birds there are bones, but these are not so strong as the bones of the Vivipara. Then come the [20] oviparous fishes, where there is fish-spine. In the serpents too the bones have the character of fish-spine, excepting in the very large species, where the solid foundation of the body requires to be stronger, in order that the animal itself may be strong, the same reason prevailing as in the case of the Vivipara. Lastly, in the Selachia, as they are called, the fish-spines are replaced by cartilage. For it is necessary that the movements of these animals shall be of an undulating character; [25] and this again requires the framework that supports the body to be made of a pliable and not of a brittle substance. Moreover, nature has used all the earthy matter on the skin; and she is unable to allot to many different parts one and the same superfluity of material. Even in viviparous animals many of the bones are cartilaginous. This happens in those parts where it is to the advantage of the [30] surrounding flesh that its solid base shall be soft and mucilaginous. Such, for instance, is the case with the ears and nostrils; for in projecting parts brittle substances would soon get broken. Cartilage and bone are indeed fundamentally the same thing, the differences between them being merely matters of degree. Thus neither cartilage nor bone, when once cut off, grows again. Now the cartilages of these land animals are without marrow, that is without any distinctly separate [35] marrow. For the marrow, which in bones is distinctly separate, is here mixed up with the whole mass, and gives a soft and mucilaginous consistence to the cartilage. But in the Selachia the backbone, though it is cartilaginous, yet contains marrow; [655<sup>b</sup>1] for here it stands in the stead of a bone.

Very nearly resembling the bones to the touch are such parts as nails, hoofs, claws, horns, and the beaks of birds, all of which are intended to serve as means of [5] defence. For the organs which are made out of these substances, and which are called by the same names as the substances themselves, the organ hoof, for instance, and the organ horn, are contrivances to ensure the preservation of the animals to which they severally belong. In this class too must be reckoned the teeth, which in some animals have but a single function, namely the mastication of the



food, while [10] in others they have an additional office, namely to serve as weapons; as is the case with all animals that have sharp interfitting teeth or that have tusks. All these parts are necessarily of a solid and earthy character; for the value of a weapon depends on such properties. Hence it is that all such parts are more developed in four-footed vivipara than in man. For there is always more earth in the composition of these [15] animals than in that of the human body. However, not only all these parts but such others as are nearly connected with them, skin for instance, bladder, membrane, hairs, feathers, and their analogues, and any other similar parts that there may be, will be considered farther on with the heterogeneous parts. There we shall inquire into the causes which produce them, and into the goals of their presence severally in [20] the bodies of animals. For, as with the heterogeneous parts, so with these, it is from a consideration of their functions that alone we can derive any knowledge of them. The reason for dealing with them at all in this part of the treatise, and classifying them with the homogeneous parts, is that both the organs and their parts have the same name; and of all these substances flesh and bone form the basis. Semen and milk were also passed over when we were considering the homogeneous fluids. For [25] the treatise on Generation affords a more suitable place for their examination, seeing that the former of the two is a principle of the thing generated, while the latter is its nourishment.

10 · Let us now make, as it were, a fresh beginning, and consider the heterogeneous parts, taking those first which are the first in importance. For in all animals, at least in all the perfect kinds, there are two parts more essential than the [30] rest, namely the part which serves for the ingestion of food, and the part which serves for the discharge of its residue. For without food growth and even existence is impossible. (As for plants, though they also are included by us among things that have life, yet are they without any part for the discharge of waste residue. For the food which they absorb from the ground is already concocted, and they give off [35] instead their seeds and fruits.) And in all there is a third part, intermediate between these two, in which is situated the principle of life. Plants, again, inasmuch as they [656<sup>a</sup>1] are without locomotion, present no great variety in their heterogeneous parts. For, where the functions are but few, few also are the organs required to effect them. The configuration of plants is a matter then for separate consideration. Animals, however, that not only live but perceive, present a greater multiformity of parts, and [5] this diversity is greater in some animals

than in others, being most varied in those to whose share has fallen not mere life but life of high degree. Now such an animal is man. For of all living beings with which we are acquainted man alone partakes of the divine, or at any rate partakes of it in a fuller measure than the rest. For this [10] reason, then, and also because his external parts and their forms are more familiar to us than those of other animals, we must speak of man first; and this the more fitly, because in him alone do the natural parts hold the natural position; his upper part being turned towards that which is upper in the universe. For, of all animals, man alone stands erect.

In man, then, the head is destitute of flesh; this being the necessary [15] consequence of what has already been stated concerning the brain. There are, indeed, some who hold that the life of man would be longer than it is, were his head more abundantly furnished with flesh; and they account for the absence of this substance by saying that it is intended to add to the perfection of sensation. For the brain they assert to be the organ of sensation; and sensation, they say, cannot penetrate to parts that are too thickly covered with flesh. But neither part of this [20] statement is true. On the contrary, were the region of the brain thickly covered with flesh, the very purpose for which animals are provided with a brain would be directly contravened. For the brain would itself be heated to excess and so unable to cool any other part. Again, the brain cannot be the cause of any of the sensations, [25] seeing that it is itself as utterly without feeling as any one of the excretions. These writers see that certain of the senses are located in the head, and are unable to discern the reason for this; they see also that the brain is the most peculiar of all the animal organs; and out of these facts they form an argument, by which they link sensation and brain together. It has, however, already been clearly set forth in the treatise on Sensation, that it is the region of the heart that constitutes the sensory centre. There also it was stated that two of the senses, namely touch and taste, are [30] manifestly in immediate connexion with the heart; and that as regards the other three, namely hearing, sight, and the centrally placed sense of smell, it is the character of their sense-organs which causes them to be lodged as a rule in the head. Vision is so placed in all animals. But such is not invariably the case with hearing or [35] with smell. For fishes and the like hear and smell, and yet have novisible organs for these senses in the head; a fact which demonstrates the accuracy of the opinion here maintained. Now that vision, whenever it exists, should be in the neighbourhood of [656<sup>b</sup>1] the brain is but what one would rationally expect. For the brain is moist and

cold, and vision is of the nature of water, water being of all transparent substances the one most easily confined. Moreover it cannot but necessarily be that the more precise senses will have their precision rendered still greater if ministered to by [5] parts that have the purest blood. For the motion of the heat of blood destroys sensory activity. For these reasons the organs of these senses are lodged in the head.

It is not only the fore part of the head that is destitute of flesh, but the hind part also. For, in all animals that have a head, it is this head which more than any other part requires to be held up. But, were the head heavily laden with flesh, this would be impossible; for nothing so burdened can be held upright. This is an additional [10] proof that the absence of flesh from the head is not for the sake of brain sensation. For there is no brain in the hinder part of the head, and yet this is as much without flesh as is the front.

In some animals hearing as well as vision is lodged in the region of the head. [15] Nor is this without a rational explanation. For what is called the empty space is full of air, and the organ of hearing is, as we say, of the nature of air. Now there are channels which lead from the eyes to the blood-vessels that surround the brain; and similarly there is a channel which leads back again from each ear and connects it with the hinder part of the head. [But no part that is without blood is endowed with sensation, as neither is the blood itself, but only some one of the parts that are [20] formed of blood. That is why in the Sanguinea no bloodless part is capable of sensation, nor is the blood itself; for it is no part of the animals.]<sup>9</sup>

The brain in all animals that have one is placed in the front part of the head; because the direction in which sensation acts is in front; and because the heart, from which sensation proceeds, is in the front part of the body; and lastly because the [25] instruments of sensation are the blood-containing parts, and the cavity in the posterior part of the skull is destitute of blood-vessels.

As to the position of the sense-organs, they have been arranged by nature in the following well-ordered manner. The organs of hearing are so placed as to divide the circumference of the head into two equal halves; for they have to hear not only sounds which are directly in a line with themselves, but sounds from all quarters. The organs of vision are placed in front, because sight is exercised only in a straight [30] line, and moving as we do in a forward direction it is necessary that we should see before us, in the direction of our motion. Lastly, the organs of smell are placed with good reason between the eyes. For as the body consists of

two parts, a right half and a left, so also each organ of sense is double. In the case of touch this is not apparent, [35] the reason being that the primary organ of this sense is not the flesh or analogous part, but lies internally. In the case of taste, which is merely a modification of touch [657<sup>a</sup>1] and which is placed in the tongue, the fact is more apparent than in the case of touch, but still not so manifest as in the case of the other senses. However, even in taste it is evident enough; for in some animals the tongue is plainly forked. The double character of the sensations is, however, more conspicuous in the other organs of sense. For there are two ears and two eyes, and the nostrils, though joined together, are also two. Were these latter otherwise disposed, and separated from [5] each other as are the ears, neither they nor the nose in which they are placed would be able to perform their office. For in such animals as have nostrils olfaction is effected by means of inspiration, and the organ of inspiration is placed in front and in the middle line. This is the reason why nature has brought the two nostrils together and placed them as the central of the three sense-organs, setting them side by side on a level with each other, to avail themselves of the inspiratory motion. In [10] other animals than man the arrangement of these sense-organs is also such as is adapted in each case to the special requirements.

**11** · For instance, in quadrupeds the ears stand out freely from the head and are set to all appearance above the eyes. Not that they are in reality above the eyes; [15] but they seem to be so, because the animal does not stand erect, but has its head hung downwards. This being the usual attitude of the animal when in motion, it is of advantage that its ears shall be high up and movable; for by turning themselves about they can the better take in sounds from every quarter.

**12** · In birds, on the other hand, there are only the auditory passages. This is [20] because their skin is hard and because they have feathers instead of hairs, so that they have not got the proper material for the formation of ears. Exactly the same is the case with such oviparous quadrupeds as are clad with scaly plates, and the same explanation applies to them. There is also one of the vivipara, namely the seal, that has no ears but only the auditory passages. The explanation of this is that the seal is a deformed quadruped.

[25] **13** · Men, and Birds, and Quadrupeds, viviparous and oviparous alike, have their eyes protected by lids. In the Vivipara there are two of these; and both are used also in the act of blinking; whereas the oviparous quadrupeds, and the heavy-bodied [30] birds as well as some others, use only the lower lid to close the eye; while birds blink by means of a membrane that issues from the corner of the eye. The reason for the eyes being thus protected is that they are of fluid consistency, in order to ensure keenness of vision. For had they been covered with hard skin, they would, it is true, have been less liable to get injured by anything falling into them from without, but they would not have been sharp-sighted. It is then to ensure keenness of vision that [35] the skin over the pupil is fine and delicate; while the lids are for protection from injury. It is as a still further safeguard that all these animals blink, and man most of [657<sup>b</sup>1] all; this action (which is not performed from deliberate intention but from a natural instinct) serving to keep objects from falling into the eyes; and being more frequent in man than in the rest of these animals, because of the greater delicacy of his skin. These lids are made of a roll of skin; and it is because they are made of skin and contain no flesh that neither they, nor the foreskin, unite again when once cut.

[5] As to the oviparous quadrupeds, and such birds as close the eye with the lower lid, it is the hardness of the skin of their heads which makes them do so. For such birds as have heavy bodies are not made for flight; and so the materials which would otherwise have gone to increase the growth of the feathers are diverted thence, and [10] used to augment the thickness of the skin. Birds therefore of this kind close the eye with the lower lid; whereas pigeons and the like use both. Oviparous quadrupeds are covered with scaly plates; and these in all their forms are harder than hairs, so that the skin also to which they belong is harder than the skin of hairy animals. In these animals, then, the skin on the head is hard, and so does not allow of the formation of [15] an upper eyelid, whereas lower down the integument is of a flesh-like character, so that the lower lid can be thin and extensible.

The act of blinking is performed by the heavy-bodied birds by means of the membrane already mentioned, and not by this lower lid. For in blinking rapid motion is required, and such is the motion of this membrane, whereas that of the lower lid is slow. It is from the corner of the eye that is nearest to the nostrils that the membrane comes. For it is better to have one starting-point than two; and in these [20] birds this

starting-point is the junction of eye and nostrils, an anterior starting-point being preferable to a lateral one. Oviparous quadrupeds do not blink in like manner as the birds; for, living as they do on the ground, they are free from the necessity of having eyes of fluid consistency and of keen sight, whereas these are essential requisites for birds, inasmuch as they have to use their eyes at long distances. This [25] too explains why birds with talons, that have to search for prey by eye from aloft, and therefore soar to greater heights than other birds, are sharp-sighted; while common fowls and the like, that live on the ground and are not made for flight, have no such keenness of vision. For there is nothing in their mode of life which imperatively requires it.

Fishes and Insects and the hard-skinned Crustacea present certain differences [30] in their eyes, but none of them have eyelids. As for the hard-skinned Crustacea it is utterly out of the question that they should have any; for an eyelid, to be of use, requires the action of the skin to be rapid. These animals then have hard eyes in [35] default of this protection, just as though the lid were attached to the surface of the eye, and the animal saw through it. Inasmuch, however, as such hardness must necessarily blunt the sharpness of vision, nature has endowed the eyes of Insects, and still more those of Crustacea, with mobility (just as she has given some [658<sup>a</sup>1] quadrupeds movable ears), in order that they may be able to turn to the light and catch its rays, and so see more plainly. Fishes, however, have eyes of a fluid consistency. For animals that move much about have to use their vision at [5] considerable distances. For land animals, the air is transparent enough. But the water in which fishes live is a hindrance to sharp sight, though it has this advantage over the air, that it does not contain so many objects to knock against the eyes. For this reason, nature, which makes nothing in vain, has given no eyelids to fishes, while to counterbalance the opacity of the water she has made their eyes of fluid [10] consistency.

14 · All animals that have hairs on the body have lashes on the eyelids; but birds and animals with scale-like plates, being hairless, have none. The Libyan ostrich, indeed, is furnished with eyelashes. This exception, however, will be [15] explained hereafter. Of hairy animals, man alone has lashes on both lids. For in quadrupeds there is a greater abundance of hair on the back than on the under side of the body; whereas in man the contrary is the case, and the hair is more abundant on the front surface than on the back. The reason for this is that hair is

intended to serve as a protection to its possessor. Now, in quadrupeds the back requires more protection, and their underside, though more noble is smooth because of their [20] inclined posture. But in man, owing to his upright attitude, the anterior and posterior surfaces of the body are on an equality as regards need of protection. Nature therefore has assigned the protective covering to the nobler of the two surfaces; for invariably she brings about the best arrangement of such as are [25] possible. This then is the reason that there is no lower eyelash in any quadruped; though in some a few scattered hairs sprout out under the lower lid. This also is the reason that they never have hair in the armpits, nor on the pubes, as man has. Their hair, then, instead of being collected in these parts, is either thickly set over the whole dorsal surface, as is the case for instance in dogs, or, sometimes, forms a [30] mane, as in horses and the like, or as in the male lion, where the mane is still more ample. So, again, whenever there is a tail of any length, nature decks it with hair, with long hair if the stem of the tail be short, as in horses, with short hair if the stem [35] be long, regard also being had to the condition of the rest of the body. For nature invariably gives to one part what she subtracts from another. Thus when she has covered the general surface of an animal's body with an excess of hair, she leaves a [658<sup>b</sup>1] deficiency in the region of the tail. This, for instance, is the case with bears.

No animal has so much hair on the head as man. This, in the first place, is the necessary result of the fluid character of his brain, and of the presence of so many sutures in his skull. For wherever there is the most fluid and the most heat, there [5] also must necessarily occur the greatest outgrowth. But, secondly, in order to protect the head, by preserving it from excess of either heat or cold. And as the brain of man is larger and more fluid than that of any other animal, it requires a proportionately greater amount of protection. For the more fluid a substance is, the more readily does it get excessively heated or excessively chilled, while substances [10] of an opposite character are less liable to such affections.

These, however, are matters which by their close connexion with eyelashes have led us to digress from our real topic, namely the cause to which these lashes owe their existence. We must therefore defer any further remarks we may have to make on these matters till the proper occasion arises.

[15] **15** · Both eyebrows and eyelashes exist for the protection of the eyes; the former that they may shelter them, like the eaves of a house,

from any fluids that trickle down from the head; the latter to act like the palisades which are sometimes placed in front of enclosures, and keep out any objects which might otherwise get in. The brows are placed over the junction of two bones, which is the reason that in old [20] age they often become so bushy as to require cutting. The lashes are set at the terminations of small blood-vessels. For the vessels come to an end where the skin itself terminates; and, in all places where these endings occur, the exudation of [25] moisture of a corporeal character actually necessitates the growth of hairs, unless there be some operation of nature which interferes, by diverting the moisture to another purpose.

16 · Viviparous quadrupeds, as a rule, present no great variety of form in the [30] organ of smell. In those of them, however, whose jaws project forwards and taper to a narrow end, so as to form what is called a snout, the nostrils are placed in this projection, there being no other available plan; while, in the rest, there is a more definite demarcation between nostrils and jaws. But in no animal is this part so [35] peculiar as in the elephant, where it attains an extraordinary size and strength. For the elephant uses its nostril as a hand; this being the instrument with which it conveys food, fluid and solid alike, to its mouth. With it, too, it tears up trees, coiling [659<sup>a</sup>1] it round their stems. In fact it applies it generally to the purposes of a hand. For the elephant has the double character of a land animal, and of one that lives in swamps. Seeing then that it has to get its food from the water, and yet must necessarily breathe, inasmuch as it is a land animal and has blood; seeing, also, that its [5] excessive weight prevents it from passing rapidly from water to land, as some other sanguineous vivipara that breathe can do, it becomes necessary that it shall be suited alike for life in the water and for life on dry land. Just then as divers are sometimes provided with instruments for respiration, through which they can draw air from above the water, and thus may remain for a long time under the sea, so also [10] have elephants been furnished by nature with their lengthened nostril; and, whenever they have to traverse the water, they lift this up above the surface and breathe through it. For the elephant's trunk, as already said, is a nostril. Now it [15] would have been impossible for this nostril to have such a form had it been hard and incapable of bending. For its very length would then have prevented the animal from supplying itself with food, being as great an impediment as the horns of certain oxen, that are said to be obliged to walk backwards while they are grazing. It is [20] therefore soft and flexible, and, being such, is made, in addition to its



own proper functions, to serve the office of the fore-feet; nature in this following her wonted plan of using one and the same part for several purposes. For in polydactylous quadrupeds the fore-feet are intended not merely to support the weight of the body, [25] but to serve as hands. But in elephants, though they must be reckoned polydactylous, as their foot has neither cloven nor solid hoof, the fore-feet, owing to the great size and weight of the body, are reduced to the condition of mere supports; and indeed their slow motion and unfitness for bending make them useless for any other purpose. A nostril, then, is given to the elephant for respiration, as to every other [30] animal that has a lung, and is lengthened out and endowed with its power of coiling because the animal has to remain for considerable periods of time in the water, and is unable to pass thence to dry ground with any rapidity. But as the feet are shorn of their full office, this same part is also, as already said, made by nature to supply [35] their place, and give such help as otherwise would be rendered by them.

As to other sanguineous animals, the birds, the serpents, and the oviparous [659<sup>b</sup>1] quadrupeds, in all of them there are the nostril-holes, placed in front of the mouth; but in none are there any distinctly formed nostrils, nothing in fact which can be called nostrils except from a functional point of view. A bird at any rate has nothing which can properly be called a nose. For its so-called beak is a substitute for jaws. [5] The reason for this is to be found in the natural conformation of birds. For they are winged bipeds; and this makes it necessary that their head and neck shall be of light weight; just as it makes it necessary that their breast shall be narrow. The beak therefore is formed of a bone-like substance, in order that it may serve as a weapon [10] as well as for nutritive purposes, but is made of narrow dimensions to suit the small size of the head. In this beak are placed the olfactory passages. But there are no nostrils; for such could not possibly be placed there.

As for those animals that have no respiration, it has already been explained [15] why it is that they are without nostrils, and perceive odours either through gills, or through a blow-hole, or, if they are insects, by the hypozoma; and how the power of smelling depends, like their motion, upon the innate breath of their bodies, which in all of them is implanted by nature and not introduced from without.

[20] Under the nostrils are the lips, in such sanguineous animals, that is, as have teeth. For in birds, as already has been said, the purposes of nutrition and defence are fulfilled by a bone-like beak, which forms a compound substitute for teeth and [25] lips. For supposing that one were

to cut off a man's lips, unite his upper teeth together, and similarly his under ones, and then were to lengthen out the two separate pieces thus formed, narrowing them on either side—then we should at once have a bird-like beak.

The use of the lips in all animals except man is to preserve and guard the teeth; [30] and thus it is that the distinctness with which the lips are formed is in direct proportion to the degree of nicety and perfection with which the teeth are fashioned. In man the lips are soft and flesh-like and capable of separating from each other. Their purpose, as in other animals, is to guard the teeth, but they are more especially intended to serve a higher office, contributing in common with other parts to man's faculty of speech. For just as nature has made man's tongue unlike [660<sup>a</sup>1] that of other animals, and, in accordance with what I have said is her not uncommon practice, has used it for two distinct operations, namely for the perception of savours and for speech, so also has she acted with regard to the lips, and made them serve both for speech and for the protection of the teeth. For vocal speech consists of combinations of the letters, and most of these it would be [5] impossible to pronounce, were the lips not moist, nor the tongue such as it is. For some letters are formed by closures of the lips and others by applications of the tongue. But what are the differences presented by these and what the nature and extent of such differences, are questions to which answers must be sought from those who are versed in metrical science. It was necessary that the two parts which [10] we are discussing should from the start be severally adapted to fulfil the office mentioned above, and be of appropriate character. Therefore are they made of flesh, and flesh is softer in man than in any other animal, the reason for this being that of all animals man has the most delicate sense of touch.

[15] **17** · The tongue is placed under the vaulted roof of the mouth. In land animals it presents but little diversity. But in other animals it is variable, and this whether we compare them as a class with such as live on land, or compare their several species with each other. It is in man that the tongue attains its greatest degree of freedom, of softness, and of breadth; the object of this being to render it [20] suitable for its double function—both for the perception of savours (for man is the most sensitive of animals, and a soft tongue is most adapted to sensation, being most impressionable by touch, of which sense taste is but a variety), and its softness again, together with its breadth, adapts it for the articulation

of letters and for [25] speech. For these qualities, combined with its freedom from attachment, are those which suit it best for advancing and retiring in every direction. That this is so is plain, if we consider the case of those who are tongue-tied in however slight a degree. For their speech is indistinct and lisping; that is to say there are certain letters which they cannot pronounce. In being broad is comprised the possibility of becoming narrow; for in the great the small is included, but not the great in the small.

What has been said explains why, even among birds, those that are most capable of pronouncing letters are such as have the broadest tongues; and why the [30] viviparous and sanguineous quadrupeds, where the tongue is hard and thick and not free in its motions, have a very limited vocal articulation. Some birds have a considerable variety of notes. These are the smaller kinds. But it is the birds with [35] talons that have the broader tongues. All birds use their tongues to communicate with each other. But some do this in a greater degree than the rest; so that in some [660<sup>b</sup>1] cases it even seems as though actual instruction were imparted from one to another. These, however, are matters which have already been discussed in the *History of Animals*.

As to those oviparous and sanguineous animals that live on land, their tongue in most cases is tied down and hard, and is therefore useless for vocal purposes; in [5] the serpents, however, and in the lizards it is long and forked, so as to be suited for the perception of savours. So long indeed is this part in serpents, that though small while in the mouth it can be protruded to a great distance. In these same animals it is forked and has a fine and hair-like extremity, because of their great liking for food. For by this arrangement they derive a twofold pleasure from savours, their gustatory sensation being as it were doubled. [10]

Even some bloodless animals have an organ that serves for the perception of savours; and in sanguineous animals such an organ is invariably present. For even in such of these as seem to most people to have nothing of the kind, some of the fishes for example, there is a kind of shabby representative of a tongue, much like what exists in river crocodiles. In most of these cases the apparent absence of the part can [15] be rationally explained on some ground or other. For in the first place the interior of the mouth in animals of this character is invariably spinous. Secondly, in water animals there is but short space of time for the perception of savours, and as the use of this sense is thus of short duration, shortened also is the separate part which [20] subserves it. The reason for their food being so rapidly transmitted to the stomach is that

they cannot possibly spend any time in sucking out the juices; for were they to attempt to do so, the water would make its way in during the process. Unless therefore one pulls their mouth very widely open, the projection of this part is quite invisible. The region exposed by thus opening the mouth is spinous; for it is formed by the close apposition of the gills, which are of a spinous character. [25]

In crocodiles the immobility of the lower jaw also contributes in some measure to stunt the development of the tongue. For the crocodile's tongue is adherent to the lower jaw. For its upper and lower jaws are, as it were, inverted, it being the upper jaw which in other animals is the immovable one. The tongue, however, of this animal is not attached to the upper jaw, because that would interfere with the [30] ingestion of food, but adheres to the lower jaw, because this is, as it were, the upper one which has changed its place. Moreover, it is the crocodile's lot, though a land animal, to live the life of a fish, and this again necessarily involves an indistinct formation of the part in question.

[35] The roof of the mouth resembles flesh, even in many of the fishes; and in some of the river species, as for instance in the fishes known as Cyprini, is so very [661\*1] flesh-like and soft as to be taken by careless observers for a tongue. The tongue of fishes, however, though it exists as a separate part, is never formed with such distinctness as this, as has been already explained. Again, the gustatory sensibility [5] is not diffused equally over the whole surface of the tongue-like organ, but is placed chiefly in the tip; and for this reason it is the tip which is the only part of the tongue separated in fishes from the rest of the mouth. As all animals are sensible to the pleasure derivable from food, they all feel a desire for it. For the object of desire is the pleasant. The part, however, by which food produces the sensation is not alike in [10] all of them, but while in some it is free from attachments, in others, where it is not required for vocal purposes, it is adherent. In some again it is hard, in others soft or flesh-like. Thus even the Crustacea, the crayfish for instance and the like, and the [15] Cephalopods, such as the cuttlefish and the octopus, have some such part inside the mouth. As for the Insects, some of them have the part which serves as tongue inside the mouth, as is the case with ants, and as is also the case with many Testacea, while in others it is placed externally. In this latter case it resembles a sting, and is hollow and spongy, so as to serve at one and the same time for the tasting and for the [20] sucking up of nutriment. This is plainly to be seen in flies and bees and all such animals, and likewise in some of the Testacea. In the purple murex, for instance, so strong is this part that it enables them

to bore holes through the hard covering of shell-fish, of the spiral snails, for example, that are used as bait to catch them. So also the gad-flies and cattle-flies can pierce through the skin of man, and some of [25] them even through the skins of other animals. Such, then, in these animals is the nature of the tongue, which is thus as it were the counterpart of the elephant's nostril. For as in the elephant the nostril is used as a defence, so in these animals the tongue serves as a sting.

[30] In all other animals the tongue agrees with the description already given.

## BOOK III

1 · We have next to consider the teeth, and with these the mouth which they [661<sup>b</sup>1] enclose and form. The teeth have one invariable office, namely the reduction of food; but besides this general function they have other special ones, and these differ in different groups. Thus in some animals the teeth serve as weapons; but this with a distinction. For there are offensive weapons and there are defensive weapons; and [5] while in some animals, as the wild Carnivora, the teeth answer both purposes, in many others, both wild and domesticated, they serve only for defence. In man the teeth are admirably constructed for their general office, the front ones being sharp, so as to cut the food into bits, and the molars broad and flat, so as to grind it to a pulp; while between these and separating them are the canines which, in accordance [10] with the rule that the mean partakes of both extremes, share in the characters of those on either side, being broad in one part but sharp in another. Similar distinctions of shape are presented by the teeth of other animals, with the exception of those whose teeth are one and all of the sharp kind. In man, however, the number and the character even of these sharp teeth have been mainly determined by the requirements of speech. For the front teeth of man contribute in many ways to the [15] formation of letter-sounds.

In some animals, however, the teeth, as already said, serve merely for the reduction of food. When, besides this, they serve as offensive and defensive weapons, they may either be formed into tusks, as for instance is the case in swine, or may be sharp-pointed and interlock with those of the opposite jaw, in which case the animal is said to be saw-toothed. For the strength of such an animal is in its [20] teeth, and these depend for their efficiency on their sharpness. In order, then, to prevent their getting blunted by mutual friction, such of them as serve for weapons fit into each other's interspaces. No animal that has saw-teeth is at the same time furnished with tusks. For nature never makes anything superfluous or in vain. She gives, therefore, tusks to such animals as strike in fighting, and serrated teeth to [25] such as bite. Sows, for instance, have no tusks, and accordingly sows bite.

A general principle must here be noted, which will be found applicable not only in this instance but in many others that will occur

later on. Nature allots each weapon, offensive and defensive alike, to those animals alone that can use it; or, if [30] not to them alone, to them in a more marked degree; and she allots it in its most perfect state to those than can use it best; and this whether it be a sting, or a spur, or horns, or tusks, or what it may of a like kind.

Thus as males are stronger and more choleric than females, it is in males that such parts as those just mentioned are found, either exclusively, as in some species, or more fully developed, as in others. For though females are of course provided with such parts as are necessary to them, the parts, for instance, which subserve [35] nutrition, they have even these in an inferior degree, and the parts which answer no such necessary purpose they do not possess at all. This explains why stags have [662<sup>a</sup>1] horns, while does have none; why the horns of cows are different from those of bulls, and, similarly, the horns of ewes from those of rams. It explains also why the females are often without spurs in species where the males are provided with them, [5] and accounts for similar facts relating to all other such parts.

All fishes have teeth of the saw-toothed form, with the single exception of the fish known as the Scarus. In many of them there are teeth even on the tongue and on the roof of the mouth. The reason for this is that, living as they do in the water, they cannot but allow this fluid to pass into the mouth with the food. The fluid thus [10] admitted they must necessarily discharge again without delay. For they cannot spend time grinding their food, since the water would run into their digestive cavities. Their teeth therefore are all sharp, being adapted only for cutting, and are numerous and set in many parts, that their abundance may serve in lieu of any grinding faculty, to mince the food into small bits. They are also curved, because [15] they are almost the only weapons which fishes possess.

In all these offices of the teeth the mouth also takes its part; but besides these functions it is subservient to respiration, in all such animals as breathe and are cooled by external agency. For nature, as already said, uses the parts which are [20] common to all animals for many special purposes, and this of her own accord. Thus the mouth has one universal function in all animals alike, namely its alimentary office; but in some, besides this, the special duty of serving as a weapon is attached to it; in others that of ministering to speech; and again in many, though not in all, the office of respiration. All these functions are thrown by nature upon one single organ, the construction of which she varies so as to suit the variations of office. [25] Therefore it is that in some animals the mouth is

contracted, while in others it is of wide dimensions. The contracted form belongs to such animals as use the mouth merely for nutritive, respiratory, and vocal purposes; whereas in such as use it as a means of defence it has a wide gape. This is its invariable form in such animals as are saw-toothed. For seeing that their mode of warfare consists in biting, it is advantageous to them that their mouth shall have a wide opening; for the wider it [30] opens, the greater will be the extent of the bite, and the more numerous will be the teeth called into play.

Biting and carnivorous fish have a mouth of that sort, whereas in the rest it is a tapering snout. For this form is suited for their purposes, while the other would be useless.

In birds the mouth consists of what is called the beak, which in them is a substitute for lips and teeth. This beak presents variations in harmony with the [662<sup>b</sup>1] functions and protective purposes which it serves. Thus in those birds that are called Crooked-clawed it is invariably hooked, inasmuch as these birds are carnivorous, and eat no kind of vegetable food. For this form renders it serviceable to them in obtaining the mastery over their prey, and is better suited for deeds of violence than [5] any other. Moreover, as their weapons of offence consist of this beak and of their claws, these latter also are more crooked in them than in the generality of birds. Similarly in each other kind of bird the beak is suited to the mode of life. Thus, in woodpeckers it is hard and strong, as also in crows and birds of crow-like habit, while in the smaller birds it is delicate, so as to be of use in collecting seeds and [10] picking up minute animals. In such birds, again, as eat herbage, and such as live about marshes—those, for example, that swim and have webbed feet—the bill is broad, or adapted in some other way to the mode of life. For a broad bill enables a bird to dig into the ground with ease, just as, among quadrupeds, does the broad snout of the pig, an animal which, like the birds in question, lives on roots. [15] Moreover, in these root-eating birds and in some others of like habits of life, the tips of the bill end in hard points, which gives them additional facility in dealing with herbaceous food.

The several parts which are set on the head have now, pretty nearly all, been considered. In man, however, the part which lies between the head and the neck is called the face, this name being, it would seem, derived from the function of the [20] part. For as man is the only animal that stands erect, he is also the only one that looks directly in front; and the only one whose voice is emitted in that direction.<sup>10</sup>



2 · We have now to treat of horns; for these also, when present, are appendages of the head. They exist in none but viviparous animals; though in some ovipara certain parts are metaphorically spoken of as horns, in virtue of a certain [25] resemblance. To none of such parts, however, does the proper office of a horn belong; for the vivipara have their horns for the sake of defence and attack, but this is not the case with any of the other creatures said to have horns; for they do not use their horns in defence or for mastery, which are tasks requiring strength. So also no [30] polydactylous animal is furnished with horns. For horns are defensive weapons, and these polydactylous animals possess other means of security. For to some of them nature has given claws, to others teeth suited for combat, and to the rest some other adequate defensive appliance. There are horns, however, in most of the cloven-hoofed animals, and in some of those that have a solid hoof, serving them as an [663<sup>a</sup>1] offensive weapon. Horns also serve for defence in all animals that have not been provided by nature with some other means of security; such means, for instance, as speed, which has been given to horses; or great size, as in camels; for excessive bulk, [5] such as has been given to these animals, and in a still greater measure to elephants, is sufficient in itself to protect an animal from being destroyed by others. Other animals again are protected by the possession of tusks; and among these are the swine, though they have a cloven hoof.

All animals again, whose horns are but useless appendages, have been provided by nature with some additional means of security. Thus deer are endowed with [10] speed; for the large size and great branching of their horns makes these a source of detriment rather than of profit to their possessors. Similarly endowed are the antelope and gazelle; for though these animals will stand up against some enemies and defend themselves with their horns, yet they run away from such as are fierce and pugnacious. The bison again, whose horns curve inwards towards each other, is provided with a means of protection in the discharge of its excrement; and of this it [15] avails itself when frightened. There are some other animals that have a similar mode of defence. In no case, however, does nature ever give more than one adequate means of protection to one and the same animal.

Most of the animals that have horns are cloven-hoofed; but the Indian ass, as they call it, is also reported to be horned, though its hoof is solid.

Again as the body, so far as regards its organs of motion, consists of two [20] distinct parts, the right and the left, so also and for the same

reasons the horns of animals are, in the great majority of cases, two in number. Still there are some that have but a single horn; the oryx, for instance, and the so-called Indian ass; in the former of which the hoof is cloven, while in the latter it is solid. In such animals the [25] horn is set in the centre of the head; for as the middle belongs equally to both extremes, this arrangement is the one that comes nearest to each side having its own horn.

Again, it would appear consistent with reason that the single horn should go with the solid rather than with the cloven hoof. For hoof, whether solid or cloven, is [30] of the same nature as horn; so that the two naturally undergo division simultaneously and in the same animals. Again, since the division of the cloven hoof depends on deficiency of material, it is but rationally consistent, that nature, when she gave an animal an excess of material for the hoofs, which thus became solid, should have taken away something from the upper parts and so made the animal to have but one horn.

[35] Rightly too did she act when she chose the head whereon to set the horns; and Æsop's Momus is beside the mark, when he finds fault with the bull for not having [663<sup>b</sup>1] its horns upon its shoulders. For from this position, says he, they would have delivered their blow with the greatest force, whereas on the head they occupy the weakest part of the whole body. Momus was but dull-sighted in making this hostile [5] criticism. For had the horns been set on any other part than they are, the encumbrance of their weight would have been increased, not only without any compensating gain whatsoever, but with the disadvantage of impeding many bodily operations—and similarly if they had been set on the shoulders. For the point whence the blows could be delivered with the greatest force was not the only matter to be considered, but the point also whence they could be delivered with the widest range. But as the bull has no hands and cannot possibly have its horns on its feet or on its knees, where they would prevent flexion, there remains no other site for them [10] but the head; and this therefore they necessarily occupy. In this position, moreover, they are much less in the way of the movements of the body than they would be elsewhere.

Deer are the only animals in which the horns are solid throughout, and are also the only animals that cast them. This casting is for the advantage of the deer from the increased lightness which it produces, but, seeing how heavy the horns are, it is also a matter of necessity.

[15] In all other animals the horns are hollow for a certain distance, and the end alone is solid, this being the part of use in a blow. At the

same time, to prevent even the hollow part which grows out of the skin from being weak, the solid part fitted into it comes up from the bones. For this arrangement is not only that which makes the horns of the greatest service in fighting, but that which causes them to be as [20] little of an impediment as possible in the other actions of life.

Such then are the reasons for which horns exist; and such the reasons why they are present in some animals, absent from others.

Let us now consider the character of the material nature whose necessary results have been employed by rational nature for a final cause.

In the first place, then, the larger the bulk of animals, the greater is the [25] proportion of corporeal and earthy matter which they contain. Thus no very small animal is known to have horns, the smallest horned animal that we are acquainted with being the gazelle. But in all our speculations concerning nature, what we have to consider is the general rule; for that is natural which applies either universally or for the most part. Now all the bone in animals' bodies is earthy; and that is why we [30] can say, if we consider what holds for the most part, that there is most earthy matter in the largest animals. At any rate, in the larger animals there is an excess of it, and this excess is turned by nature to useful account, being converted into weapons of defence. Part of it necessarily flows to the upper portion of the body, and this is allotted in some cases to the formation of tusks and teeth, in others to the formation [35] of horns. Thus it is that no animal that has horns has also front teeth in both jaws, those in the upper jaw being deficient. For nature by subtracting from the teeth [664<sup>a</sup>1] adds to the horns; the nutriment which in most animals goes to the former being here spent on the augmentation of the latter. Does, it is true, have no horns and yet are equally deficient with the males as regards the teeth. The reason, however, for this is that they, as much as the males, are naturally horn-bearing animals; but they [5] have been stripped of their horns, because these would be useless—indeed they are useless to the males too, but the males' strength makes them less harmful. In other animals, where this material is not secreted from the body in the shape of horns, it is used to increase the size of the teeth; in some cases of all the teeth, in others merely [10] of the tusks, which thus become so long as to resemble horns projecting from the jaws.

So much, then, of the parts which appertain to the head.

**3** · Below the head lies the neck, in such animals as have one. This is the case with those only that have the parts to which a neck is

subservient. These parts are [15] the larynx and what is called the oesophagus. Of these the larynx exists for the sake of respiration, being the instrument by which animals inhale and discharge the air. Therefore it is that, when there is no lung, there is also no neck. Of this condition the [20] fishes are an example. The oesophagus is the channel through which food is conveyed to the stomach; so that all animals that are without a neck are also without a distinct oesophagus. Such a part is in fact not required of necessity for nutritive purposes; for it has no action whatsoever on the food. Indeed there is nothing to prevent the stomach from being placed directly after the mouth. This, however, is [25] impossible in the case of the lung. For there must be some sort of tube common to the two divisions of the lung, by which—it being bipartite—the breath may be apportioned to their respective bronchi, and thence pass into the air-pipes; and such an arrangement will be the best for producing inspiration and expiration. The organ then concerned in respiration must of necessity be of some length; and this, again, [30] necessitates there being an oesophagus to unite mouth and stomach. This oesophagus is of a flesh-like character, and yet admits of extension like a sinew. This latter property is given to it, that it may stretch when food is introduced; while the flesh-like character is intended to make it soft and yielding, and to prevent it from [35] being rasped by particles as they pass downwards, and so suffering damage. On the other hand, the windpipe and the so-called larynx are constructed out of a cartilaginous substance. For they have to serve not only for respiration, but also for [664<sup>b</sup>1] vocal purposes; and an instrument that is to produce sounds must necessarily be not only smooth but firm. The windpipe lies in front of the oesophagus, although this position causes it to be some hindrance to the latter when admitting food. For if a [5] morsel of food, fluid or solid, slips into it by accident, choking and much distress and violent fits of coughing ensue. This must be a matter of astonishment to any of those who assert that it is by the windpipe that an animal imbibes fluid. For the consequences just mentioned occur invariably, whenever a particle of food slips in, [10] and are quite obvious. Indeed on many grounds it is ridiculous to say that this is the channel through which animals imbibe fluid. For there is no passage leading from the lung to the stomach, such as the oesophagus which we see leading thither from the mouth. Moreover, when any cause produces sickness and vomiting, it is plain enough whence the fluid is discharged. It is manifest also that fluid does not pass [15] directly into the bladder and collect there, but goes first into the stomach. For, when red wine is taken, the excreta from the

stomach are seen to be coloured by its dregs; and such discoloration has been even seen on many occasions where there have been wounds opening into the stomach. However, it is perhaps silly to be minutely particular in dealing with silly statements such as this.

[20] The windpipe then, owing to its position in front of the oesophagus, is exposed, as we have said, to annoyance from the food. To obviate this, however, nature has contrived the epiglottis. This part is not found in all viviparous animals, but only in such of them as have a lung and a skin covered with hairs, and not either with scaly [25] plates or with feathers. In the latter animals, instead of an epiglottis the larynx closes and opens, just as in the other case the epiglottis falls down and rises up; rising up during the ingress or egress of breath, and falling down during the ingestion of food, so as to prevent any particle from slipping into the windpipe. [30] Should there be the slightest want of accuracy in this movement, or should an inspiration be made during the ingestion of food, choking and coughing ensue, as already has been noticed. So admirably contrived, however, is the movement both of the epiglottis and of the tongue, that, while the food is being ground in the mouth [35] and passing over the epiglottis, the tongue very rarely gets caught between the teeth and seldom does a particle slip into the windpipe.

[665<sup>a</sup>1] The animals which have been mentioned as having no epiglottis owe this deficiency to the dryness of their flesh and to the hardness of their skin. For an epiglottis made of such materials would not admit of easy motion. It would, indeed, take a longer time to shut down an epiglottis made of the peculiar flesh of these [5] animals, and shaped like that of those with hairy skins, than to bring the edges of the windpipe itself into contact with each other.

Thus much then as to the reason why some animals have an epiglottis while others have none. It is a contrivance of nature to remedy the unsatisfactory position [10] of the windpipe in front of the oesophagus. That position is the result of necessity. For it is in the front and centre of the body that the heart is situated, in which we say is the principle of life and the source of all motion and sensation. (For sensation and motion are exercised in the direction which we term forwards, and it is on this very [15] relation that the distinction of before and behind is founded.) But where the heart is, there and surrounding it is the lung. Now inspiration, which occurs because of the lung and the principle which has its seat in the heart, is effected through the windpipe. Since then the heart must of necessity lie in the very front place of all, it follows that the larynx also and the windpipe must of necessity lie in front of the [20] oesophagus.

For they lead to the lung and heart, whereas the oesophagus leads to the stomach. And in general, as regards above and below, front and back, right and [25] left, the nobler and more honourable part invariably is placed uppermost, in front, and on the right, unless some more important object stands in the way.

4 · We have now dealt with the neck, the oesophagus, and the windpipe, and have next to treat of the viscera. These are peculiar to sanguineous animals, some of which have all of them, others only a part, while no bloodless animals have any at [30] all. Democritus then seems to have been mistaken in the notion he formed of the viscera, if, that is to say, he fancied that the reason why none were discoverable in bloodless animals was that these animals were too small to allow them to be seen. For, in sanguineous animals, both heart and liver are visible enough when the body is only just formed, and while it is still extremely small. For these parts are to be seen in the egg sometimes as early as the third day, being then no bigger than a point; and are visible also in aborted embryos, while still excessively minute. [665<sup>b</sup>1] Moreover, as the external organs are not precisely alike in all animals, but each creature is provided with such as are suited to its special mode of life and motion, so is it with the internal parts, these also differing in different animals. Viscera, then, [5] are peculiar to sanguineous animals; and therefore are all formed from sanguineous material, as is plainly to be seen in the new-born young of these animals. For in such the viscera are more sanguineous, and of greater bulk in proportion to the body, it being in the earliest stage of formation that the nature of the material and its abundance are most conspicuous. There is a heart, then, in all sanguineous animals, [10] and the reason for this has already been given. For that sanguineous animals must necessarily have blood is self-evident. And, as the blood is fluid, it is also a matter of necessity that there shall be a receptacle for it; and it is apparently to meet this requirement that nature has devised the blood-vessels. These, again, must necessarily have one primary source. For it is preferable that there shall be one such, [15] when possible, rather than several. This primary source of the vessels is the heart. For the vessels manifestly issue from it and do not go through it. Moreover, being as it is homogeneous, it has the character of a blood-vessel. Again its position is that of a primary part. For nature, when no other more important purpose stands in her way, places the more honourable part in the more honourable position; and the [20] heart lies about the centre of the body, but rather in its upper than its lower half, and also more in front than

behind. This is most evident in the case of man, but even in other animals there is a tendency in the heart to assume a similar position, in the centre of the necessary part of the body, that is to say of the part which terminates in the vent for excrement. For the limbs vary in position in different animals, and [25] are not to be counted with the parts which are necessary for life. That is why life can be maintained even when they are removed; while it is self-evident that the addition of them to an animal is not destructive of it.

There are some who say that the vessels commence in the head. In this they are mistaken. For in the first place, according to their representation, there would be many sources for the vessels, and these scattered; and secondly, these sources would [30] be in a region that is manifestly cold, as is shown by its intolerance of chill, whereas the region of the heart is hot. Again, as already said, the vessels continue their course through the other viscera, but no vessel passes through the heart. From this it is quite evident that the heart is a part of the vessels and their origin; and for this it is well suited by its structure. For its central part consists of a dense and hollow [666<sup>a</sup>1] substance, and is moreover full of blood, as though the vessels took thence their origin. It is hollow to serve for the reception of the blood, while its wall is dense, that it may serve to protect the source of heat. For here, and here alone in all the viscera [5] and indeed in all the body, there is blood without blood-vessels, the blood elsewhere being always contained within vessels. Nor is this but consistent with reason. For the blood is conveyed into the vessels from the heart, but none passes into the heart from without. For this constitutes the origin and fountain, or primary receptacle, of [10] the blood. It is, however, from dissections and from observations on the process of development that the truth of these statements receives its clearest demonstration. For the heart is the first of all the parts to be formed; and no sooner is it formed than it contains blood. Moreover, the motions of pain and pleasure, and generally of all sensation, plainly have their source in the heart, and find in it their termination. This, indeed, reason would lead us to expect. For the source must, whenever [15] possible, be one; and, of all places, the best suited for a source is the centre. For the centre is one, and is equally or almost equally within reach of every part. Again, as neither the blood itself, nor yet any part which is bloodless, is endowed with sensation, it is plain that that part which first has blood, and which holds it as it were in a receptacle, must be the primary source. And that this part is the heart is [20] not only a rational inference, but is also evident to the senses. For no sooner is the

embryo formed, than its heart is seen in motion as though it were a living creature, and this before any of the other parts, it being, as thus shown, the starting-point of their nature in all animals that have blood. A further evidence of the truth of what has been stated is the fact that no sanguineous animal is without a heart. For the primary source of blood must of necessity be present in them all. It is true that [25] sanguineous animals also invariably have a liver. But no one could ever deem the liver to be the primary organ either of the whole body or of the blood. For the position in which it is placed is far from being that of a primary part; and, moreover, in the most perfectly finished animals there is another part, the spleen, which as it were counterbalances it. Still further, the liver contains no receptacle for blood, as [30] does the heart; but its blood is in a vessel as in all the other viscera. A vessel, moreover, extends through it, and no vessel extends through the heart; for it is from the heart that all the vessels take their rise. Since then one or other of these two parts must be the central source, and since it is not the liver which is such, it follows of necessity that it is the heart which is the source of the blood. For the definitive [35] characteristic of an animal is the possession of sensation; and the first sensory part is that which first has blood; that is to say is the heart, which is the source of blood [666<sup>b</sup>1] and the first of the parts to contain it.



The apex of the heart is pointed and more solid than the rest of the organ. It lies against the breast, and entirely in the anterior part of the body, in order to prevent that region from getting chilled. For in all animals there is comparatively little flesh over the breast, whereas there is a more abundant covering of that [5] substance on the posterior surface, so that the heat has in the back a sufficient amount of protection. In all animals but man the heart is placed in the centre of the pectoral region; but in man it inclines a little towards the left, so that it may counterbalance the chilliness of that side. For the left side is colder in man than in [10] any other animal. It has been stated earlier that even in fishes the heart holds the same position as in other animals; and the reason has been given why it appears not to do so. The apex of the heart, it is true, is in them turned towards the head, but this in fishes is the front aspect, for it is the direction in which their motion occurs.

The heart again is abundantly supplied with sinews, as might reasonably be expected. For the motions of the body commence from the heart, and are brought [15] about by traction and relaxation. The heart therefore, which, as already said, is as it were a living creature inside its possessor, requires some such subservient and strengthening parts.

In no animals does the heart contain a bone, certainly in none of those that we have ourselves inspected, with the exception of the horse and a certain kind of ox. In these the heart, owing to its large bulk, is provided with a bone as a support; just as [20] the bones serve as supports for the body generally.

In animals of great size the heart has three cavities; in smaller animals it has two; and in all has at least one, for, as already stated, there must be some place in the heart to serve as a receptacle for the first blood; which, as has been mentioned more than once, is formed in this organ. But inasmuch as the main blood-vessels are [25] two in number, namely the so-called great vessel and the aorta, each of which is the origin of other vessels; inasmuch, moreover, as these two vessels present differences, hereafter to be discussed, when compared with each other, it is of advantage that they also shall themselves have distinct origins. This advantage will be obtained if each side have its own blood, and the blood of one side be kept separate from that of [30] the other. For this reason the heart, whenever it is possible, has two receptacles. And this possibility exists in the case of large animals, for in them the heart too is of large size. Again it is still better that there shall be three cavities, so that the middle and odd one may serve as a source common to both sides.

But this requires the heart to be of greater magnitude, so that it is only in the largest hearts that there are three [35] cavities.

Of these three cavities it is the right that has the most abundant and the hottest [667<sup>a</sup>1] blood, and this explains why the limbs also on the right side of the body are warmer than those on the left. The left cavity has the least blood of all, and the coldest; while in the middle cavity the blood, as regards quantity and heat, is intermediate to the other two, being however of purer quality than either. For it behoves the principal part to be as tranquil as possible, and this tranquillity can be ensured by the blood [5] being pure, and of moderate amount and warmth.

In the heart of animals there is also a kind of joint-like division, something like the sutures of the skull. This is not, however, attributable to the heart being formed by the union of several parts into a compound whole, but is rather, as already said, the result of a joint-like division. These jointings are most distinct in animals of keen [10] sensibility, and less so in those that are of duller feeling, in swine for instance. Different hearts differ also from each other in their sizes, and in their degrees of firmness; and these differences somehow extend their influence to the temperaments of the animals. For in animals of low sensibility the heart is hard and dense in [15] texture, while it is softer in such as are endowed with keener feeling. So also when the heart is of large size the animal is timorous, while it is more courageous if the organ be smaller and of moderate bulk. For in the former the bodily affection which results from terror already pre-exists; for the bulk of the heart is out of all proportion to the animal's heat, which being small is reduced to insignificance in the large space, and thus the blood is made colder than it would otherwise be.

[20] The heart is of large size in the hare, the deer, the mouse, the hyena, the ass, the leopard, the weasel, and in pretty nearly all other animals that either are manifestly timorous, or betray their cowardice by their spitefulness.

What has been said of the heart as a whole is no less true of its cavities and of the blood-vessels; these also if of large size being cold. For just as a fire of equal size [25] gives less heat in a large room than in a small one, so also does the heat in the present case; for the vessels and the cavities are receptacles. Moreover, all hot bodies are cooled by motions external to themselves, and the more spacious the cavities and vessels are, the greater the amount of breath they contain, and the more [30] potent its action. Thus it is that no animal that has large cavities in its heart, or large blood-vessels, is ever fat, the vessels being indistinct

and the cavities small in all or most fat animals.

The heart again is the only one of the viscera, and indeed the only part of the body, that is unable to tolerate any serious affection. This is but what might reasonably be expected. For, if the primary part be diseased, there is nothing from [667<sup>b</sup>1] which the other parts which depend upon it can derive succour. A proof that the heart is thus unable to tolerate any affection is furnished by the fact that in no sacrificial victim has it ever been seen to be affected with those diseases that are observable in the other viscera. For the kidneys are frequently found to be full of [5] stones, and growths, and small abscesses, as also are the liver, the lung, and more than all the spleen. There are also many other conditions which are seen to occur in these parts, those which are least liable to such being the portion of the lung which is close to the windpipe, and the portion of the liver which lies about the junction with [10] the great blood-vessel. This again admits of a rational explanation. For it is in these parts that they are most closely in communion with the heart. On the other hand, when animals die not by sacrifice but from disease, and from affections such as are mentioned above, they are found on dissection to have morbid affections of the heart.

Thus much of the heart, its nature, and the end and cause of its existence in such animals as have it.

[15] **5** · In due sequence we have next to discuss the blood-vessels, that is to say the great vessel and the aorta. For it is into these two that the blood first passes when it quits the heart; and all the other vessels are but offshoots from them. Now that these vessels exist on account of the blood has already been stated. For every fluid requires a receptacle, and in the case of the blood the vessels are that [20] receptacle. Let us now explain why these vessels are two, and why they spring from one single source, and extend throughout the whole body.

The reason, then, why these two vessels coalesce into one centre, and spring from one source, is that the sensory soul is in all animals actually one, so that the part in which it primarily abides must also be one. In sanguineous animals this oneness is not only actual but potential, whereas in some bloodless animals it is only [25] actual. Hence in the self-same place must necessarily be the source of heat; and this is the cause of the warmth and fluidity of the blood. Thus, then, the oneness of the part in which is lodged the prime source of sensation and of heat explains the oneness of the source in which the blood originates; and this,

again, explains why [30] the blood-vessels have one common starting-point.

The vessels are two because the body of every sanguineous animal that is capable of locomotion is bilateral; for in all such animals there is a distinguishable before and behind, a right and left, an above and below. Now as the front is more honourable and of higher supremacy than the hinder aspect, so also and in like degree is the great vessel superior to the aorta. For the great vessel is placed in front, [668<sup>a</sup>1] while the aorta is behind; the former again is plainly visible in all sanguineous animals, while the latter is in some indistinct and in some not discernible at all.

Lastly, the reason for the vessels being distributed throughout the entire body is that in them, or in parts analogous to them, is contained the blood, or the fluid which in bloodless animals takes the place of blood, and that this is the material from which the whole body is made. Now as to the manner in which animals are [5] nourished, and as to the source from which they obtain nutriment and as to the way in which they absorb this from the stomach, these are matters which may be more suitably considered and explained in the treatise on Generation. [But inasmuch as the parts are, as already said, formed out of the blood, it is but rational that the flow [10] of the blood should extend, as it does, throughout the whole of the body. For since each part is formed of blood, each must have blood all about it.]<sup>11</sup>

To give an illustration of this. The water-courses in gardens are so constructed as to distribute water from one single source or fount into numerous channels, which [15] convey it to all parts; and, again, in house-building stones are thrown down along the whole ground-plan of the foundation walls; because the garden-plants in the one case take their growth from water, and the foundation walls in the other are built out of the stones. Now just after the same fashion has nature laid down channels for [20] the conveyance of the blood throughout the whole body, because this blood is the material out of which the whole fabric is made. This becomes very evident in bodies that have undergone great emaciation. For in such there is nothing to be seen but the blood-vessels; just as when fig-leaves or vine-leaves or the like have dried up, [25] there is nothing left of them but their vessels. The explanation of this is that the blood, or fluid which takes its place, is potentially body and flesh, or substance analogous to flesh. Now just as in irrigation the largest dykes are permanent, while the smallest are soon filled up with mud and disappear, again to become visible [30] when the deposit of mud ceases; so also do the largest blood-vessels remain permanently open, while the smallest are

converted actually into flesh, though potentially they are no whit less vessels than before. This too explains why, so long as the flesh of an animal is in its integrity, blood will flow from any part of it whatsoever that is cut. Now there can be no blood, unless there be a blood-vessel, and yet no vessel is visible—just as the dykes for irrigation are invisible until they [668<sup>b</sup>1] have been cleared of mud.

As the blood-vessels advance, they become gradually smaller and smaller, until at last their tubes are too fine to admit the blood. This fluid can therefore no longer find its way through them, though they still give passage to the residue of the moist [5] humour which we call sweat; and especially so when the body is heated, and the mouths of the small vessels are dilated. Instances, indeed, are not unknown of persons who in consequence of a bad general condition have secreted sweat that resembled blood, their body having become loose and flabby, and their blood watery, owing to the heat in the small vessels having been too scanty for its [10] concoction. For, as was before said, every compound of earth and water—and both nutriment and blood are such—becomes thicker from concoction. The inability of the heat to effect concoction may be due either to its being absolutely small in amount, or to the quantity of food, when this has been taken in excess and relative to [15] which it is small. This excess again may be of two kinds, either quantitative or qualitative; for all substances are not equally amenable to concoction.

The widest passages in the body are of all parts the most liable to haemorrhage; so that bleeding occurs not infrequently from the nostrils, the gums, and the fundament, occasionally also from the mouth. Such haemorrhages are of a painless kind, and not violent as are those from the windpipe.

[20] The great vessel and the aorta, which above lie somewhat apart, lower down exchange positions, and by so doing give compactness to the body. For when they reach the point where the legs diverge, they each split into two, and the great vessel passes from the front to the rear, and the aorta from the rear to the front. By this [25] they contribute to the unity of the whole fabric. For as in plaited work the parts hold more firmly together, so also by the interchange of position between the blood-vessels are the anterior and posterior parts of the body more closely knit together. A similar exchange of position occurs also in the upper part of the body, between the vessels that have issued from the heart. The details however of the mutual relations [30] of the different vessels must be looked for in the *Dissections* and the *History of Animals*.

So much, then, as concerns the heart and the blood-vessels. We must now pass on to the other viscera and apply the same method of inquiry to them.

6 · The lung, then, is an organ found in all the animals of a certain class, because they live on land. For there must of necessity be some means or other of tempering the heat of the body; and in sanguineous animals, as they are of an especially hot nature, the cooling agency must be external, whereas in the bloodless [669<sup>a</sup>1] kinds the innate spirit is sufficient of itself for the purpose. The external cooling agent must be either air or water. In fishes the agent is water. Fishes therefore never [5] have a lung, but have gills in its place, as was stated in the treatise on Respiration. But animals that breathe are cooled by air. These therefore are all provided with a lung.

All land animals breathe, and even some water animals, such as the whale, the dolphin, and all the spouting Cetacea. For many animals are ambivalent: some that [10] are terrestrial and that inspire air being nevertheless of such a bodily constitution that they abide for the most time in the water; and some that are aquatic partaking so largely of the land character, that respiration constitutes for them the limiting condition of life.

The organ of respiration is the lung. This derives its motion from the heart; but [15] it is its own large size and spongy texture that affords amplitude of space for the entrance of the breath. For when the lung rises up the breath streams in, and is again expelled when the lung collapses. It has been said that the lung exists as a provision to meet the jumping of the heart. But this is out of the question. For man is practically the only animal whose heart presents this phenomenon of jumping, [20] inasmuch as he alone is influenced by hope and anticipation of the future. Moreover, in most animals it is separated from the lung by a considerable interval and lies above it, so that the lung can contribute nothing to mitigate any jumping of the heart.

The lung differs much in different animals. For in some it is of large size and contains blood; while in others it is smaller and of spongy texture. In the vivipara it [25] is large and rich in blood, because of their natural heat; while in the ovipara it is small and dry but capable of expanding to a vast extent when inflated. Among terrestrial animals, the oviparous quadrupeds, such as lizards, tortoises, and the [30] like, have this kind of lung; and, among inhabitants of the air, the animals known as

birds. For in all these the lung is spongy, and like foam. For foam contracts from a large mass to a small when it runs together, and the lung of these animals is small and membraneous. In this too lies the explanation of the fact that these animals are little liable to thirst and drink but sparingly, and that they are able to remain for a [35] considerable time under water. For, inasmuch as they have but little heat, the very motion of the lung, airlike and void, suffices by itself to cool them for a considerable [669<sup>b</sup>1] period.

These animals, speaking generally, are also distinguished from others by their smaller bulk. For heat promotes growth, and abundance of blood is an indication of heat. Heat, again, tends to make the body erect; and thus it is that man is the most [5] erect of animals, and the vivipara more erect than other quadrupeds. For no viviparous animal, be it footless or be it possessed of feet, is so given to creep into holes.

The lung, then, exists in general for respiration; but in one order of animals it is bloodless and has the structure described above, to suit the special requirements. There is, however, no one term to denote all animals that have a lung; no [10] designation, that is, like the term bird, applicable to the whole of a certain class. Yet the possession of a lung is a part of their substance, just as much as the presence of certain characters constitutes the essence of a bird.

7 · Of the viscera some appear to be single, as the heart and lung; others to be [15] double, as the kidneys; while of a third kind it is doubtful in which class they should be reckoned. For the liver and the spleen would seem to be ambivalent. For they may be regarded either as constituting each a single organ, or as a pair of organs resembling each other in character.

In reality, however, all the organs are double. The reason for this is that the body itself is double, consisting of two halves, which are however combined together [20] under a single origin. For there is an upper and a lower half, a front and a rear, a right side and a left.

This explains why it is that even the brain and the several organs of sense tend in all animals to consist of two parts; and the same explanation applies to the heart with its cavities. The lung again in Ovipara is divided to such an extent that these [25] animals look as though they had actually two lungs. As to the kidneys, no one can overlook their double character. But when we come to the liver and the spleen, any one might fairly be in doubt. The reason for this is, that, in animals that necessarily

have a spleen, this organ is such that it might be taken for a kind of bastard liver; while in those in which a spleen is not an actual necessity but is merely present, as it [30] were, by way of token, in an extremely minute form, the liver plainly consists of two parts; of which the larger tends to lie on the right side and the smaller on the left. Not but what there are some even of the Ovipara in which this condition is comparatively indistinctly marked; while, on the other hand, there are some Vivipara in which the liver is manifestly divided into two parts. Examples of such division are furnished by the hares of certain regions, which have the appearance of having two livers, and by the selachia and some other fishes.

[670<sup>a1</sup>] It is the position of the liver on the right side of the body that is the main cause for the formation of the spleen; the existence of which thus becomes to a certain extent a matter of necessity in all animals, though not of very stringent necessity.

The reason, then, why the viscera are bilateral is, as we have said, that there [5] are two sides to the body, a right and a left. For each of these sides aims at similarity with the other, and so likewise do their several viscera; and as the sides, though dual, are knit together into unity, so also is it with each of the viscera.

Those viscera which lie below the diaphragm exist one and all on account of [10] the blood-vessels; serving as a bond, by which these vessels, while floating freely, are yet held in connexion with the body. For the vessels give off branches which run to the body through the outstretched structures, like so many anchor-lines. The great vessel sends such branches to the liver and the spleen; and these viscera—the liver [15] and spleen on either side with the kidneys behind—attach the great vessel to the body with the firmness of nails. The aorta sends similar branches to each kidney.

[20] These viscera, then, contribute in this manner to the animal body. The liver and spleen assist, moreover, in the concoction of the food; for both are of a hot character, owing to the blood which they contain. The kidneys, on the other hand, take part in the separation of the excretion which flows into the bladder.

The heart then and the liver are essential constituents of every animal; the liver that it may effect concoction, the heart that it may lodge the central source of heat. For some part or other there must be which, like a hearth, shall hold the kindling [25] fire; and this part must be well protected, seeing that it is, as it were, the citadel of the body.



All sanguineous animals, then, need these two parts; and this explains why these two viscera are found in them all. In such of them, however, as breathe, there is also a third, namely the lung. The spleen, in those animals that have it, is only [30] present of necessity in the same sense as the excretions of the belly and of the bladder are necessary, in the sense, that is, of being a concomitant. Therefore it is that in some animals the spleen is but scantily developed as regards size. This, for instance, is the case in such feathered animals as have a hot stomach. Such are the pigeon, the hawk, and the kite. It is the case also in oviparous quadrupeds, where the [670<sup>b</sup>1] spleen is excessively minute, and in many of the scaly fishes. These same animals are also without a bladder, because the loose texture of their flesh allows the residual fluid to pass through and to be applied to the formation of feathers and scales. For the spleen attracts the residual humours from the stomach, and owing to [5] its bloodlike character is enabled to assist in their concoction. Should, however, this residual fluid be too abundant, or the heat of the spleen be too scanty, the body becomes sickly from over-repletion with nutriment. Often, too, when the spleen is affected by disease, the belly becomes hard owing to the reflux into it of the fluid; just as happens to those who form too much urine, for they also are liable to a [10] similar diversion of the fluids into the belly. But in those animals that have but little to excrete, such as birds and fishes, the spleen is never large, and in some exists no more than by way of token. So also in the oviparous quadrupeds it is small, compact, and like a kidney. For their lung is spongy, and they drink but little, and such [15] residue as they have is applied to the growth of the body and the formation of scaly plates, just as in birds it is applied to the formation of feathers.

On the other hand, in such animals as have a bladder, and whose lung contains blood, the spleen is watery, both for the reason already mentioned, and also because the left side of the body is more watery and colder than the right. For each of two [20] contraries has been so placed as to go together with that which is akin to it in another pair of contraries. Thus right and left, hot and cold, are pairs of contraries; and they are in the same column as one another, after the manner described.

The kidneys when they are present exist not of actual necessity, but as matters of greater finish and perfection. For by their special character they are suited to serve in the excretion of the fluid which collects in the bladder. In animals therefore [25] where this fluid is very abundantly formed, their presence enables the bladder to perform better its proper office.

Since then both kidneys and bladder exist in animals for one and the same function, we must next treat of the bladder, though in so doing we disregard the due [30] order of succession in which the parts should be enumerated. For not a word has yet been said of the midriff, which is one of the parts that environ the viscera.

8 · It is not every animal that has a bladder; those only being apparently [671<sup>a</sup>1] intended by nature to have one, whose lung contains blood. To such it was but reasonable that she should give this part. For the superabundance in their lung of its natural constituents causes them to be the thirstiest of animals, and makes them require a more than ordinary quantity not merely of solid but also of liquid nutriment. This increased consumption necessarily entails the production of an [5] increased amount of residue; which thus becomes too abundant to be concocted by the stomach and excreted with its own residual matter. The residual fluid must therefore of necessity have a receptacle of its own; and thus all animals whose lung contains blood are provided with a bladder. Those animals, on the other hand, that are without a lung of this character, and that either drink but sparingly owing to [10] their lung being of a spongy texture, or never imbibe fluid at all for drinking's sake but only as nutriment, insects for instance and fishes, and that are moreover clad with feathers or scales or scaly plates—all these animals, owing to the small amount of fluid which they imbibe, and owing also to such residue as there may be being [15] converted into feathers and the like, are invariably without a bladder. The tortoises, which are comprised among animals with scaly plates, form the only exception; and this is merely due to the imperfect development of their natural conformation; the explanation of the matter being that in the sea-tortoises the lung is flesh-like and contains blood, resembling the lung of the ox, and that in the land-tortoises it is of disproportionately large size. Moreover, inasmuch as the covering which invests [20] them is dense and shell-like, so that the moisture cannot exhale through the porous flesh, as it does in birds and in snakes and other animals with scaly plates, such an amount of secretion is formed that some special part is required to receive and hold it. This then is the reason why these animals, alone of their kind, have a bladder, the [25] sea-tortoise a large one, the land-tortoises an extremely small one.

9 · What has been said of the bladder is equally true of the kidneys.

For these also are wanting in all animals that are clad with feathers or with scales or with scale-like plates; the sea and land tortoises forming the only exception. In some of the birds, however, there are flattened kidney-like bodies, as though the flesh [30] allotted to the formation of the kidneys, unable to find one single place of sufficient size, had been scattered over several.

The fresh-water tortoise has neither bladder nor kidneys. For the softness of its shell allows of the ready transpiration of fluid; and for this reason neither of the organs mentioned exists in this animal. All other animals, however, whose lung [671<sup>b</sup>1] contains blood are, as before said, provided with kidneys. For nature uses these organs for two separate purposes, namely for the excretion of the residual fluid, and to subserve the blood-vessels, a channel leading to them from the great vessel.

In the centre of the kidney is a cavity of variable size. This is the case in all [5] animals, excepting the seal. The kidneys of this animal are more solid than those of any other, and resemble the kidneys of the ox. The human kidneys are also like those of the ox; being as it were made up of numerous small kidneys, and not presenting one unbroken surface like the kidneys of sheep and other quadrupeds. For this reason, should the kidneys of a man be once attacked by disease, the [10] malady is not easily expelled. For it is as though many kidneys were diseased and not merely one; which naturally enhances the difficulties of a cure.

The duct which runs to the kidney from the great vessel does not terminate in the central cavity, but is expended on the substance of the organ, so that there is no blood in the cavity, nor does any congeal there after death. A pair of stout ducts, [15] void of blood, run, one from the cavity of each kidney, to the bladder; and other ducts, strong and continuous, lead into the kidneys from the aorta. The purpose of this arrangement is to allow the superfluous fluid to pass from the blood-vessel into the kidney, and the resulting renal excretion to collect, by the percolation of the [20] fluid through the solid substance of the organ, in its centre, where as a general rule there is a cavity. (This by the way explains why the kidney is the most malodorous of all the viscera.) From the central cavity the fluid is discharged into the bladder by the ducts that have been mentioned, having already assumed in great degree the character of excremental residue. The bladder is as it were moored to the kidneys; [25] for, as already has been stated, it is attached to them by strong ducts. These then are the causes for which the kidneys exist, and such the functions of these organs.

In all animals that have kidneys, that on the right is placed higher

than that on the left. For, inasmuch as motion commences from the right, and the organs on this [30] side are in consequence stronger than those on the left, they must all push upwards because of this motion in advance of their opposite fellows; indeed, men even raise the right eyebrow more than the left, and the former is more arched than the latter. The right kidney being thus drawn upwards is in all animals brought into contact with the liver; for the liver lies on the right side. [672<sup>a</sup>1]

Of all the viscera the kidneys are those that have the most fat. This is in the first place the result of necessity, because the kidneys are the parts through which the residual matters percolate. For the blood which is left behind after this excretion, being of pure quality, is of easy concoction, and the final result of thorough blood-concoction is lard and suet. For just as a certain amount of fire is [5] left in the ashes of solid substances after combustion, so also does a remnant of the heat that has been developed remain in fluids after concoction; and this is the reason why oily matter is light, and floats on the surface of other fluids. The fat is not formed in the kidneys themselves, the density of their substance forbidding this, but [10] is deposited about their external surface. It consists of lard or of suet, according as the animal's fat is of the former or latter character. The difference between these two kinds of fat has already been set forth in other passages. The formation, then, of fat in the kidneys is the result of necessity; being, as explained, a consequence of the necessary conditions which accompany the possession of such organs. But at the [15] same time the fat is there to ensure the safety of the kidneys, and to maintain their natural heat. For placed, as these organs are, close to the surface, they require a greater supply of heat than other parts. For while the back is thickly covered with flesh, so as to form a shield for the heart and neighbouring viscera, the loins, in accordance with a rule that applies to all bendings, are destitute of flesh; and fat is therefore formed as a substitute for it, so that the kidneys may not be without [20] protection. The kidneys, moreover, by being fat are the better enabled to secrete and concoct their fluid; for fat is hot, and it is heat that effects concoction.

Such, then, are the reasons why the kidneys are fat. But in all animals the right kidney is less fat than its fellow. The reason for this is, that the parts on the right [25] side are naturally more dry and more suited for motion than those on the left. But motion is antagonistic to fat, for it tends to melt it.

Animals then, as a general rule, derive advantage from their kidneys being fat; and the fat is often very abundant and extends over the whole of these organs. But, should the like occur in the sheep, death ensues. Be

its kidneys, however, as fat as [30] they may, they are never so fat but that some part, if not in both at any rate in the right one, is left free. The reason why sheep are the only animals that suffer in this manner, or suffer more than others, is that in animals whose fat is composed of lard this is of fluid consistency, so that there is not the same chance in their case of breath getting shut in and causing mischief. But it is to this that rot is due. And thus [35] even in men who suffer from kidney trouble, though it is beneficial to them to have fat kidneys, yet should these organs become over-fat, deadly pains ensue. As to [672<sup>b</sup>1] those animals whose fat consists of suet, in none is the suet so dense as in the sheep, neither is it nearly so abundant; for of all animals there is none in which the kidneys become so soon gorged with fat as in the sheep. Rot, then, is produced by the moisture and the breath getting shut up in the kidneys, and is a malady that carries [5] off sheep with great rapidity. For the disease forthwith reaches the heart, passing thither by the aorta and great vessel, the ducts which connect these with the kidneys being of unbroken continuity.

10 · We have now dealt with the heart and the lung, as also with the liver, [10] spleen, and kidneys. The latter are separated from the former by the midriff or, as some call it, the diaphragm. This divides off the heart and lung, and, as already said, is called the diaphragm in sanguineous animals, all of which have a midriff, just as they all have a heart and a liver. The reason is that the midriff serves to [15] divide the region of the heart from the region of the stomach, so that the centre wherein abides the sensory soul may be undisturbed, and not be overwhelmed, directly food is taken, by its up-steaming vapour and by the abundance of heat then superinduced. For it was to guard against this that nature made a division, [20] constructing the midriff as a kind of partition-wall and fence, and so separated the nobler from the less noble parts, in all cases where a separation of upper from lower is possible. For the upper part is the better and that for the sake of which the rest exists; while the lower part exists for the sake of the upper and constitutes the necessary element in the body, inasmuch as it is the recipient of the food.

[25] That portion of the midriff which is near the ribs is fleshier and stronger than the rest, but the central part has more of a membranous character; for this structure conduces best to its strength and its extensibility. Now that there are as it were outgrowths to prevent heat mounting up from below, is shown by what happens when, owing to their

proximity to the stomach, they attract thence the hot and residual fluid. For when this occurs there ensues forthwith a marked disturbance of [30] intellect and sensation. It is indeed because of this that the midriff is called the diaphragm, as though it had some share in the process of thinking.<sup>12</sup> In reality, however, it has no part whatsoever itself in the matter, but, lying in close proximity to organs that have, it makes the changes of intelligence evident. This too explains why its central part is thin—not only by necessity, inasmuch as those portions of the fleshy whole which lie nearest to the ribs must necessarily be fleshier than the rest, [35] but also in order to give it as small a proportion of humour as possible; for, had it been made of flesh throughout, it would have been more likely to attract and hold a [673<sup>a</sup>1] large amount of this. That heating of it affects sensation rapidly and in a notable manner is shown by the phenomena of laughing. For when men are tickled they are quickly set a-laughing, because the motion quickly reaches this part, and being heated but slightly it nevertheless manifestly so disturbs the mental action as to occasion movements that are contrary to the man's intention. That man alone is affected by tickling is due firstly to the delicacy of his skin, and secondly to his being [5] the only animal that laughs. For to be tickled is to be set in laughter, the laughter being produced by such a motion as mentioned of the region of the armpit. [10]

It is said also that when men in battle are wounded anywhere near the midriff, they are seen to laugh, owing to the heat produced by the wound. This is asserted by more credible persons than those who tell the story of how a human head speaks after it is cut off. For so some assert, and even call in Homer to support them, representing [15] him as alluding to this when he wrote, 'His head still speaking rolled into the dust', instead of 'The head of the speaker'.<sup>13</sup> So fully was the possibility of such an occurrence accepted in Arcadia, that one of that country was actually brought to trial under the following circumstances. The priest of Zeus Hoplosmios had been murdered; but as yet it had not been ascertained who was the assassin; when certain persons asserted that they [20] had heard the murdered man's head, which had been severed from the body, repeat several times the words, 'Cercidas slew man on man'. Search was thereupon made and a man of those parts who bore the name of Cercidas hunted out and put upon his trial. But it is impossible that any one should utter a word when the windpipe is severed and no motion any longer derived from the lung. Moreover, among the barbarians, where heads are chopped off with great rapidity, nothing of the kind has ever yet occurred. [25] Why, again, does not the like occur in the case of other

animals than man? [For the story about laughing when the midriff is wounded, is but what one would expect; for no animal but man ever laughs. So, too, there is nothing irrational in supposing that the trunk may run forwards to a certain distance after the head has been cut off; seeing that bloodless animals at any rate can live, and that for a considerable time, after decapitation, [30] as has been set forth and explained in other passages.]<sup>14</sup>

The purposes, then, for which the viscera severally exist have now been stated. It is of necessity upon the inner terminations of the vessels that they are developed; [673<sup>b</sup>1] for humour, and that of a bloody character, cannot but exude at these points, and it is of this, solidified and coagulated, that the substance of the viscera is formed. Thus they are of a bloody character, and in substance resemble each other while they differ from other parts.

**11** · The viscera are enclosed each in a membrane. For they require some [5] covering to protect them from injury, and require, moreover, that this covering shall be light. To such requirements membrane is well adapted; for it is close in texture so as to form a good protection, destitute of flesh so as neither to attract humour nor retain it, and thin so as to be light and not add to the weight of the body. Of the membranes those are the stoutest and strongest which invest the heart and the [10] brain; as is but consistent with reason. For these are the parts which require most protection, seeing that they are the main governing powers of life, and that it is to governing powers that guard is due.

**12** · Some animals have all the viscera that have been enumerated; others have only some of them. In what kind of animals this latter is the case, and what is the explanation, has already been stated. Moreover, the self-same viscera present [15] differences in different possessors. For the heart is not precisely alike in all animals that have one; nor, in fact, is any of the others. Thus the liver is in some animals split into several parts, while in others it is comparatively undivided. Such differences present themselves even among those sanguineous animals that are viviparous, but [20] are marked in fishes and in the oviparous quadrupeds, and this whether we compare them with each other or with the Vivipara. As for birds, their liver very nearly resembles that of the Vivipara; for in them, as in these, it is of a pure and blood-like colour. The reason for this is that the body in both these classes of animals admits of the freest exhalation

and the amount of foul residual matter within is but small. [25] Hence it is that some of the Vivipara are without any gall-bladder at all. For the liver takes a large share in maintaining the purity of composition and the healthiness of the body. For these are conditions that depend finally upon the blood, and there is more blood in the liver than in any of the other viscera, the heart only excepted. On the other hand, the liver of oviparous quadrupeds and fishes inclines, as a rule, to a yellow hue, and there are even some of them in which it is entirely of [30] this bad colour, in accordance with the bad composition of their bodies generally. Such, for instance, is the case in the toad, the tortoise, and other similar animals.

The spleen in animals that have horns and cloven hoofs, such as the goat, the sheep, and the like, is of a rounded form; excepting when increased size has caused [674<sup>a</sup>1] some part of it to extend its growth longitudinally, as has happened in the case of the ox. On the other hand, it is elongated in all polydactylous animals. Such, for instance, is the case in the pig, in man, and in the dog. While in animals with solid hoofs it is of a form intermediate to these two and mixed, being broad in one part, narrow in another. Such, for example, is its shape in the horse, the mule, and the ass.

**13** · The viscera differ from the flesh not only in the bulkiness of their [5] substance, but also in position; for they lie within the body, whereas the flesh is placed on the outside. The explanation of this is that these parts partake of the character of blood-vessels, and that while the former exist for the sake of the vessels, the latter cannot exist without them.

**14** · Below the midriff lies the stomach, placed at the end of the oesophagus [10] when there is one, and in immediate contiguity with the mouth when the oesophagus is wanting. Continuous with this stomach is what is called the gut. These parts are present in animals, for reasons that are self-evident. For it is a matter of necessity that an animal shall receive the incoming food and discharge it when its moisture has been extracted. This residual matter, again, must not occupy [15] the same place as the yet unconcocted nutriment, and there must be a place in which they change. For there must be one receptacle for the ingoing food and another for the useless residue, and as there are separate times for these operations, so there must be distinct places. These, however, are matters which will be more suitably set forth when we come to deal with



Generation and Nutrition. What we [20] have at present to consider are the variations presented by the stomach and its subsidiary parts. For neither in size nor in shape are these parts uniformly alike in all animals. Thus the stomach is single in all sanguineous and viviparous animals which are ambidentate. It is single therefore in all the polydactylous kinds, such as man, dog, lion, and the rest; in all the solid-hoofed animals also, such as horse, mule, [25] ass; and in all those which, like the pig, though their hoof is cloven, yet are ambidentate. When, however, an animal is of large size, and feeds on substances of so thorny and ligneous a character as to be difficult of concoction, it may in [30] consequence have several stomachs, as for instance is the case with the camel. A similar multiplicity of stomachs exists also in the horned animals; the reason being that horn-bearing animals are not ambidentate. The camel also, though it has no horns, is not ambidentate. The explanation of this is that it is more essential for the camel to have a multiple stomach than to have front teeth. Its stomach, then, is constructed like that of non-ambidentates, and its teeth match its stomach—for the [674<sup>b</sup>1] teeth in question would be of no service. Its food, moreover, being of a thorny character, and its tongue necessarily made of a fleshy substance, nature uses the earthy matter which is saved from the teeth to give hardness to the palate. The [5] camel ruminates like the horned animals, because its multiple stomach resembles theirs. For all animals that have horns, the sheep for instance, the ox, the goat, the deer, and the like, have several stomachs. For since the mouth, owing to its lack of [10] teeth, only imperfectly performs its office as regards the food, the stomachs receive the food one from the other in succession, the first taking the un-reduced substances, the second the same when somewhat reduced, the third when reduction is complete, and the fourth when the whole has become a smooth pulp. Such is the reason why there is this multiplicity of parts and cavities in animals with such dentition. The names given to the several cavities are the paunch, the honey-comb bag, the [15] manyplies, and the reed. How these parts are related to each other, in position and in shape, must be looked for in the *History of Animals* and the *Anatomies*.

Birds also present variations in the part which acts as a recipient of the food for [20] the same reason. For here again it is because the mouth fails to perform its office—for birds have no teeth at all, nor any instrument whatsoever with which to bite up or grind down their food—it is because of this, that in some of them what is called the crop precedes the stomach and does the work of the mouth; while in others the oesophagus is either broad or a part of it bulges just before it enters the

[25] stomach, so as to form a preparatory store-house for the unreduced food; or the stomach itself has a protuberance in some part, or is strong and fleshy, so as to be able to store up the food for a considerable period and to concoct it, in spite of its not [30] having been ground into a pulp. For nature retrieves the inefficiency of the mouth by increasing the efficiency and heat of the stomach. Other birds there are, such, namely, as have long legs and live in marshes, that have none of these provisions, but merely an elongated oesophagus.<sup>15</sup> The explanation of this is to be found in the moist character of their food. For all these birds feed on substances easy of reduction, and because of this, [their food being moist and not requiring much concoction]<sup>16</sup> their stomachs are moist.

[675<sup>a</sup>1] Fishes are provided with teeth, which in almost all of them are of the saw-toothed kind. For there is but one small group in which it is otherwise. Of these the fish called *Scarus* is an example. And this is probably the reason why this fish [5] apparently ruminates, though no other fishes do so. For those horned animals that are not ambidentate also ruminate.

In fishes the teeth are all sharp; so that these animals can divide their food, though imperfectly. For it is impossible for a fish to linger or spend time in the act of mastication, and therefore they have no teeth that are flat or suitable for grinding; for such teeth would be to no purpose. The oesophagus again in some fishes is [10] entirely wanting, and in the rest is short. In order, however to facilitate the concoction of the food, some of them, as the mullet, have a fleshy stomach resembling that of a bird; while most of them have numerous appendages close against the stomach, to serve as a sort of antechamber in which the food may be stored up and undergo putrefaction and concoction. There is a contrast between [15] fishes and birds in the position of these appendages. For in fishes they are placed high up, close to the stomach; while in birds, if present at all, they are lower down, near the end of the gut. Some of the *Vivipara* also have appendages connected with the lower part of the gut which serve the same purpose as that stated above.

The whole tribe of fishes is of gluttonous appetite, owing to the arrangements [20] for the reduction of their food being very imperfect, and much of it consequently passing through them without undergoing concoction; and, of all, those are the most gluttonous that have a straight intestine. For as the passage of food in such cases is rapid, and the enjoyment derived from it in consequence but brief, it follows of necessity that the return of appetite is also speedy.

[25] It has already been mentioned that in ambidentates the stomach

is of small size. It may be classed pretty nearly always under one or other of two headings, namely as resembling the stomach of the dog, or as resembling the stomach of the pig. In the pig the stomach is larger than in the dog, and presents certain folds of moderate size, the purpose of which is to lengthen out the period of concoction; while the stomach of the dog is of small size, not much larger in calibre than the gut, [30] and smooth on the internal surface.

For in all animals after the stomach comes the gut. This, like the stomach, presents numerous modifications. For in some animals it is uniform, when uncoiled, and alike throughout, while in others it differs in different portions. Thus in some cases it is wider in the neighbourhood of the stomach, and narrower towards the [35] other end; and this explains by the way why dogs have to strain so much in discharging their excrement. But in most animals it is the upper portion that is the [675<sup>b</sup>1] narrower and the lower that is of greater width.

Of greater length than in other animals, and much convoluted, are the intestines of those that have horns. These intestines, moreover, as also the stomach, are of ampler volume, in accordance with the larger size of the body. For animals with horns are, as a rule, large, because of the thorough elaboration which their food [5] undergoes. The gut, except in those animals where it is straight, invariably widens out as it gets farther from the stomach; then they have what is called the colon, and the blind and swollen part of the gut. After this it again becomes narrower and convoluted. Then succeeds a straight portion which runs right on to the vent. This [10] vent is known as the anus, and is in some animals surrounded by fat, in others not so. All these parts have been so contrived by nature as to harmonize with the various operations that relate to the food and its residue. For, as the residual food gets farther on and lower down, the space to contain it enlarges, allowing it to remain stationary and undergo conversion. Thus is it in those animals which, owing either [15] to their large size, or to the heat of the parts concerned, require more nutriment, and consume more fodder than the rest.

After this, just as a narrower gut succeeds to the upper stomach, so also does the residual food, when its juice is thoroughly exhausted, pass from the colon and the ample space of the lower stomach into a narrower channel and into the spiral [20] coil, in order that nature can regulate her expenditure and prevent the excremental residue from being discharged all at once.

In all such animals, however, as have to be comparatively moderate in their alimentation, the lower stomach presents no wide and roomy

spaces, though their gut is not straight, but has a number of convolutions. For amplitude of space causes [25] desire for ample food, and straightness of the intestine causes quick return of appetite. And thus it is that all animals whose food receptacles are either simple or spacious are of gluttonous habits, the latter eating enormously at a meal, the former making meals at short intervals.

Again, since the food in the upper stomach, having just been swallowed, must of necessity be quite fresh, while that which has reached the lower stomach must [30] have had its juices exhausted and resemble dung, it follows of necessity that there must also be some intermediate part, in which the change may be effected, and where the food will be neither perfectly fresh nor yet dung. And thus it is that, in all [35] such animals as we are now considering, there is found what is called the jejunum; which is a part of the small gut which comes next to the stomach. For this jejunum lies between the upper cavity which contains the yet unconcocted food and the lower cavity which holds the useless residual matter. There is a jejunum in all these [676<sup>a</sup>1] animals, but it is plainly discernible in those of large size when they have abstained from food for a certain time. For then there is a sort of no-man's land between the two regions, but when they have eaten the time occupied in the transition of food is but brief. In females this jejunum may occupy any part whatsoever of the upper [5] intestine, but in males it comes just before the caecum and the lower stomach.

15 · What is known as rennet is found in all animals that have a multiple stomach, and in the hare among animals whose stomach is single. In the former the rennet neither occupies the large paunch, nor the honeycomb bag, nor the terminal [10] reed, but is found in the cavity which separates this terminal one from the first, namely in the so-called manyplies. It is the thick character of their milk which causes all these animals to have rennet; whereas in animals with a single stomach the milk is thin, and consequently no rennet is formed. That is why the milk of [15] horned animals coagulates, while that of animals without horns does not. Rennet forms in the hare because it feeds on herbage that has juice like that of the fig; for juice of this kind coagulates the milk in the stomach of the sucklings. Why it is in the manyplies that rennet is formed in animals with multiple stomachs has been stated in the *Problems*.

## BOOK IV

1 · The account which has now been given of the viscera, the stomach, and the other several parts holds equally good not only for the oviparous quadrupeds, [25] but also for such footless animals as the Serpents. These two classes of animals are indeed nearly akin, a serpent resembling a lizard which has been lengthened out and deprived of its feet. Fishes, again, resemble these two groups in all their parts, excepting that, while these, being land animals, have a lung, fishes have no lung, but [30] gills in its place. None of these animals, excepting the tortoise, as also no fish, has a bladder. For owing to the bloodlessness of their lung, they drink but sparingly; and such fluid as they have is diverted to the scaly plates, as in birds it is diverted to the feathers, and thus they come to have the same white matter on the surface of their excrement as we see on that of birds. For in animals that have a bladder, its [35] excretion when voided leaves a deposit of earthy brine in the containing vessel. For the sweet and fresh elements, being light, are expended on the flesh.

[676<sup>b</sup>1] Among the Serpents, the same peculiarity attaches to vipers, as among fishes attaches to Selachia. For both these and vipers are externally viviparous, but previously produce ova internally.

The stomach in all these animals is single, just as it is single in all other ambidentates; and their viscera are excessively small, as always happens when there [5] is no bladder. In serpents these viscera are, moreover, differently shaped from those of other animals. For, a serpent's body being long and narrow, its contents are as it were moulded into a similar form, and thus come to be themselves elongated. [10]

All animals that have blood possess an omentum, a mesentery, intestines, and, moreover, a diaphragm and a heart; and all, excepting fishes, a lung and a windpipe. The relative positions, moreover, of the windpipe and the oesophagus are precisely similar in them all; and the reason is the same as has already been given. [15]

2 · Almost all sanguineous animals have a gall-bladder. In some this is attached to the liver, in others separated from that organ and attached to the intestines, being apparently in the latter case no less than in the

former an appendage of the lower stomach. It is in fishes that this is most clearly seen. For all fishes have a gall-bladder; and in most of them it is attached to the intestine, being [20] in some, as in the bonito, united with this, like a border, along its whole length. It is similarly placed in most serpents. There are therefore no good grounds for the view entertained by some writers, that the gall exists for the sake of some sensory action. For they say that its use is to affect that part of the soul which is lodged in the neighbourhood of the liver, vexing this part so as to congeal it, and restoring it to [25] cheerfulness when it again flows free. But in some animals there is absolutely no gallbladder at all—in the horse, for instance, the mule, the ass, the deer, and the roe; and in others, as the camel, there is no distinct bladder, but merely small vessels of a biliary character. Again, there is no such organ in the seal, nor, among sea-animals, in the dolphin. Even within the limits of the same genus, some animals [30] appear to have and others to be without it. Such, for instance, is the case with mice; such also with man. For in some individuals there is a distinct gall-bladder attached to the liver, while in others there is no gall-bladder at all. This explains why there is a dispute about the group as a whole. For each observer, according as he has found it present or absent in the individual cases he has examined, has supposed it to be [35] present or absent in the whole genus. The same has occurred in the case of sheep and of goats. For these animals usually have a gall-bladder; but, while in some [677<sup>a</sup>1] localities it is so enormously big as to appear a monstrosity, as is the case in Naxos, in others it is altogether wanting, as is the case in a certain district belonging to the inhabitants of Chalcis in Euboea. Moreover, the gall-bladder in fishes is separated, [5] as already mentioned, by a considerable interval from the liver. No less mistaken seems to be the opinion of Anaxagoras and his followers, that the gall-bladder is the cause of acute diseases, inasmuch as it becomes over-full, and spurts out its excess on to the lung, the blood-vessels, and the ribs. For, almost invariably, those who suffer from these forms of disease are persons who have no gall-bladder at all, as would be quite evident were they to be dissected. Moreover, there is no kind of [10] correspondence between the amount of bile which is present in these diseases and the amount which is exuded. The most probable opinion is that, as the bile when it is present in any other part of the body is a mere residuum or a collipuescence, so also when it is present in the region of the liver it is a residue and not for the sake of [15] anything; just as is the case with the excretions of the stomach and intestines. For though even the residua are occasionally used by nature for some useful purpose, yet

we must not in all cases expect to find such a final cause; for granted the existence of this or that constituent, with such and such properties, many results must ensue as necessary consequences of these properties. All animals, then, whose [20] liver is healthy in composition and supplied with none but sweet blood, are either entirely without a gall-bladder on this organ, or have merely small bile-containing vessels; or are some with and some without such parts. Thus it is that the liver in animals that have no gall-bladder is, as a rule, of good colour and sweet; and that, [25] when there is a gall-bladder, that part of the liver is sweetest which lies immediately underneath it. But, when animals are formed of blood less pure in composition, the bile is the residue left by this. For the very meaning of excrement is that it is the opposite of nutriment, and of bitter that it is the opposite of sweet; and healthy [30] blood is sweet. So that it is evident that the bile is not for the sake of anything, but is a purifying excretion. It was therefore no bad saying of old writers that the absence of a gall-bladder gave long life. In so saying they had in mind deer and animals with solid hoofs. For such have no gall-bladder and live long. But besides these there are other animals that have no gall-bladder, though those old writers had not noticed [35] the fact, such as the camel and the dolphin; and these also are in fact long-lived. Seeing, indeed, that the liver is a necessary and vital part in all animals that have [677<sup>b</sup>1] blood, it is but reasonable that on its character should depend the length or the shortness of life. Nor less reasonable is it that this organ and none other should have [5] such an excretion as the bile. For the heart, unable as it is to stand any violent affection, would be utterly intolerant of the proximity of such a fluid; and, as to the rest of the viscera, none excepting the liver are necessary parts of an animal. It would be absurd to think that phlegm and the sediment from the stomach are not residues wherever they are found; and clearly the same applies to bile too, and its [10] locality makes no difference.

3 · So much then of the gall-bladder, and of the reasons why some animals have one, while others have not. We have still to speak of the mesentery and the omentum; for these are associated with the parts already described and contained in [15] the same cavity. The omentum, then, is a membrane containing fat; the fat being suet or lard, according as the fat of the animal generally is of the former or latter description. What kinds of animals are so distinguished has been already set forth in an earlier part of this treatise. This membrane, alike in animals that have a single and in those that have a multiple stomach, grows from the

middle of that organ, along a line which is marked on it like a seam. And it covers the rest of the stomach [20] and the greater part of the bowels, and this alike in all sanguineous animals whether they live on land or in water. Now the development of this part into such a form as has been described is the result of necessity. For, whenever dry and moist are mixed together and heated, the surface invariably becomes membranous and skin-like. But the region in which the omentum lies is full of nutriment of such a mixed character. Moreover, in consequence of the close texture of the membrane, that [25] portion of the sanguineous nutriment will alone filter into it which is of a greasy character; for this portion is composed of the finest particles; and it will be concocted by the heat of the part, and will be converted into suet or lard, and will not acquire a flesh-like or sanguineous constitution. The development, then, of the omentum occurs in this way. But it is used by nature to facilitate and to hasten the [30] concoction of food. For all that is hot aids concoction; and fat is hot, and the omentum is fat. This too explains why it hangs from the middle of the stomach; for the upper part of the stomach is assisted in concoction by the adjacent liver. Thus [35] much as concerns the omentum.

4 · The so-called mesentery is a membrane; and extends continuously from the long stretch of intestine to the great vessel and the aorta. In it are numerous and [678<sup>a</sup>1] close-packed vessels, which run from the intestines to the great vessel and to the aorta. The formation of this membrane we shall find to be the result of necessity, as is that of the other parts. What, however, is the cause of its existence in sanguineous [5] animals is manifest on reflection. For it is necessary that animals shall get nutriment from without; and, again, that this shall be converted into the ultimate nutriment, which is then distributed to the various parts; this ultimate nutriment being, in sanguineous animals, what we call blood, and having, in bloodless animals, no definite name. This being so, there must be channels through which the [10] nutriment shall pass, as it were through roots, from the stomach into the blood-vessels. Now the roots of plants are in the ground; for thence their nutriment is derived. But in animals the stomach and intestines represent the ground from which the nutriment is to be taken. The mesentery, then, is an organ to contain the [15] roots; and these roots are the vessels that traverse it. This then is the final cause of its existence. But how it absorbs nutriment, and how that portion of the food which enters into the vessels is distributed by them to the various parts of the body, are questions which will be considered



when we come to deal with the generation and nutrition of animals. [20]

The constitution of sanguineous animals, so far as the parts as yet mentioned are concerned, and the reasons for such constitution, have now been set forth. In natural sequence we should next go on to the organs of generation, as yet undescribed, on which depend the distinctions of male and female. But, inasmuch as we shall have to deal specially with generation hereafter, it will be more convenient [25] to defer the consideration of these parts to that occasion.

5 · Very different from the animals we have as yet considered are the Cephalopoda and the Crustacea. For these have absolutely no viscera whatsoever; as is indeed the case with all bloodless animals, in which are included two other [30] genera, namely the Testacea and the Insects. For in none of them does the material out of which viscera are formed exist. None of them, that is, have blood. The cause of this lies in their substance. For the presence of blood in some animals, its absence from others, must be included in the formula which determines their respective [35] substances. Moreover, in the animals we are now considering, none of those final causes will be found to exist which in sanguineous animals determine the presence [678<sup>b</sup>1] of viscera. For they have no blood-vessels nor bladder, nor do they breathe; the only part that it is necessary for them to have being that which is analogous to a heart. For in all animals there must be some central and commanding part of the body, to lodge the sensory portion of the soul and the source of life. The organs of nutrition [5] are also of necessity present in them all. They differ, however, in character because of differences of the habitats in which they get their subsistence.

In the Cephalopoda there are two teeth, enclosing what is called the mouth; and inside this mouth is a flesh-like substance which represents a tongue and serves for the discrimination of pleasant and unpleasant food. The Crustacea have front [10] teeth in the same way, and also have the fleshy representative of a tongue. This latter part is found, moreover, in all Testacea for the same reason as in sanguineous animals, viz. to perceive their food. Similarly provided also are the Insects. For [15] some of these, such as the bees and the flies, have, as already described, their proboscis protruding from the mouth; while those others that have no such instrument in front have a similar part inside the mouth. Such, for instance, is the case in the ants and the like. As for teeth, some insects have them, the bees and the flies for instance, though in a somewhat

modified form, while others that live on [20] fluid nutriment are without them. For in many insects the teeth are not meant to deal with the food, but to serve as weapons.

In some Testacea, as was said in the first treatise, the organ which is called the tongue is of considerable strength; and in sea-snails there are also two teeth, just as [25] in the Crustacea. The mouth in the Cephalopoda is succeeded by a long gullet. This leads to a crop, like that of a bird, and directly continuous with this is the stomach, from which a gut runs without windings to the vent. The cuttlefish and the octopus resemble each other completely, so far as regards the shape and consistency of these [30] parts. In the calamaries, as in the other groups, there are the two stomach-like receptacles; but the first of these cavities has less resemblance to a crop, and in neither is the form the same as in the other kinds, the whole body indeed being made of a softer kind of flesh.

The object of this arrangement of the parts in question is the same as in Birds; [35] for these also are all unable to masticate their food; and therefore it is that a crop precedes their stomach.

For purposes of defence, and to enable them to escape from their foes, the [679<sup>a</sup>1] Cephalopoda have what is called their ink. This is contained in a membranous pouch, which is attached to the body and provided with a terminal outlet just at the point where what is termed the funnel gives issue to the residua of the stomach. This [5] funnel is placed on the under surface of the animal. All Cephalopoda alike have this characteristic ink, but chief of all the cuttlefish, where it is more abundant than in the rest. When the animal is disturbed and frightened it uses this ink to make the surrounding water black and turbid, and so, as it were, puts a shield in front of its body.

In the Calamaries and the octopus the ink-bag is placed in the upper part of the body, in close proximity to the *mytis*, whereas in the cuttlefish it is lower down, against the stomach. For the cuttlefish has a more plentiful supply of ink than the [10] rest, inasmuch as it makes more use of it. The reasons for this are that it lives near the shore, and that it has no other means of protection; whereas the octopus has its tentacles to use in its defence, and is, moreover, endowed with the power of changing colour. This changing of colour, like the discharge of ink, occurs as the result of fright. As to the calamary, it lives far out at sea, being the only one of the [15] Cephalopoda that does so. Thus the ink is more abundant in the cuttlefish, and this greater abundance explains the lower position; for it allows the ink to be ejected with ease even from a distance. The ink

itself is of an earthy character, in this resembling the white deposit on the surface of a bird's excrement, and the explanation in both cases is the same, namely, the absence of a bladder. For it is the ink that serves for the excretion of the earthiest matter. And this is more especially [20] the case in the cuttlefish, because there is a greater proportion of earth in its composition. The earthy character of its bone is a clear indication of this. For in the octopus there is no bone at all, and in the calamary it is thin and cartilaginous. (Why this bone should be present in some Cephalopoda, and wanting in others, and how its character varies in those that have it, has been explained.)

These animals, having no blood, are in consequence cold and of a timid [25] character. Now, in some animals, fear causes a disturbance of the bowels, and, in others, a flow of urine from the bladder. Similarly in these it produces a discharge of ink, and, though the ejection is the result of necessity, like the discharge of urine, yet at the same time nature makes use of this residue for the protection and safety of the [30] animal.

The Crustacea also, both the crayfish and the crabs, are provided with two anterior teeth and between these the tongue-like piece of flesh, as has indeed been already mentioned. Directly after their mouth comes a gullet, which is small in proportion to the body; and then a stomach, which in the crayfish and some of the [35] crabs is furnished with a second set of teeth, the anterior teeth being insufficient for adequate mastication. From the stomach a uniform gut runs in a direct line to the [679<sup>b</sup>1] excremental vent.

The parts described are to be found also in all the various Testacea. The degree of distinctness, however, with which they are formed varies in the different kinds, and the larger the size of the animal the more easily distinguishable are all these parts severally. In the sea-snails, for example, we find teeth, hard and sharp, as [5] before mentioned, and between them the flesh-like substance, just as in the Crustacea and Cephalopoda, and again the proboscis, which, as has been stated, is something between a sting and a tongue. Directly after the mouth comes a kind of bird-like crop, then a gullet, succeeded by a stomach, in which is the 'poppy', as it is [10] styled; and continuous with this is an intestine, starting directly from it. It is this residual substance which appears in all the Testacea to form the most palatable morsel. The purple murex, the trumpet-shell, and the other spiral-shells resemble [15] the sea-snail. The genera and species of Testacea are very numerous. For there are those with spiral shells, of which some have just been mentioned; and, besides these, there are bivalves and univalves. Those with spiral shells may, indeed, after a

certain fashion be said to resemble bivalves. For they all from their very birth have an operculum over that part of their body which is exposed to view. This is the case [20] with the purple murex, the trumpet-shell, the nerites, and the like. Were it not for this, the part which is undefended by the shell would be very liable to injury by collision with external objects. The univalves also are not without protection. For on their upper surface they have a shell, and they attach themselves to the rocks, and so [25] after a manner become bivalved by virtue of this borrowed protection. Of these the animals known as limpets are an example. The bivalves, scallops and mussels, for instance, are protected by the power they have of closing their valves; and the spiral-shells by the operculum just mentioned, which transforms them, as it were, from univalves into bivalves. But of all there is none so perfectly protected as the sea-urchin. For here there is a shell which encloses the body completely, and which [30] is, moreover, set with sharp spines. This peculiarity distinguishes the sea-urchin from all other Testacea, as has already been mentioned.

The structure of the Testacea and of the Crustacea is exactly the reverse of that of the Cephalopoda. For in the latter the fleshy substance is on the outside and the earthy substance within, whereas in the former the soft parts are inside and the hard part without. In the sea-urchin, however, there is no fleshy part whatsoever.

[35] All the other Testacea also possess, as has been said, a mouth with the tongue-like body, a stomach, and a vent for excrement, but they differ from each [680<sup>a</sup>1] other in the positions and proportions of these parts. The details, however, of these differences must be looked for in the *History of Animals* and the *Anatomies*. For while there are some points which can be made clear by verbal description, there are others which are more suited for ocular demonstration.

[5] Peculiar among the Testacea are the sea-urchins and the animals known as ascidians. The sea-urchins have five teeth, and in the centre of these the fleshy body which is common to all the animals we have been discussing. Immediately after this comes a gullet, and then the stomach, divided into a number of separate compartments, which look like so many distinct stomachs; for the cavities are separate and [10] all contain abundant residual matter. They are all, however, connected with one and the same oesophagus, and they all end in one and the same excremental vent. There is nothing besides the stomach of a fleshy character, as has already been stated. All that can be seen are the so-called eggs, of which there are several, contained each in a separate membrane, and certain black bodies which have no name, and which, beginning at the animal's

mouth, are scattered round its body here and there. These [15] sea-urchins are not all of one species, but there are several different kinds, and in all of them the parts mentioned are to be found. It is not, however, in every kind that the so-called eggs are edible. Neither do these attain to any size in any other species than that with which we are all familiar. A similar distinction may be made [20] generally in the case of all Testacea. For there is a great difference in the edible qualities of the flesh of different kinds; and in some, moreover, the residual substance known as the poppy is good for food, while in others it is uneatable. This in the spiral kinds is lodged in the spiral part of the shell, while in univalves, such as limpets, it occupies the fundus, and in bivalves is placed near the hinge, the so-called egg lying on the right; while on the opposite side is the vent. The former is [25] incorrectly termed egg, for it merely corresponds to what in well-fed sanguineous animals is fat; and thus it is that it makes its appearance at those seasons of the year when they are in good condition, namely, spring and autumn. For no Testacea can abide extremes of temperature, and they are in evil plight in seasons of great cold or [30] heat. This is clearly shown by what occurs in the case of the sea-urchins. For though the eggs are to be found in these animals even directly they are born, yet they acquire a greater size than usual at the time of full moon; not, as some think, because sea-urchins eat more at that season, but because the nights are then warmer, owing to the moonlight. For these creatures are bloodless, and so are unable to stand cold and require warmth. That is why they are found in better condition in summer everywhere except in the Pyrrhean tidal strait. There the [680<sup>b</sup>1] sea-urchins flourish as well in winter as in summer. But the reason for this is that they have a greater abundance of food in the winter, because the fish desert the strait at that season.

The number of the eggs is the same in all sea-urchins, and is an odd one. For there are five ova, just as there are also five teeth and five stomachs; and the [5] explanation of this is to be found in the fact that the eggs are not really eggs, but merely, as was said before, the result of the animal's well-fed condition. Oysters also have a so-called egg, corresponding in character to that of the sea-urchins, but existing only on one side of their body. Now inasmuch as the sea-urchin is of a spherical form, and not merely a single disk like the oyster, and in virtue of its [10] spherical shape is the same from whatever side it be examined, its egg must necessarily be of a corresponding symmetry. For the spherical shape has not the asymmetry of the disk-shaped body of the oysters. For in all these animals the head is central, but in the sea-urchin it is at the top. But

even so the egg cannot be [15] continuous—for it is not so in the others—but is on one side of the disk only. Thus since this is a common property of them all and the sea-urchin is peculiar in being spherical, this animal cannot possibly have an even number of eggs. For were they an even number, they would have to be arranged exactly opposite to each other, so as to keep the necessary symmetry; and in that case there would be eggs on both [20] sides of the disk. But this is not the case in any of the other shell-fish. For both in the oysters and in the scallops we find the egg only on one side of the circumference. The number then must be uneven, three for instance, or five. But if there were only three they would be much too far apart; while, if there were more than five, they [25] would come to form a continuous mass. The former arrangement would not be for the animal's good, the latter would not be possible. There can therefore be neither more nor less than five. For the same reason the stomach is divided into five parts, and there is a corresponding number of teeth. For seeing that the eggs represent each of them a kind of body for the animal, their disposition must conform to that of [30] the stomach, seeing that it is from this that they derive the material for their growth. Now if there were only one stomach, either the eggs would be too far off from it, or it would be so big as to fill up the whole cavity, and the sea-urchin would have great difficulty in moving about and finding due nourishment for its repletion. As then there are five intervals so are there of necessity five divisions of the stomach, one for each interval. So also, and on like grounds, there are five teeth. For [681<sup>a</sup>1] nature is thus enabled to allot one alike to each of the aforementioned parts. These, then, are the reasons why the number of eggs in the sea-urchin is an odd one, and why that odd number is five. In some sea-urchins the eggs are excessively small, in others of considerable size, the explanation being that the latter are of a warmer [5] constitution, and so are able to concoct their food more thoroughly; and that is why the inedible ones tend to be full of residue. Those of a warmer constitution are, moreover, in virtue of their warmth more given to motion, so that they make expeditions in search of food, instead of remaining stationary like the rest. As evidence of this, it will be found that they always have something or other sticking to their spines, as though they moved much about; for they use their spines as feet.

[10] The ascidians differ but slightly from plants, and yet have more of an animal nature than the sponges, which are plants and nothing more. For nature passes from lifeless objects to animals in such unbroken sequence, interposing between them beings which live and yet are not

animals, that scarcely any difference seems to [15] exist between two neighbouring groups owing to their close proximity.

A sponge, then, as already said, in these respects completely resembles a plant, that throughout its life it is attached to a rock, and that when separated from this it dies. Slightly different from the sponges are the so-called *Holothurias* and the sea-lungs, as also sundry other sea-animals that resemble them. For these are free [20] and unattached. Yet they have no sensation, and their life is simply that of a plant separated from the ground. For even among landplants there are some that spring up and grow, either upon other plants, or even entirely free. Such, for example, is the plant which is found on *Parnassus*, and which some call the rockplant. This you may hang up on a peg and it will yet live for a considerable time. Sometimes [25] *ascidians* and the like so far resemble plants as that they never live free and unattached, but, on the other hand, inasmuch as they have a certain flesh-like substance, they must be supposed to possess some degree of sensibility—and it is unclear whether they are to be classed as plants or as animals.

An *ascidian* has a body divided by a single septum and with two orifices, one [30] where it takes in the fluid matter that ministers to its nutrition, the other where it discharges the surplus juice, for it has no visible residual substance, such as have the other *Testacea*. This is itself a very strong justification for considering an *ascidian*, and anything else there may be among animals that resembles it, to be a plant; for plants also never have any residuum. Across the middle of the body of these there [35] runs a thin transverse partition, and here it is that we may reasonably suppose the part on which life depends to be situated.

The sea-anemones or sea-nettles, as they are variously called, are not *Testacea* [681<sup>b</sup>1] at all, but lie outside the recognized groups. Their constitution approximates them on one side to plants, on the other to animals. For seeing that some of them can [5] detach themselves and can fasten upon their food, and that they are sensible of objects which come in contact with them, they must be considered to have an animal nature. The like conclusion follows from their using the asperity of their bodies as a protection against their enemies. But, on the other hand, they are closely allied to plants, firstly by the imperfection of their structure, secondly by their being able to attach themselves to the rocks, which they do with great rapidity, and lastly by their having no visible residuum notwithstanding that they possess a mouth.

Very similar again are the *Starfishes*. For these also fasten on their prey, and suck out its juices, and thus destroy a vast number of oysters.

At the same time they [10] present a certain resemblance to such of the animals we have described as the Cephalopoda and Crustacea, inasmuch as they are free and unattached. The same may also be said of the Testacea.

Such, then, is the structure of the parts that minister to nutrition and which every animal must necessarily possess. But besides these organs it is quite plain that in every animal there must be some part or other which shall be analogous to what [15] in sanguineous animals is the presiding seat of sensation. In the Cephalopoda this part consists of a fluid substance contained in a membrane, through which runs the gullet on its way to the stomach. It is attached to the body rather towards its upper surface, and by some is called the *mytis*. Just such another organ is found also in the [20] Crustacea and there too is known by the same name. This part is at once fluid and corporeal and, as before said, is traversed by the gullet. For had the gullet been placed between the *mytis* and the upper surface of the animal, the hardness of the back would have interfered with its due dilatation as the food enters. On the outer [25] surface of the *mytis* runs the intestine; and in contact with this latter is placed the ink-bag, so that it may be removed as far as possible from the mouth and its obnoxious fluid be kept at a distance from the nobler and sovereign part. The position of the *mytis* shows that it corresponds to the heart of sanguineous animals; for it occupies the self-same place. The same is shown by the sweetness of its fluid, [30] which has the character of concocted matter and resembles blood.

In the Testacea the presiding seat of sensation is in a corresponding position, but is less easily made out. It should, however, always be looked for in some midway position; namely, in such Testacea as are stationary, midway between the part by which food is taken in and the channel through which either the excrement or the spermatic fluid is voided, and, in those species which are capable of locomotion, [682<sup>a</sup>1] invariably midway between the right and left sides.

In Insects the organ which is the seat of sensation, lies, as was stated in the first treatise, between the head and the cavity which contains the stomach. In most of them it consists of a single part; but in others, for instance in such as have long bodies and resemble the centipede, it is made up of several parts, so that such insects [5] continue to live after they have been cut in pieces. For the aim of nature is to give to each animal only one such dominant part; and when she can, she makes it a unity; when she cannot, a plurality. This is much more clearly marked in some insects than in others.



The parts concerned in nutrition are not alike in all insects, but show considerable diversity. Thus some have what is called a sting in the mouth, which is [10] a kind of compound instrument that combines in itself the character of a tongue and of lips. In others that have no such instrument in front there is a part behind the teeth that answers the same sensory purposes. Immediately after the mouth comes the intestine, which is never wanting in any insect. This runs in a straight line and [15] without further complication to the vent; occasionally, however, it has a spiral coil. There are, moreover, some insects in which a stomach succeeds to the mouth, and is itself succeeded by a convoluted intestine, so that the larger and more voracious insects may be enabled to take in a more abundant supply of food. More peculiar [20] than any are the Cicadae. For here the mouth and the tongue are united so as to form a single part, through which, as through a root, the insect sucks up the fluids on which it lives. Insects are always small eaters, not so much because of their diminutive size as because of their cold temperament. For it is heat which requires sustenance; just as it is heat which speedily concocts it. But cold requires no [25] sustenance. In no insects is this so conspicuous as in these Cicadae. For they find enough to live on in the moisture which is deposited from the air. So also do the Ephemera that are found about the Black Sea. But while these latter only live for a single day, the Cicadae subsist on such food for several days, though still not many.

[30] We have now done with the internal parts of animals, and must therefore return to the consideration of the external parts which have not yet been described. It will be better to begin with the animals we have just been describing, rather than from the point at which we left off, so that proceeding from these, which require less discussion, our account may have more time to spend on the perfect kinds of animals, those namely that have blood.

[35] 6 · Insects, though they present no great multiplicity of parts, are not without diversities when compared with each other. They are all many-footed; the [682<sup>b</sup>1] object of this being to compensate their natural slowness and frigidity, and give greater activity to their motions. Accordingly we find that those which, as the centipedes, have long bodies, and are therefore the most liable to refrigeration, have also the greatest number of feet. Again, the body in these animals is insected—the [5] reason for this being that they have not got one vital centre but many

—and the number of their feet corresponds to that of the insections.<sup>17</sup>

Should the feet fall short of this, their deficiency is compensated by the power of flight. Of such flying insects some live a wandering life, and are forced to make long expeditions in search of food. These have a body of light weight, and four [10] wings, two on either side, to support it. Such are bees and the insects akin to them; for they have two wings on each side. When, however, such insects are of very small bulk, their wings are reduced to two, as is the case with flies. Insects with heavy bodies and of stationary habits, though not polypterous in the same way as bees, yet have sheaths to their wings to maintain their efficiency. Such are the *Melolonthae* [15] and the like. For their stationary habits expose their wings to much greater risks than are run by those of insects that are more constantly in flight, and on this account they are provided with this protecting shield. The wing of an insect has neither divisions nor shaft. For it is no wing at all, but merely a skin-like membrane that, owing to its dryness, necessarily becomes detached from the surface of the [20] body, as the fleshy substance grows cold.

These animals then have their bodies insectioned, not only for the reasons already assigned, but also to enable them to curl round in such a manner as may protect them from injury; for such insects as have long bodies can roll themselves up, which would be impossible were it not for the insections; and those that cannot do this can yet draw their segments up and so increase the hardness of their bodies. This can be felt quite plainly by putting the finger on one of the insects, for instance, known as [25] dung-beetles. The touch frightens the insect, and it remains motionless, while its body becomes hard. The division of the body into segments is necessary; for that they have several controlling sources is a constituent of their substances, and is a character which approximates them to plants. For as plants, though cut into pieces, [30] can still live, so also can insects. There is, however, this difference between the two cases, that the portions of the divided insect live only for a limited time, whereas the portions of the plant actually attain the perfect form of the whole, so that from one single plant you may obtain two or more.

Some insects are also provided with another means of protection against their enemies, namely a sting. In some this is in front, connected with the tongue, in [35] others behind at the posterior end. For just as the organ of smell in elephants answers several uses, serving alike as a weapon and for purposes of nutrition, so does [683<sup>a</sup>1] also the sting, when placed in connexion with the tongue, as in some insects, answer more than one end. For it is the instrument through which they derive

their sensations of food, as well as that with which they suck it up and bring it to the mouth. Such of these insects as have no anterior sting are provided with teeth, which serve in some of them for biting the food, and in others for its prehension and [5] conveyance to the mouth. Such are their uses, for instance, in ants and all the various kinds of bees. As for the insects that have a sting behind, this weapon is given them because they are of a fierce disposition. In some of them the sting is lodged inside the body, in bees, for example, and wasps. For these insects are made for flight, and were their sting external and of delicate make it would soon get [10] spoiled; and if, on the other hand, it were of thicker build, as in scorpions, its weight would be an incumbrance. As for scorpions that live on the ground and have a tail, their sting must be set upon this, as otherwise it would be of no use as a weapon. Dipterous insects never have a posterior sting. For the very reason of their being [15] dipterous is that they are small and weak, and therefore require no more than two feathers to support their light weight; and for the same reason their sting is in front; for their strength is not sufficient to allow them to strike efficiently with the hinder part of their body. Polypterous insects, on the other hand, are of greater bulk and hence have more wings and are stronger in their hinder parts. Now it is better, when possible, that one and the same instrument shall not be made to serve several [20] dissimilar uses; but that there shall be one organ to serve as a weapon, which can then be very sharp, and a distinct one to serve as a tongue, which can then be of spongy texture and fit to absorb nutriment. Whenever, therefore, nature is able to provide two separate instruments for two separate uses, without the one hampering the other, she does so, instead of acting like a coppersmith who for cheapness makes [25] a spit and lampholder in one. It is only when this is impossible that she uses one organ for several functions. The anterior legs are in some cases longer than the others, that they may serve to wipe away any foreign matter that may lodge on the insect's eyes; for their sight is not very distinct owing to the eyes being made of a [30] hard substance. Flies and bees and the like may be constantly seen thus dressing themselves with crossed forelegs. Of the other legs, the hinder are bigger than the middle pair, both to aid in walking and also that the insect, when it takes flight, may spring more easily from the ground. This difference is still more marked in such insects as leap, in locusts for instance, and in the various kinds of fleas. For these first bend and then extend the legs, and, by doing so, are necessarily shot up from [683<sup>b</sup>1] the ground. It is only the hind legs of locusts, and not the front ones, that resemble the steering oars of a ship.

For this requires that the joint shall be deflected inwards, and such is never the case with the anterior limbs. The whole number of legs, including those used in leaping, is six in all these insects.

[5] **7** · In the Testacea the body consists of but few parts, the reason being that these animals live a stationary life. For such animals as move much about must of necessity have more numerous parts than such as remain quiet; for their activities are many, and the more the movements the greater the number of organs required to effect them. Some species of Testacea are absolutely motionless, and others not [10] quite but nearly so. Nature, however, has provided them with a protection in the hardness of the shell with which she has invested their body. This shell, as already has been said, may have one valve, or two valves, or be spiral. In the latter case it may be either helical, as in trumpet-shells, or spherical, as in sea-urchins. When it [15] has two valves, these may be gaping, as in scallops and mussels, where the valves are united together on one side only, so as to open and shut on the other; or they may be united together on both sides, as in the razor-fish. In all cases alike the Testacea [20] have, like plants, the head downwards. The reason for this is, that they take in their nourishment from below, just as do plants with their roots. Thus the under parts come in them to be above, and the upper parts to be below. The body is enclosed in a membrane, and through this the animal filters fresh water and absorbs its nutriment. In all there is a head; but none of the parts, excepting this recipient of food, has any distinctive name.

[25] **8** · All the Crustacea can crawl as well as swim, and accordingly they are provided with numerous feet. There are four main genera, viz. the crayfish, the lobsters, the prawns, and the crabs. In each of these genera, again, there are numerous species, which differ from each other not only as regards shape, but also [30] very considerably as regards size. For, while in some species the individuals are large, in others they are excessively minute. The crabs and crayfish resemble each other in possessing claws. These claws are not for locomotion, but to serve in place of hands for seizing and holding objects; and they are therefore bent in the opposite direction to the feet, being so twisted as to turn their convexity towards the body, [35] while their feet turn towards it their concavity. For in this position the claws are best suited for laying hold of the food and carrying it to the mouth. The distinction [684<sup>a</sup>1] between

the crayfish and the crabs consists in the former having a tail while the latter have none. For the crayfish swim about and a tail is therefore of use to them, serving for their propulsion like the blade of an oar. But it would be of no use to the crabs; for these animals live habitually close to the shore, and creep into holes and [5] corners. In such of them as live out at sea, the feet are much less adapted for locomotion than in the rest, because they are little given to moving about but depend for protection on their shell-like covering. The *Maiae* and the crabs known [10] as *Heracleotic* are examples of this; the legs in the former being very thin, in the latter very short.

The very minute crabs that are found among the small fry have their hindermost feet flattened out into the semblance of fins or oar-blades, so as to help the animal in swimming.

The prawns are distinguished from the crabs by the presence of a tail; and from the crayfish by the absence of claws. This is explained by their large number of feet, [15] on which has been expended the material for the growth of claws. Their feet again are numerous to suit their mode of progression, which is mainly by swimming.

Of the parts on the under surface, those near the head are in some of these animals formed like gills, for the admission and discharge of water; while the parts [20] lower down in the female crayfish are more laminar than in the males, and in the female crabs the flap is furnished with hairier appendages. For the females retain their eggs in these parts instead of letting them go free, as do fishes and all other oviparous animals; for the appendages are broader and provide more room for the [25] eggs. In the crayfish and in the crabs the right claw is invariably the larger and the stronger. For it is natural to every animal in active operations to use the parts on its right side in preference to those on its left; and nature invariably assigns each organ, either exclusively or in a more perfect condition, to such animals as can use it. So it is with tusks, and teeth, and horns, and spurs, and all such defensive and offensive [30] weapons.

In the lobsters alone it is a matter of chance which claw is the larger, and this in either sex. Claws they must have, because they belong to a genus in which this is a constant character; but they have them in this indeterminate way, owing to imperfect formation and to their not using them for their natural purpose, but for [684<sup>b</sup>1] locomotion.

For a detailed account of the several parts of these animals, of their position and their differences, those parts being also included which distinguish the sexes, reference must be made to the *Anatomies* and to the

9 · We come now to the Cephalopoda. Their internal organs have already been described with those of other animals. Externally there is the trunk of the body, not distinctly defined, and in front of this the head surrounded by feet, which [10] form a circle about the mouth and teeth, and are set between these and the eyes. Now in all other animals the feet, if there are any, are disposed in one of two ways; either before and behind or along the sides, the latter being the plan in such of them, for instance, as are bloodless and have numerous feet. But in the Cephalopoda there is a peculiar arrangement, different from either of these. For their feet are all placed at what may be called the fore end. The reason for this is that the hind part of [15] their body has been drawn up close to the fore part, as is also the case in the spiral Testacea. For the Testacea, while in some points they resemble the Crustacea, in others resemble the Cephalopoda. Their earthy matter is on the outside, and their fleshy substance within. So far they are like the Crustacea. But the general plan of [20] their body is that of the Cephalopoda; and, though this is true in a certain degree of all the Testacea, it is more especially true of those turbinated species that have a spiral shell. For<sup>18</sup> both classes have this nature; and that is why they walk evenly, [25] unlike quadrupeds and men. Now men have their mouth in their head, i.e. in the upper part of their body; next comes the gullet, then the stomach, then the gut which extends to the vent for the residue. That is the arrangement in the sanguinea, i.e. the head is followed by what is called the thorax and the parts about it; the remaining parts, such as the anterior and posterior limbs, having been superadded [30] by nature, to minister to these and for locomotion.

In the Crustacea also and in Insects there is a tendency to a similar arrangement of the internal parts in a straight line; the distinction between these groups and the sanguineous animals depending on differences of the external organs which minister to locomotion. But the Cephalopoda and the spiral Testacea have in [685<sup>a</sup>1] common an arrangement which stands in contrast with this. For here the two extremities are brought together by a curve, as if one were to bend the straight line until *D* came close to *A*. Such, then, is the disposition of the internal parts; and [5] round these, in the Cephalopoda, is placed the sac (in the octopus alone called a head), and, in the Testacea, the spiral shell which corresponds to the sac. There is, in fact, only this difference

between them, that the investing substance of the Cephalopoda is soft while the shell of the Testacea is hard, nature having surrounded their fleshy part with this hard coating as a protection because of their [10] limited power of locomotion. For this reason, in both classes the excrement is voided near the mouth; at a point below this orifice in the Cephalopoda, and in the spiral-shells on one side of it.

Such, then, is the explanation of the position of the feet in the Cephalopoda, and of the contrast they present to other animals in this matter. The arrangement, however, in the cuttlefish and the calamaries is not precisely the same as in the [15] octopus, owing to the former having no other mode of progression than by swimming, while the latter not only swim but crawl. For in the former six of the feet are above the teeth and small, the outer one on either side being the biggest; while the remaining two of the eight are below the mouth and are the biggest of all, just as the hind limbs in quadrupeds are stronger than the fore limbs. For it is these that [20] have to support the weight, and to take the main part in locomotion. And the outer two are bigger than the pair which intervene between them because they have to assist the lowermost pair in their office. In the octopus, on the other hand, the four central feet are the biggest. Again, though the number of feet is the same in all the Cephalopoda, namely eight, their length varies in different kinds, being short in the cuttlefish and the calamaries, but greater in the octopus. For in these latter the trunk of the body is of small bulk, while in the former it is of considerable size; and [25] so in the one case nature has used the materials subtracted from the body to give length to the feet, while in the other she has given to the growth of the body what she has first taken from the feet. The octopus then, owing to the length of their feet, can not only swim but crawl, whereas in the other genera the feet are useless for the latter mode of progression, being small while the bulk of the body is considerable. [30] These short feet would not enable their possessors to cling to the rocks and keep themselves from being torn off by the waves when these run high in times of storm; neither would they serve to lay hold of objects at all remote and bring them in; but, to supply these defects, the animal is furnished with two long proboscises, by which it can moor itself and ride at anchor like a ship in rough weather, and by which it can catch prey at a distance and to bring it to the mouth. They are so used by both [685<sup>b</sup>1] the cuttlefish and the calamaries. In the octopus the feet are themselves able to perform these offices, and there are consequently no proboscises. Some animals have suckers and tentacles as well as feet; and these have the same capacity and [5]

structure as those plaited instruments which were used by physicians of old to reduce dislocations of the fingers. Like these they are made by the interlacing of their fibres, and they act by pulling upon pieces of flesh and yielding substances. For they encircle an object in a slackened condition, and when they are put on the stretch they grasp and cling tightly to whatever it may be that is in contact with their inner surface. Since, then, the Cephalopoda have no other instruments with [10] which to convey anything to themselves from without, than either feet, as in some species or proboscises as in others, they are provided with these to serve as hands for offence and defence and other uses.

The suckers are set in double line in all the Cephalopoda excepting in one kind of octopus where there is but a single row. The length and the slimness which is part of the nature of this kind of octopus explain the exception. For a narrow space cannot possibly admit of more than a single row. This exceptional character, then, belongs to them, not because it is the most advantageous arrangement, but because [15] it is the necessary consequence of the special nature of their substance.

In all these animals there is a fin, encircling the sac. In the octopus and the cuttlefish this fin is unbroken and continuous, as is also the case in the larger calamaries. But in the smaller kind, called Teuthides, the fin is not only broader than in the cuttlefish and the octopus where it is narrow, but, moreover, does not [20] encircle the entire sac, but only begins in the middle of the side. The use of this fin is to enable the animal to swim, and also to direct its course. It acts, that is, like the rump-feathers in birds, or the tail-fin in fishes. In none is it so small or so indistinct as in the octopus. For in these the body is of small bulk and can be steered by the [25] feet sufficiently well.

The Insects, the Crustacea, the Testacea, and the Cephalopoda, have now been dealt with in turn; and their parts have been described, whether internal or external.

[30] **10** · We must now go back to the vivipara that have blood, and consider such of their parts, already enumerated, as were before passed over. When we have done with these, we will pass on to the oviparous sanguinea, and treat of them in like manner.

[35] The parts that border on the head, and on what is known as the neck and throat, have already been taken into consideration. All animals that have blood [686<sup>a</sup>1] have a head; whereas in some bloodless animals, such as crabs, the part which represents a head is not clearly defined. As



to the neck, it is present in all the Vivipara, but only in some of the Ovipara; for while those that have a lung also have [5] a neck those that do not inhale the outer air have none.

The head exists mainly for the sake of the brain. For every animal that has blood must of necessity have a brain; and must, moreover, for reasons already given, have it placed in an opposite region to the heart. But the head has also been chosen [10] by nature as the part in which to set some of the senses; because its blood is mixed in such suitable proportions as to ensure their tranquillity and precision, while at the same time it can supply the brain with such warmth as it requires. There is yet a third constituent superadded to the head, namely the part which ministers to the ingestion of food. This has been placed here by nature, because such a situation accords best with the general configuration of the body. For the stomach could not [15] possibly be placed above the heart, seeing that this is the sovereign organ; and if placed below, as in fact it is, then the mouth could not possibly be placed there also. For this would have necessitated a great increase in the length of the body; and the stomach, moreover, would have been removed too far from the source of motion and of concoction.

The head, then, exists for the sake of these three parts; while the neck, again, [20] exists for the sake of the windpipe. For it acts as a defence to this and to the oesophagus, encircling them and keeping them from injury. In all other animals this neck is flexible and contains several vertebrae; but in wolves and lions it contains only a single bone. For the object of nature was to give these animals an organ which should be serviceable in the way of strength, rather than for other purposes.

[25] Continuous with the head and neck is the trunk with the anterior limbs. In man the forelegs and forefeet are replaced by arms and by what we call hands. For of all animals man alone stands erect, in accordance with his god-like nature and substance. For it is the function of the god-like to think and to be wise; and no easy [30] task were this under the burden of a heavy body, pressing down from above and obstructing by its weight the motions of the intellect and of the general sense. When, moreover, the weight and corporeal substance become excessive, the body must of necessity incline towards the ground. In such cases therefore nature, in order to give support to the body, has replaced the arms and hands by forefeet, and has thus converted the animal into a quadruped. For, as every animal that walks [686<sup>b</sup>1] must of necessity have the two hinder feet, such an animal becomes a quadruped, its body inclining downwards in front from the weight which its soul cannot

sustain. For all animals, man alone excepted, are dwarf-like in form. For the dwarf-like is that in which the upper part is large, while that which bears the weight and is used [5] in progression is small. This upper part is what we call the trunk, which reaches from the mouth to the vent. In man it is duly proportionate to the part below, and diminishes much in its comparative size as the man attains to full growth. But in his infancy the contrary obtains, and the upper parts are large, while the lower part is small, so that the infant can only crawl, and is unable to walk; and at first cannot [10] even crawl, but remains without motion. For all children are dwarfs in shape, but cease to be so as they become men, from the growth of their lower part; whereas in quadrupeds the reverse occurs, their lower parts being largest in youth, and advance of years bringing increased growth above, that is in the trunk, which extends from the rump to the head. Thus it is that foals are scarcely, if at all, below horses in [15] height; and that while still young they can touch their heads with the hind legs, though this is no longer possible when they are older. Such, then, is the form of animals that have either a solid or a cloven hoof. But such as are polydactylous and without horns, though they too are of dwarf-like shape, are so in a less degree; and therefore the greater growth of the lower parts as compared with the upper is also small, being proportionate to this smaller deficiency. [20]

Dwarf-like again is the race of birds and fishes; and so in fact, as already has been said, is every animal that has blood. This is the reason why no other animal is so intelligent as man. For even among men themselves if we compare children with adults, or such adults as are of dwarf-like shape with such as are not, we find that, whatever other superiority the former may possess, they are at any rate deficient as [25] compared with the latter in intelligence. The explanation, as already stated, is that in many their psychical principle is corporeal and impeded in its motions. Let now a further decrease occur in the elevating heat, and a further increase in the earthly matter, and the animals become smaller in bulk, and their feet more numerous, [30] until at a later stage they become footless and extended full length on the ground. Then, by further small successions of change, they come to have their principal organ below; and at last the part which answers to a head becomes motionless and destitute of sensation. Thus the animal becomes a plant, that has its upper parts downwards and its lower parts above. For in plants the roots are the equivalents of mouth and head, while the seed has an opposite significance, for it is produced [687<sup>a</sup>1] above at the extremities of the twigs.

The reasons have now been stated why some animals have many feet, some only two, and others none; why, also, some living things are plants and others animals; and, lastly, why man alone of all animals stands erect. Standing thus erect, [5] man has no need of legs in front, and in their stead has been endowed by nature with arms and hands. Now it is the opinion of Anaxagoras that the possession of these hands is the cause of man being of all animals the most intelligent. But it is more rational to suppose that man has hands because of his superior intelligence. For the [10] hands are instruments, and the invariable plan of nature in distributing the organs is to give each to such animal as can make use of it; nature acting in this matter as any prudent man would do. For it is a better plan to take a person who is already a flute-player and give him a flute, than to take one who possesses a flute and teach him the art of flute-playing. For nature adds that which is less to that which is [15] greater and more important, and not that which is more valuable and greater to that which is less. Seeing then that such is the better course, and seeing also that of what is possible nature invariably brings about the best, we must conclude that man does not owe his superior intelligence to his hands, but his hands to his superior intelligence. For the most intelligent of animals is the one who would put the most [20] organs to good use; and the hand is not to be looked on as one organ but as many; for it is, as it were, an instrument for further instruments. This instrument, therefore,—the hand—of all instruments the most variously serviceable, has been given by nature to man, the animal of all animals the most capable of acquiring the most varied arts.

Much in error, then, are they who say that the construction of man is not only [25] faulty, but inferior to that of all other animals; seeing that he is, as they point out, barefooted, naked, and without weapon of which to avail himself. For other animals have each but one mode of defence, and this they can never change; so that they must perform all the offices of life and even, so to speak, sleep with sandals on, never laying aside whatever serves as a protection to their bodies, nor changing such single weapon as they may chance to possess. But to man numerous modes of defence are [687<sup>b</sup>1] open, and these, moreover, he may change at will; as also he may adopt such weapon as he pleases, and at such places as suit him. For the hand is talon, hoof, and horn, at will. So too it is spear, and sword, and whatsoever other weapon or instrument you [5] please; for all these can it be from its power of grasping and holding them all. In harmony with this varied office is the form which nature has contrived for it. For it is split into several divisions, and whereas being compounded

is contained in being divided, the reverse is not the case. The divisions also may be used singly or two [10] together and in various combinations. The joints, moreover, of the fingers are well constructed for prehension and for pressure. One of these also, short and thick but not long, is placed laterally. For were it not so placed all prehension would be as impossible, as were there no hand at all. For the pressure of this digit is applied from [15] below upwards, while the rest act from above downwards; an arrangement which is essential, if the grasp is to be firm and hold like a tight clamp. As for the shortness of this digit, the object is to increase its strength, so that it may be able, though but one, to counterbalance the other four.<sup>19</sup> Moreover, were it long it would be of no use. (The finger which stands at the end is small, while the central one of all is long, like a centre oar in a ship. This is rightly so; for it is mainly by the central part of the [20] encircling grasp that a tool must be held when put to use.) And for this reason it is called the great finger, though it is small, because the others are pretty well useless without it.

No less skilfully contrived are the nails. For, while in man these serve simply as [25] coverings to protect the tips of the fingers, in other animals they are also used for active purposes.

The arms in man and the fore limbs in quadrupeds bend in contrary directions, this difference having reference to the conveying of food and to the other offices which belong to these parts. For quadrupeds must of necessity bend their anterior limbs inwards that they may serve in locomotion; for they use them as feet. Not but what even among quadrupeds there is at any rate a tendency for such as are [30] polydactylous to use their forefeet not only for locomotion but as hands. And they are in fact so used, as any one may see. For these animals seize hold of objects, and also repel assailants with their anterior limbs; whereas quadrupeds with solid hoofs [688<sup>a</sup>1] use their hind legs for this latter purpose. For their fore limbs are not analogous to the elbows and hands of man.

It is this which explains why in some of the polydactylous quadrupeds, such as wolves, lions, dogs, and leopards, there are actually five digits on each forefoot, though there are only four on each hind one. For the fifth digit of the foot [5] corresponds to the fifth digit of the hand, and like it is called the big one. It is true that in the smaller polydactylous quadrupeds the hind feet also have each five toes. But this is because these animals are creepers; and the increased number of nails serves to give them a tighter grip, and so enables them to creep up steep places with [10] greater facility, or even to run head downwards.

In man between the arms, and in other animals between the forelegs, lies what is called the chest. This in man is broad, as one might expect; for as the arms are set laterally on the body, they offer no impediment to such expansion in this part. But in quadrupeds the chest is narrow, owing to the legs having to be extended in a forward [15] direction in progression and locomotion.

For this reason the breasts of quadrupeds are never placed on the chest. But in the human body there is ample space in this part; moreover, the heart and neighbouring organs require protection, and for these reasons this part is fleshy and [20] the breasts are placed upon it separately, being themselves of a fleshy substance in the male for the reason just stated; while in the female, nature, in accordance with what we say is her frequent practice, makes them minister to an additional function, employing them as a store-place of nutriment for the offspring. The human breasts [25] are two in number, in accordance with the division of the body into two halves, a right and a left. They are somewhat firmer and divided, because the ribs in this region are joined together and because their presence is not burdensome. In other animals it is impossible for the breasts to be placed on the chest between the [30] forelegs, for they would interfere with locomotion; they are therefore disposed of in a variety of ways. Thus in such animals as produce but few at a birth, whether horned quadrupeds or those with solid hoofs, the breasts are placed in the region of the thighs, and are two in number, while in such as produce litters, or such as are polydactylous, they are either numerous and placed laterally on the belly, as in pigs and dogs, or are only two in number, being set, however, in the centre of the [688<sup>b</sup>1] abdomen, as in the case in the lion. The explanation of this is not that the lion produces few at a birth, for sometimes it has more than two cubs at a time, but is to be found in the fact that this animal has no plentiful supply of milk. For, being a flesh-eater, it gets food at but rare intervals, and such nourishment as it obtains is all expended on the growth of its body.

In the elephant also there are but two breasts which are placed under the pits [5] of the forelimbs. The breasts are not more than two, because this animal has only a single young one at a birth; and they are not placed in the region of the thighs, because they never occupy that position in any polydactylous animal such as this. Lastly, they are placed above, close to the armpits, because this is the position of the [10] foremost breasts in all animals whose breasts are numerous, and they give the most milk. Evidence of this is furnished by the sow. For she always presents these foremost teats to the first-born of her litter. A single young

one is of course a first-born, and so such animals as only produce a single young one must have these first breasts, and the first breasts are those under the armpits. This, then, is the [15] reason why the elephant has but two breasts, and why they are so placed. But, in such animals as have litters of young, the teats are disposed about the belly; the reason being that more teats are required by those that will have more young to nourish. Now it is impossible that these should be set transversely in rows of more than two, one, that is, for each side of the body, the right and the left; they must [20] therefore be placed lengthways, and the only place where there is sufficient length for this is the region between the front and hind legs. As to the animals that are not polydactylous but produce few at a birth, or have horns, their breasts are placed in the region of the thighs. The horse, the ass, the camel are examples; all of which bear but a single young one at a time, and of which the two former have solid hoofs, while in the last the hoof is cloven. As still further examples may be mentioned the [25] deer, the ox, the goat, and all other similar animals.

The explanation is that in these animals growth takes place in an upward direction; so that there must be an abundant collection of residual matter and of blood in the lower region, that is to say in the neighbourhood of the orifices for efflux, and here therefore nature has placed the breasts. For the place in which the [30] nutriment is set in motion must also be the place whence nutriment can be derived by them. In man there are breasts in the male as well as in the female; but some of the males of other animals are without them. Such, for instance, is the case with horses, some stallions being destitute of these parts, while others that resemble their dams have them. Thus much then concerning the breasts.

Next after the chest comes the region of the belly, which is left unenclosed by [689<sup>a</sup>1] the ribs for a reason which has already been given; namely that there may be no impediment to the swelling which necessarily occurs in the food as it gets heated, not to the expansion of the womb in pregnancy.

At the extreme end of what is called the trunk are the parts concerned in the [5] evacuation of the solid and of the fluid residue. In all sanguineous animals with some few exceptions, and in all Vivipara without any exception at all, the same part which serves for the evacuation of the fluid residue is also made by nature to serve in sexual congress, and this alike in male and female. For the semen is a kind of fluid [10] and residual matter. (The proof of this will be given hereafter, but for the present let it be taken for granted.) The like holds good of the

menstrual fluid in women, and of the part where they emit semen. This also, however, is a matter of which a more accurate account will be given hereafter. For the present let it be simply stated as a fact, that the menstrual fluids of the female are also residual matter. Both of them, moreover, being fluid, it is only natural that things which are alike should be [15] discharged into the same parts. Of the internal structure of these parts, and of the differences which exist between the parts concerned with semen and the parts concerned with conception, a clear account is given in the *History of Animals* and in the *Anatomies*. Moreover, I shall have to speak of them later in the work *On* [20] *Generation*. As regards, however, the external shape of these parts, it is plain enough that they are adapted to their operations, as indeed of necessity they must be. There are, however, differences in the male organ corresponding to differences in the body generally. For all animals are not of an equally sinewy nature. This organ, again, is the only one that, independently of any morbid change, admits of augmentation and of diminution of bulk. The former condition is of service in [25] copulation, while the other is required for the advantage of the body at large. For, were the organ constantly in the former condition, it would be an incumbrance. The organ therefore has been formed of such constituents as will admit of either state. For it is partly sinewy, partly cartilaginous, and thus is enabled either to contract or [30] to become extended, and is capable of admitting air.

All female quadrupeds are retromingent, because the position of the parts which this implies is useful to them in the act of copulation. This is the case with only some few males, such as the lynx, the lion, the camel, and the hare. No quadruped with a solid hoof is retromingent. [689<sup>b</sup>1]

The posterior portion of the body and the parts about the legs are peculiar in man as compared with quadrupeds. Nearly all these latter have a tail, and this whether they are viviparous or oviparous. For, even if the tail be of no great size, yet they have a kind of stump as at any rate a small representative of it. But man is [5] tail-less. He has, however, buttocks, which exist in none of the quadrupeds. His legs also are fleshy (as too are his thighs and calves); while the legs in all other animals that have any, whether viviparous or not, are fleshless, being made of sinew and bone and spinous substance. For all these differences there is, so to say, one common [10] explanation, and this is that of all animals man alone stands erect. It was to facilitate the maintenance of this position that nature made his upper parts light, taking away some of their corporeal substance, and using it to increase the weight of the parts

below, so that the buttocks, the thighs, and the calves of the legs were all [15] made fleshy. The character which she thus gave to the buttocks renders them at the same time useful in resting the body. For standing causes no fatigue to quadrupeds, and even the long continuance of this posture produces in them no weariness; for they are supported the whole time by four props, which is much as though they were lying down. But to man it is no easy task to remain for any length of time on his feet, [20] his body demanding rest in a sitting position. This, then, is the reason why man has buttocks and fleshy legs; and the presence of these fleshy parts explains why he has no tail. For the nutriment which would otherwise go to the tail is used up in the production of these parts, while at the same time the existence of buttocks does away with the necessity of a tail. But in quadrupeds and other animals the reverse [25] obtains. For they are of dwarf-like form, so that all the pressure of their weight and corporeal substance is on their upper part, and is withdrawn from the parts below. On this account they are without buttocks and have hard legs. In order, however, to cover and protect that part which serves for the evacuation of excrement, nature has [30] given them a tail of some kind or other, subtracting for the purpose some of the nutriment which would otherwise go to the legs. Intermediate in shape between man and quadrupeds is the ape, belonging therefore to neither or to both, and having on this account neither tail nor buttocks; no tail in its character of biped, no [690<sup>a</sup>1] buttocks in its character of quadruped. There is a great diversity of so-called tails; and this organ like others is sometimes used by nature for by-purposes, being made to serve not only as a covering and protection to the fundament, but also for other uses and advantages of its possessor.

[5] There are differences in the feet of quadrupeds. For in some of these animals there is a solid hoof, and in others a hoof cloven into two, and again in others a foot divided into many parts.

The hoof is solid when the body is large and the earthy matter present in great abundance; in which case the earth, instead of forming teeth and horns, is separated [10] in the character of a nail, and being very abundant forms one continuous nail, that is a hoof, in place of several. This explains why these animals, as a rule, have no huckle-bones; a second reason being that the presence of such a bone in the joint of the hind leg somewhat impedes its free motion. For extension and flexion can be made more rapidly in parts that have but one angle than in parts that have several. But the presence of a huckle-bone, as a connecting bolt is the introduction as it were [15] of a new limb between the two. Such an



addition adds to the weight of the foot, but renders the act of progression more secure. Thus it is that in such animals as have a huckle-bone, it is only in the posterior and not in the anterior limbs that this bone is found. For the anterior limbs, moving as they do in advance of the others, require to be light and capable of ready flexion, whereas firmness and extensibility are what [20] are wanted in the hind limbs. Moreover, a huckle-bone adds weight to the blow of a limb, and so renders it a suitable weapon of defence; and these animals all use their hind legs to protect themselves, kicking out against anything which annoys them. In the cloven-hoofed quadrupeds the lighter character of the hind legs admits of there being a huckle-bone; and the presence of the huckle-bone prevents them from having a solid hoof, the bony substance remaining in the joint, and therefore being deficient in the foot. As to the polydactylous quadrupeds, none of them have [25] huckle-bones. For if they had they would not be polydactylous, but the divisions of the foot would only extend to that amount of its breadth which was covered by the huckle-bone. Thus it is that most of the animals that have huckle-bones are cloven-hoofed.

Of all animals man has the largest foot in proportion to the size of the body. This is only what might be expected. For seeing that he is the only animal that [30] stands erect, the two feet which are going to bear all the weight of the body must be both long and broad. Equally intelligible is it that the proportion between the size of the fingers and that of the whole hand should be inverted in the case of the toes and feet. For the function of the hands is to take hold of objects and retain them by [690<sup>b</sup>1] pressure; so that the fingers require to be long. For it is by its flexed portion that the hand grasps an object. But the function of the feet is to enable us to stand securely, and for this the undivided part of the foot requires to be of larger size than the toes. And it is better for the extremity to be divided than to be undivided. For in an undivided foot disease of any one part would extend to the whole organ; whereas, if [5] the foot be divided into separate digits, there is not an equal liability to such an occurrence. The digits, again, by being short would be less liable to injury. For these reasons the feet in man are many-toed, while the separate digits are of no great length. The toes, finally, are furnished with nails for the same reason as are the fingers, namely because the tips are weak and therefore require special protection. [10]

that live on land and bring forth their young alive. Of the oviparous Sanguinea, some have four feet, while others have none. The latter form a single genus, namely the serpents; and why these are footless has been already explained in the remarks *On* [15] *the Progression of Animals*. But in other respects serpents resemble the oviparous quadrupeds in their conformation.

In all these animals there is a head with its component parts; its presence being determined by the same causes as obtain in the case of other sanguineous animals; and in all, with the single exception of the river crocodile, there is a tongue inside the [20] mouth. In this one exception there would seem to be no actual tongue, but merely a space left vacant for it. The reason is that a crocodile is in a way a land-animal and a water-animal combined. In its character of land-animal it has a space for a tongue; but in its character of water-animal it is without the tongue itself. For in some fishes, as has already been mentioned, there is no appearance whatsoever of a [25] tongue, unless the mouth be stretched open very widely indeed; while in others it is indistinctly separated from the rest of the mouth. The reason for this is that a tongue would be of but little service to such animals, seeing that they are unable to chew their food or to taste it beforehand, the pleasurable sensations they derive from it occurring during swallowing. For it is in their passage down the gullet that solid edibles cause enjoyment, while it is by the tongue that the savour of fluids is [30] perceived. Thus it is during swallowing that the oiliness, the heat, and other such qualities of food are recognized. Now the Vivipara too have this power of perception (and in fact the satisfaction from most solid edibles and dainties is derived almost entirely from the dilatation of the oesophagus during swallowing—that is why the [691<sup>a</sup>1] same animals are not intemperate both with regard to tasty drinks and with regard to dainty foods); but while other animals have in addition the sensation of taste, [5] tongueless animals lack it and have the other sensation only.

In some oviparous quadrupeds, namely in lizards, the tongue is bifid, as also it is in serpents, and its terminal divisions are of hair-like fineness, as has already been described. (Seals also have a forked tongue.) This is why all these animals are fond of dainty food. The teeth in the four-footed Ovipara are of the saw-like kind, like the [10] teeth of fishes. The organs of all the senses are present and resemble those of other animals. Thus there are nostrils for smell, eyes for vision, and ears for hearing. The latter organs, however, do not project from the sides of the head, but consist simply [15] of the duct, as also is the case in birds. This is due in

both cases to the hardness of the integument; birds having their bodies covered with feathers, and these oviparous quadrupeds with horny plates. These plates are equivalent to scales, but of a harder character. This is manifest in tortoises and river crocodiles, and also in the large serpents. For here the plates become stronger than the bones, being of the same substance as these.

[20] These animals have no upper eyelid, but close the eye with the lower lid. In this they resemble birds, and the reason is the same as was assigned in their case. Among birds there are some that also blink by means of a membrane which comes from the corner of the eye. But none of the oviparous quadrupeds blink; for their [25] eyes are harder than those of birds. The reason for this is that keen vision is of very considerable service to birds, flying as they do in the air, whereas it would be of comparatively small use to the oviparous quadrupeds, seeing that they all live in holes.

Of the two separate portions which constitute the head, namely the upper part and the lower jaw, the latter in man and in the viviparous quadrupeds moves not [30] only upwards and downwards, but also from side to side; while in fishes and birds and oviparous quadrupeds, the only movement is up and down. The reason is that [691<sup>b</sup>1] this latter movement is the one required in biting and dividing food, while the lateral movement serves to reduce substances to a pulp. To such animals, therefore, as have molars this lateral motion is of service; but to those animals that have none it would be quite useless, and they are therefore invariably without it. For nature never [5] makes anything that is superfluous. While in all other animals it is the lower jaw that is movable, in the river crocodile it is exceptionally the upper. This is because the feet in this creature are so excessively small as to be useless for seizing and holding prey; on which account nature has given it a mouth that can serve for these [10] purposes in their stead. For that direction of motion which will give the greater force to a blow will be the more serviceable one in holding or in seizing prey; and a blow from above is always more forcible than one from below. Seeing, then, that both the prehension and the mastication of food are offices of the mouth, and that [15] the former of these two is the more essential in an animal that has neither hands nor suitably formed feet, these crocodiles will derive greater benefit from a motion of the upper jaw than from a motion of the lower jaw. The same considerations explain why crabs also move the upper division of each claw and not the lower. For their claws are substitutes for hands, and so require to be suitable for the prehension of [20] food, and not for its

division; for such division and biting is the office of teeth. In crabs, then, and in such other animals as are able to seize their food in a leisurely manner, inasmuch as their mouth is not called on to perform its office while they are still in the water, the two functions are assigned to different parts, prehension to the [25] hands or feet, biting and division of food to the mouth. But in crocodiles the mouth has been so framed by nature as to serve both purposes, the jaws being made to move in the manner just described.

Another part present in all these animals is a neck, this being the consequence of their having a lung. For the windpipe by which the air is admitted to the lung is of some length. Since the portion between the head and the shoulders is called the neck, a serpent can scarcely be said with the same right as the rest of these animals to have a neck, but only to have something analogous to that part of the body—if, [30] indeed, the neck must be determined by the limits just stated. It is a peculiarity of serpents, as compared with other animals allied to them, that they are able to turn [692<sup>a</sup>1] their head backwards without stirring the rest of the body. The reason of this is that a serpent, like an insect, has a body that admits of being curled up, its vertebrae being cartilaginous and easily bent. The faculty in question belongs then to serpents as a necessary consequence of this cause; but it is for the sake of their good too—for [5] it enables them to guard against attacks from behind. For their body, owing to its length and the absence of feet, is ill-suited for turning round and protecting the hinder parts; and merely to lift the head, without the power of turning it round, would be of no use whatsoever.

The animals with which we are dealing have, moreover, a part which corresponds to the chest; but neither here nor elsewhere in their body have they any [10] breasts, as neither has any bird or fish. This is a consequence of their having no milk; for a breast is a receptacle for milk and, as it were, a vessel to contain it. This absence of milk is not peculiar to these animals, but is common to all such as are not internally viviparous. For all such produce eggs, and the nutriment which in Vivipara has the character of milk is in them engendered in the egg. Of all this, however, a clearer account will be given in the treatise *On Generation*. As to the [15] mode in which the legs bend, a general account, in which all animals are considered, has already been given in the work on *Progression*. These animals also have a tail, larger in some of them, smaller in others, and the reason for this has been stated in general terms in an earlier passage.

Of all oviparous animals that live on land there is none so lean as the

[20] chamaeleon. For there is none that has so little blood. The explanation of this is to be found in the psychical temperament of the creature. For it is of a timid nature—hence its many changes of appearance. But fear is a refrigeration, and results from deficiency of natural heat and scantiness of blood.

We have now done with such sanguineous animals as are quadrupeds and also [692<sup>b</sup>1] such as are footless, and have stated with sufficient completeness what external parts they possess, and for what reasons they have them.

12 · The differences of birds compared one with another are differences of magnitude, and of the greater or smaller development of parts. Thus some have long [5] legs, others short legs; some have a broad tongue, others a narrow tongue; and so on with the other parts. There are few of their parts that differ, taking birds by themselves. But when birds are compared with other animals the parts present differences of form also.

Birds, then, are feathered, and this is a character common to them all and [10] peculiar to them. For the parts of animals are covered in some cases with hair, in others with scales, in others with scaly plates; but birds have feathers. Their feathers, too, are split and distinct in kind from the undivided feathers of insects; for the bird's feather is divided, these are not; the bird's feather has a shaft, these have none.

[15] A second strange peculiarity which distinguishes birds from all other animals is their beak. For as in elephants the nostril serves in place of hands, and as in some insects the tongue serves in place of mouth, so in birds there is a beak, which, being bony, serves in place of teeth and lips. Their organs of sense have already been considered.

[20] All birds have a neck naturally extending from the body; and the purpose of this neck is the same as in such other animals as have one. This neck in some birds is long, in others short; its length, as a general rule, being pretty nearly determined by that of the legs. For long-legged birds have a long neck, short-legged birds a short one, to which rule, however, the web-footed birds form an exception. For to a bird [693<sup>a</sup>1] perched up on long legs a short neck would be of no use whatsoever in collecting food from the ground; and equally useless would be a long neck, if the legs were short. Such birds, again, as are carnivorous would find length in this part interfered [5] greatly with their habits of life. For a long neck is weak, and it is on their superior strength that carnivorous

birds depend for their subsistence. No bird, therefore, that has talons ever has an elongated neck. In web-footed birds, however, and in those other birds belonging to the same class, whose toes though actually separate are shaped like a snub nose, the neck is elongated, so as to be suitable for collecting [10] food from the water; while the legs are short, so as to serve in swimming.

The beaks of birds also vary with their modes of life. For in some the beak is straight, in others crooked; straight, in those who use it merely for eating; crooked, in those that live on raw flesh. For a crooked beak is an advantage in fighting; and these birds must, of course, get their food from the bodies of other animals, and in [15] most cases by violence. In such birds, again, as live in marshes and are herbivorous the beak is broad and flat, this form being best suited for digging and cropping, and for pulling up plants. In some of these marsh birds, however, the beak is elongated, as too is the neck, the reason for this being that the bird gets its food from some depth below the surface. For most birds of this kind, and most of those whose feet [20] are webbed, either in their entirety or each part separately, live by preying on some of the smaller animals that are to be found in water, and their neck serves as a fishing-rod, the beak representing the line and hook.

The upper and under sides of the body, that is of what in quadrupeds is called the trunk, present in birds one unbroken surface, and they have no arms or forelegs [693<sup>b</sup>1] attached to it, but in their stead wings, which are a distinctive peculiarity of these animals; and that is why the ends of the wings lie on the back in the place of a shoulder-blade.

The legs are two in number, as in man; not however, as in man, bent outwards, [5] but bent inwards like the legs of a quadruped. The wings are bent like the forelegs of a quadruped, having their convexity turned outwards. That the feet should be two in number is a matter of necessity. For a bird is essentially a sanguineous animal, and at the same time a winged animal; and no sanguineous animal has more than four points for motion. In birds, then, as in those other sanguineous animals that live and move upon the ground, the limbs attached to the trunk are four in number. But, while in all the rest these four limbs consist of a pair of arms and a pair of legs, or of [10] four legs as in quadrupeds, in birds the arms or forelegs are replaced by a pair of wings, and this is their distinctive character. For it is part of the substance of a bird that it shall be able to fly; and it is by the extension of wings that this is made possible. Of all arrangements, then, the only possible, and so the necessary, one is that birds shall have two feet; for this with the wings

will give them four points for [15] motion. The breast in all birds is sharp-edged, and fleshy. The sharp edge is to minister to flight, for broad surfaces move with considerable difficulty, owing to the large quantity of air which they have to displace; while the fleshy character acts as a protection, for the breast, owing to its form, would be weak, were it not amply covered.

Below the breast lies the belly, extending, as in quadrupeds and in man, to the vent and to the place where the legs are jointed to the trunk. [20]

Such, then, are the parts which lie between the wings and the legs. Birds like all other animals, whether produced viviparously or from eggs, have an umbilicus during their development, but, when the bird has attained to fuller growth, no signs of this remain visible. The cause of this is plainly to be seen during the process of development; for in birds the umbilical cord unites with the intestine, and is not a [25] portion of the blood vessels as is the case in viviparous animals.

Some birds, again, are well adapted for flight, their wings being large and strong. Such, for instance, are those that have talons and live on flesh. For their [694<sup>a</sup>1] mode of life renders the power of flight a necessity, and it is on this account that their feathers are so abundant and their wings so large. Besides these, however, there are also other genera of birds that can fly well; all those, namely, that depend [5] on speed for security, or that are of migratory habits. On the other hand, some kinds of birds have heavy bodies and are not constructed for flight. These are birds that are frugivorous and live on the ground, or that are able to swim and get their living in watery places. In those that have talons the body, without the wings, is small; for the nutriment is consumed in the production of these wings, and of the weapons and defensive appliances; whereas in birds that are not made for flight the contrary [10] obtains, and the body is bulky and so of heavy weight. In some of these heavy-bodied birds the legs are furnished with what are called spurs, which replace the wings as a means of defence. Spurs and talons never co-exist in the same bird. For nature never makes anything superfluous; and if a bird can fly, and has talons, [15] it has no use for spurs; for these are weapons for fighting on the ground, and on this account belong to certain heavy-bodied birds. These latter, again, would find the possession of talons not only useless but actually injurious; for the claws would stick into the ground and interfere with progression. This is the reason why all birds with talons walk so badly, and why they never settle upon rocks. For the character of [20] their claws is ill-suited for either action.

All this is the necessary consequence of the process of development. For the earthy matter in the body issuing from it is converted into parts that are useful as weapons. That which flows upwards gives hardness or size to the beak; and, should [25] any flow downwards, it either forms spurs upon the legs or gives size and strength to the claws upon the feet. But it does not at one and the same time produce both these results, one in the legs, the other in the claws; for such a dispersion of this residual matter would destroy all its efficiency. In other birds this earthy residue furnishes [694<sup>b</sup>1] the legs with the material for their elongation; or sometimes, in place of this, fills up the interspaces between the toes. Thus it is a matter of necessity that such birds as swim shall either be actually web-footed, or shall have a kind of broad blade-like [5] margin running along the whole length of each distinct toe. The forms, then, of these feet are the necessary results of the causes that have been mentioned. Yet at the same time they are intended for the animal's advantage. For they are in harmony with the mode of life of these birds, who, living on the water, where their wings are useless, require that their feet shall be such as to serve in swimming. For [10] these feet are so developed as to resemble the oars of a boat, or the fins of a fish; and if the fins of the one or the webbing of the other is destroyed, they can no longer swim.

In some birds the legs are very long, the cause of this being that they inhabit marshes—and nature makes the organs for the function, and not the function for [15] the organs. It is, then, because these birds are not meant for swimming that their feet are without webs, and it is because they live on ground that gives way under the foot that their legs and toes are elongated, and that these latter in most of them have an extra number of joints. Again, though all birds have the same material composition, they are not all made for flight; and in these, therefore, the nutriment [20] that should go to their tail-feathers is spent on the legs and used to increase their size. This is the reason why these birds when they fly make use of their legs as a tail, stretching them out behind, and so rendering them serviceable, whereas in any other position they would be simply an impediment.

In other birds, where the legs are short, these are held close against the belly [25] during flight. In some cases this is merely to keep the feet out of the way, but in birds that have talons the position has a further purpose, being the one best suited for rapine. Birds that have a long and a thick neck keep it stretched out during flight; but those whose neck though long is slender fly with it coiled up. For in this position it is protected, and less likely to get broken, should the bird fly against any



obstacle.

[695<sup>a</sup>1] In all birds there is an ischium, but in such a way that it would scarcely be taken for one, but rather for a second thigh-bone because of its length; for it extends as far as to the middle of the belly. The reason for this is that the bird is a biped, and yet is unable to stand erect. For if its ischium extended but a short way from the [5] fundament, and then immediately came the leg, as is the case in man and in quadrupeds, the bird would be unable to stand up at all. For while man stands erect, and while quadrupeds have their heavy bodies propped up in front by the forelegs, birds can neither stand erect owing to their dwarf-like shape, nor have anterior legs [10] to prop them up, these legs being replaced by wings. As a remedy for this nature has given them a long ischium, and brought it to the centre of the body, fixing it firmly; and she has placed the legs under this, so that the weight on either side may be equally balanced, and standing or progression rendered possible. Such then is the reason why a bird, though it is a biped, does not stand erect. The reason why its legs are destitute of flesh is the same as in the case of quadrupeds, about which we have already spoken.

In all birds alike, whether web-footed or not, the number of toes in each foot is [15] four. For the Libyan ostrich may be disregarded for the present, and its cloven hoof and other discrepancies of structure as compared with the tribe of birds will be considered further on. Of these four toes three are in front, while the fourth points backwards, serving as a heel, to give steadiness. In the long-legged birds this fourth [20] toe is much shorter than the others, as is the case with the corncrake, but the number of their toes is not increased. The arrangement of the toes is such as has been described in all birds with the exception of the wryneck. Here only two of the toes are in front, the other two behind; and the reason for this is that the body of the wryneck is not inclined forward so much as that of other birds. All birds have [25] testicles; but they are inside the body. The reason for this will be given in the treatise on the *Generation of Animals*.

13 · Thus then are fashioned the parts of birds. But in fishes a still further [695<sup>b</sup>1] stunting has occurred in the external parts. For here, for reasons already given, there are neither legs nor hands nor wings, the whole body from head to tail [5] presenting one unbroken surface. This tail differs in different fishes, in some approximating in character to the fins,<sup>20</sup> while in some of the flat kinds, it is spinous and elongated, because

the material which should have gone to the tail has been diverted thence and used to increase the breadth of the body. Such, for instance, is the case with the torpedos, the sting-rays, and whatever other Selachia there may be of like nature. In such fishes, then, the tail is spinous and long; while in some others [10] it is short and fleshy, for the same reason which makes it spinous and long in the torpedo. For to be short and fleshy comes to the same thing as to be long and less amply furnished with flesh.

The opposite has occurred in the fishing-frog; for here the anterior and broad part of the body is not of a fleshy character, and so all the fleshy substance which [15] has been thence diverted has been placed by nature in the tail and hinder portion of the body.

In fishes there are no limbs attached to the body. For in accordance with their essential substance they are swimming animals; and nature never makes anything superfluous or in vain. Now fish are sanguineous in their substance; and since they [20] are made for swimming they have fins, and as they are not made for walking they are without feet; for feet are attached to the body that they may be of use in progression on land. Moreover, fishes cannot have feet, or any other similar limbs, as well as four fins; for they are sanguineous animals. The cordylus, though it has [25] gills, has feet, for it has no fins but has its tail flattened out and loose in texture.

Fishes, unless, like the ray and the sting-ray they are broad and flat, have four [696<sup>a</sup>1] fins, two on the upper and two on the under side of the body; and no fish ever has more than these. For, if it had, it would be a bloodless animal.

The upper pair of fins is present in nearly all fishes, but not so the under pair; for these are wanting in some of those fishes that have long thick bodies, such as the [5] eel, the conger, and a certain kind of mullet that is found in the lake at Siphæe. When the body is still more elongated, and resembles that of a serpent as is the case in the muraena, there are absolutely no fins at all; and locomotion is effected by the flexures of the body, the water being put to the same use by these fins as is the ground by serpents. For serpents swim in water exactly in the same way as they [10] glide on the ground. The reason for these serpent-like fishes being without fins is the same as that which causes serpents to be without feet; and what this is has been already stated in the works on the *Progression* and the *Movement of Animals*. The reason was this. If the points of motion were four, motion would be effected under difficulties; for either the two pairs of fins would be close to each other, in which case motion would

scarcely be possible, or they would be at a very considerable [15] distance apart, in which case the long interval between them would be just as great an evil. On the other hand, to have more than four such motor points would convert the fishes into bloodless animals. A similar explanation applies to the case of those fishes that have only two fins. For here again the body is of great length and like that of a serpent, and its undulations do the office of the two missing fins. It is owing to this that such fishes can even crawl on dry ground, and can live there for a [20] considerable time; and some do not begin to gasp at once, while others, whose nature is akin to that of land-animals, are still less affected. In such fishes as have but two fins it is the upper pair that is present, excepting when the flat broad shape of the body prevents this. The fins in such cases are placed at the head, because in this region there is no elongation, which might serve in the absence of fins as a [25] means of locomotion; whereas in the direction of the tail there is a considerable lengthening out in fishes of this conformation. As for the rays and the like, they use the marginal part of their flattened bodies in place of fins for swimming.

Fish which are not so flat, e.g. the torpedo and the fishing-frog, have fins: the upper pair are placed further back because of the flatness of the fore parts, and the under pair are placed close to the head (for the flatness does not prevent it from [30] moving), while to compensate for this advancement they are smaller than the upper ones. In the torpedo two fins are placed on the tail, and the fish uses the broad expansion of its body to supply the place of the other two, each lateral half of its circumference serving the office of a fin.

The head, with its several parts, as also the organs of sense, have already come under consideration.

There is one peculiarity which distinguishes fishes from all other sanguineous [696<sup>b</sup>1] animals, namely, the possession of gills. Why they have these organs has been set forth in the treatise on *Respiration*. These gills are in most fishes covered by opercula, but in the Selachia there are no such coverings. For an operculum requires [5] fish-spine for its formation, and in other fishes the skeleton is made of this substance, whereas in the Selachia it is invariably formed of cartilage. Again, while the motions of spinous fishes are rapid, those of the Selachia are sluggish, inasmuch as they have neither fish-spine nor sinew; but an operculum requires rapidity of motion, seeing that the office of the gills is to minister as it were to expiration. For this reason in Selachia the branchial orifices themselves effect their own closure, [10] and thus there is no need for an operculum to ensure its taking place with due rapidity. In some fishes the

gills are numerous, in others few in number; in some again they are double, in others single. The last gill in most cases is single. For a detailed account of all this, reference must be made to the *Anatomies* and to the [15] *History of Animals*.

It is the abundance or the deficiency of the cardiac heat which determines the abundance or deficiency of the gills. For, the greater an animal's heat, the more rapid and the more forcible does it require the branchial movement to be; and numerous and double gills act with more force and rapidity than such as are few and [20] single. Thus, too, it is that some fishes that have but few gills, and those of comparatively small efficacy, can live out of water for a considerable time; for in them there is no great demand for refrigeration. Such, for example, are the eel and all other fishes of serpent-like form.

Fishes also present diversities as regards the mouth. For in some this is placed in front, at the very extremity of the body, while in others, as the dolphin and the [25] *Selachia*, it is placed on the under surface; so that these fishes turn on the back in order to take their food. The purpose of nature in this was apparently not merely to provide a means of salvation for other animals, by allowing them opportunity of escape during the time lost in the act of turning—for all the fishes with this kind of mouth prey on living animals—but also to prevent these fishes from giving way too [30] much to their gluttonous ravening after food. For had they been able to seize their prey more easily than they do, they would soon have perished from over-repletion. An additional reason is that their snout is round and small, and therefore cannot admit of a wide opening.

Again, even when the mouth is not placed on the under surface, there are differences in the extent to which it can open. For in some cases it can gape widely, [697<sup>a</sup>1] while in others it is set at the point of a small tapering snout; the former being the case in carnivorous fishes, such as those with saw teeth, whose strength lies in their mouth, while the latter is its form in all such as are not carnivorous.

The skin is in some fishes covered with scales (the scale of a fish is a thin and [5] shiny film, and therefore easily becomes detached from the surface of the body). In others it is rough, as for instance in the angel-fish, the ray, and the like. Fewest of all are those whose skin is smooth. The *Selachia* have no scales, but a rough skin. This is explained by their cartilaginous skeleton. For the earthy material which has been thence diverted is expended by nature upon the skin.

No fish has testicles either externally or internally; as indeed have no footless [10] animals, among which of course are included the serpents.

One and the same orifice serves both for the excrement and for the generative secretions, as is the case also in all other oviparous animals, quadrupeds included, inasmuch as they have no bladder and form no fluid excretion.

Such then are the characters which distinguish fishes from all other animals. [15] But dolphins and whales and all such Cetacea are without gills; and, having a lung, are provided with a blow-hole; for this serves them to discharge the sea-water which [20] has been taken into the mouth. For, feeding as they do in the water, they cannot but let this fluid enter into their mouth, and, having let it in, they must of necessity let it out again. Gills are useful here, as has been explained in the treatise on *Respiration*, to such animals as do not breathe; for no animal can possibly possess gills and at the same time be a respiratory animal. In order, therefore, that these Cetacea may discharge the water, they are provided with a blow-hole. This is placed in front of [25] the brain; for otherwise it would have cut off the brain from the spine. The reason for these animals having a lung and breathing, is that animals of large size require more heat to enable them to move. A lung, therefore, is placed within their body, and is fully supplied with blood-heat. These creatures are after a fashion land and [30] water animals in one. For so far as they are inhalers of air they resemble land-animals, while they resemble water-animals in having no feet and in deriving [697<sup>b</sup>1] their food from the sea. So also seals and bats are ambivalent, the former between land and water animals, and the latter between animals that live on the ground and animals that fly; and so they belong to both kinds or to neither. For seals, if looked [5] on as water-animals, are yet found to have fins. For their hind feet are exactly like the fins of fishes; and their teeth also are sharp and saw-like as in fishes. Bats again, if regarded as winged animals, have feet; and, if regarded as quadrupeds, are without them. So also they have neither the tail of a quadruped nor the tail of a bird; [10] no quadruped's tail, because they are winged animals; no bird's tail, because they are terrestrial. This absence of tail is the result of necessity. For they are skin-winged; but no animal, unless it has barbed feathers, has the tail of a bird; for a bird's tail is composed of such feathers. As for a quadruped's tail, it would be an actual impediment, if present among the feathers.

14 · Much the same may be said also of the Libyan ostrich. For it has some [15] of the characters of a bird, some of the characters of a quadruped. It differs from a quadruped in being feathered; and from a

bird in being unable to soar aloft, and in having feathers that resemble hair and are useless for flight. Again, it agrees with quadrupeds in having upper eyelashes, and the parts about the head and the upper [20] portion of the neck are bare—so that its eyelashes are more hairy; and it agrees with birds in being feathered in all the parts posterior to these. Further, it resembles a bird in being a biped, and a quadruped in having a cloven hoof; for it has hoofs and not toes. The explanation of these peculiarities is to be found in its bulk, which is that of a quadruped rather than of a bird. For speaking generally, a bird must [25] necessarily be of very small size. For a body of heavy bulk can with difficulty be raised into the air.

Thus much then as regards the parts of animals. We have discussed them all, and set forth the cause why each exists; and in so doing we have severally considered each group of animals. We must now pass on, and in due sequence must [30] next deal with the question of their generation.

<sup>1</sup>See *On Generation and Corruption* II 9–11.

<sup>2</sup>Excised by Peck.

<sup>3</sup>Excised by Peck.

<sup>4</sup>Excised by Peck.

<sup>5</sup>Excised by Peck.

<sup>6</sup>Excised by Peck.

<sup>7</sup>Omitting, with Peck, οἷον τί ἦν αὐτῷ τὸ αἷματι εἶναι.

<sup>8</sup>Reading καὶ αἷτη σπερ αἱ ἐργασίαι.

<sup>9</sup>Excised by Peck.

<sup>10</sup>‘πρόσωπον’ (‘face’) is connected with ‘πρόσωθεν ὄπωπε’ (‘he looks directly in front’).

<sup>11</sup>Excised by Peck.

<sup>12</sup>‘φρένες’ (‘diaphragm’) and ‘φρονεῖν’ (‘think’).

<sup>13</sup>See *Iliad* X 457; *Odyssey* XXII 329.

<sup>14</sup>Excised by Peck.

<sup>15</sup>Reading στόμαχον.

<sup>16</sup>Excised by Peck.

<sup>17</sup>Reading κατὰ ταύτας.

<sup>18</sup>The Greek text of the next two sentences is corrupt: Peck’s text, which is translated here, draws heavily on the Arabic version.

<sup>19</sup>Transposing ἵνα ... πολλοῖς to follow τὴν ἰσχύν.

<sup>20</sup>Reading παραπλησίαν τοῖς περὺγιοις.

# MOVEMENT OF ANIMALS\*\*

*A. S. L. Farquharson*

1 · Elsewhere we have investigated the movement of animals after their [698<sup>a</sup>1] various kinds, the differences between them, and the causes of their particular characters (for some animals fly, some swim, some walk, others move in various other ways); there remains an investigation of the common cause of any sort of [5] animal movement whatsoever.

Now we have already determined (when we were discussing whether eternal [10] motion exists or not, and what it is, if it does exist) that the origin of other motions is that which moves itself, and that the origin of this is the immovable, and that the prime mover must of necessity be immovable. And we must grasp this not only generally in theory, but also by reference to individuals in the world of sense; for with these in view we seek general theories, and with these we believe that general theories ought to harmonize. Now in the world of sense too it is plainly impossible [15] for movement to be initiated if there is nothing at rest, and before all else in our present subject—animal life. For if one of the parts of an animal be moved, another must be at rest, and this is the purpose of their joints; animals use joints like a centre, and the whole member, in which the joint is, becomes both one and two, both straight and bent, changing potentially and actually by reason of the joint. And [20] when it is bending and being moved one of the points in the joint is moved and one is at rest, just as if on a diameter AD were at rest, and B were moved, and AC were generated. However, in the geometrical illustration, the centre is held to be altogether indivisible (for in mathematics the motion they speak of is a fiction, no [25] mathematical entity being really moved), whereas in the case of joints the centres become potentially and actually now one, now divided. But still the origin of movement, qua origin, always remains at rest when the lower part of a limb is [698<sup>b</sup>1] moved; for example, the elbow joint, when the forearm is moved, and the shoulder, when the whole arm; the knee when the tibia is moved, and the hip when the whole leg. Accordingly it is plain that each animal as a whole must have within itself a point at rest, whence will be the origin of



that which is moved, and supporting itself [5] upon which it will be moved both as a complete whole and in its members.

2 · But the point of rest in the animal is still quite ineffectual unless there is something outside it which is absolutely at rest and immovable. Now it is worth [10] while to pause and consider what has been said; for it involves a speculation which extends beyond animals even to the motion and march of the universe. For just as there must be something immovable within the animal, if it is to be moved, so even more must there be without it something immovable, by supporting itself upon [15] which that which is moved moves. For were that something always to give way (as it does for tortoises walking on mud or persons walking in sand) advance would be impossible, and neither would there be any walking unless the ground were to remain still, nor any flying or swimming were not the air and the sea to resist. And this which resists must needs be different from what is moved, the whole of it from [20] the whole of that, and what is thus immovable must be no part of what is moved; otherwise there will be no movement. Evidence of this lies in the problem why it is that a man easily moves a boat from outside, if he push with a pole, putting it against the mast or some other part, but if he tried to do this when in the boat itself [25] he would never move it, no not even Tityus himself nor Boreas blowing from inside the ship, if he really were blowing in the way painters represent him; for they paint [669<sup>a</sup>1] him sending the breath out from himself. For whether one blew gently or so stoutly as to make a very great wind, and whether what were thrown or pushed were breath or something else, it is necessary in the first place to be supported upon one of one's own members which is at rest and so to push, and in the second place for this [5] member, either itself, or that of which it is a part, to remain at rest, fixing itself against something external to itself. Now the man who is himself in the boat, if he pushes, fixing himself against the boat, does not move the boat, because what he pushes against must remain at rest. Now what he is trying to move, and what he is [10] fixing himself against is in his case the same. If, however, he pushes or pulls from outside he does move it; for the ground is no part of the boat.

3 · Here we may ask the question whether if something moves the whole heavens this mover must be immovable, and moreover be no part of the heavens, nor in the heavens. For either it is moved itself and moves

the heavens, in which case it [15] must touch something immovable in order to cause movement, and then this is no part of that which cause movement; or if the mover is from the first immovable it will equally be no part of that which is moved. In this point at least they argue correctly who say that as the sphere is carried round in a circle no single part remains still; for then either the whole would necessarily stand still or its continuity [20] be torn asunder; but they argue less well in supposing that the poles have a certain power, though they have no magnitude, but are merely termini or points. For besides the fact that no such things have any substantial existence it is impossible for a single movement to be initiated by what is twofold; and yet they make the poles [25] two. From a review of these difficulties we may conclude that there is something so related to the whole of nature, as the earth is to animals and things moved by them.

And the mythologists with their fable of Atlas setting his feet upon the earth appear to have based the fable upon intelligent grounds. They make Atlas a kind of diameter twirling the heavens about the poles. Now as the earth remains still this would be reasonable enough, but their theory involves them in the position that the [30] earth is no part of the universe. And further the force of that which initiates movement must be made equal to the force of that which remains at rest. For there is a definite quantity of force or power by dint of which that which remains at rest does so, just as there is of force by dint of which that which initiates movement does [35] so; and as there is a necessary proportion between contrary motions, so there is between states of rest. Now equal forces are unaffected by one another, but are overcome by a superiority of force. And so Atlas, or whatever similar power initiates [699<sup>b</sup>1] movement from within, must exert no more force than will exactly balance the stability of the earth—otherwise the earth will be moved out of her place in the centre of things. For as the pusher pushes so is the pushed pushed, and with equal [5] force. But that which initiates movement is to begin with at rest, so that its force is greater, rather than equal and like to the stability. And similarly also than the stability of what is moved but does not initiate movement. Therefore the power of the earth in its immobility will have to be as great as that of the whole heavens, and of that which moves the heavens. But if that is impossible, it follows that the [10] heavens cannot be moved by anything of this kind inside them.

which, as akin to what has gone before, may be considered next. For if one could overcome by power of motion the immobility of the earth he would clearly move it away from [15] the centre. And it is plain that the force from which this power would originate will not be infinite; for the earth is not infinite and therefore its weight is not. Now things are called impossible in several ways; for when we say it is impossible to see a sound, and when we say it is impossible to see the men in the moon, we use the word in different ways: the former is of necessity, the latter, though their nature is to be [20] seen, will not actually be seen by us. Now we suppose that the heavens are of necessity impossible to destroy and to dissolve, whereas the result of the present argument would be to do away with this necessity. For it is natural and possible for a motion to exist greater than that by dint of which the earth is at rest, or than that by dint of which fire and the upper body are moved. If then there are superior [25] motions, these will be dissolved by one another; and if there actually are not, but might possibly be (for they cannot be infinite because not even body can be infinite), there is a possibility of the heavens being dissolved. For what is to prevent this coming to pass, unless it be impossible? And it is not impossible unless the opposite [30] is necessary. This difficulty, however, we will discuss elsewhere.<sup>1</sup>

Must there be something immovable and at rest outside of what is moved, and no part of it, or not? And must this necessarily be so also in the case of the universe? Perhaps it would be thought strange were the origin of movement inside. And to those who so conceive it the words of Homer<sup>2</sup> would appear to have been well [35] spoken: 'Nay, ye would not pull Zeus, highest of all, from heaven to the plain, no not even if ye toiled right hard; come, all ye gods and goddesses! Set hands to the chain'. [700a1] For that which is entirely immovable cannot possibly be moved by anything. And herein lies the solution of the difficulty stated just now, the possibility or [5] impossibility of dissolving the system of the heavens, in that it depends from an origin which is immovable.

Now in the animal world there must be not only an immovable without, but also within those things which move in place, and initiate their own movement. For one part of an animal must be moved, and another be at rest, and against this the [10] part which is moved will support itself and be moved; for example, if it moves one of its parts; for one part supports itself against another as though it were at rest.

But about things without life which are moved one might ask the question whether all contain in themselves both that which is at rest and that which initiates [15] movement, and whether they also, for instance

fire, earth, or any other inanimate thing, must support themselves against something outside which is at rest. Or is this impossible and must it not be looked for rather in those primary causes by which they are set in motion? For all things without life are moved by something other, and the origin of all things so moved are things which move themselves. And out of these we have spoken about animals (for they must all have in themselves that which is at rest, and without them that against which they are supported); but [20] whether there is some higher and prime mover is not clear, and an origin of that kind involves a different discussion. Animals at any rate which move themselves are all moved supporting themselves on what is outside them, even when they breathe in and out; for there is no essential difference between casting a great and a small weight, and this is what men do when they spit and cough and when they breathe in [25] and breathe out.

5 · But is it only in that which moves itself in place that there must be a point at rest, or does this hold also of that which causes its own qualitative changes, and its own growth? Now the question of original generation and decay is different; for [30] if there is, as we hold, a primary movement, this would be the cause of generation and decay, and probably of all the secondary movements too. And as in the universe, so in the animal world this is the primary movement, when the creature attains maturity; and therefore it is the cause of growth, when the creature becomes the cause of its own growth and the cause too of alteration. Otherwise, the point at rest is not necessary. However, the earliest growth and alteration in the living creature [700<sup>b</sup>1] arise through another and by other channels, nor can anything possibly be the cause of its own generation and decay; for the mover must exist before the moved, the begetter before the begotten, and nothing is prior to itself.

6 · Now whether the soul is moved or not, and how it is moved if it be moved, [5] has been stated before in our treatise concerning it.<sup>3</sup> And since all inanimate things are moved by some other thing—and the manner of the movement of the first and eternally moved, and how the first mover moves it, has been determined before in our work on first philosophy,<sup>4</sup> it remains to inquire how the soul moves the body, and [10] what is the origin of movement in a living creature. For, if we except the movement of the universe, things with life are the causes of the movement of all else, that is of all that are not moved by one another by

mutual impact. And so all their motions have a limit, inasmuch as the movements of things with life have such. For all living things both move and are moved for the sake of something, so that this is the limit of [15] all their movement—that for the sake of which. Now we see that the living creature is moved by intellect, imagination, purpose, wish, and appetite. And all these are reducible to thought and desire. For both imagination and sensation are on common ground with thought, since all three are faculties of discrimination though differing [20] according to distinctions stated elsewhere. Wish, however, impulse, and appetite, are all three forms of desire, while purpose belongs both to intellect and to desire. Therefore the object of desire or of intellect first initiates movement—not every object of intellect, but only the end in the domain of conduct. Accordingly it is goods [25] of this sort that initiate movement, not everything fine. For it initiates movement only so far as something else is for its sake, or so far as it is the end of that which is for the sake of something else. And we must suppose that a seeming good may take the room of actual good, and so may the pleasant, which is itself a seeming good. From these considerations it is clear that in one regard that which is eternally [30] moved by the eternal mover is moved in the same way as every living creature, in another regard differently, and so while it is moved eternally, the movement of living creatures has a limit. Now the eternally fine, and the truly and primarily good (which is not at one time good, at another time not good), is too divine and precious to be relative to anything else. The prime mover then moves, itself being unmoved, whereas desire and its faculty are moved and so move. But it is not necessary for the [701<sup>a</sup>1] last in the chain of things moved to move something else; wherefore it is plainly reasonable that motion in place should be the last of the movements in things that come into being; for the living creature is moved and goes forward by reason of desire or purpose, when some alteration has been set going on the occasion of [5] sensation or imagination.

7 · But how is it that thought is sometimes followed by action, sometimes not; sometimes by movement, sometimes not? What happens seems parallel to the case of thinking and inferring about the immovable objects. There the end is the truth seen (for, when one thinks the two propositions, one thinks and puts together [10] the conclusion), but here the two propositions result in a conclusion which is an action—for example, whenever one thinks that every man ought to walk, and that one is a man oneself, straightaway one walks; or that, in this case, no

man should walk, one is a man: straightaway one remains at rest. And one so acts in the two [15] cases provided that there is nothing to compel or to prevent. Again, I ought to create a good, a house is good: straightaway he makes a house. I need a covering, a coat is a covering: I need a coat. What I need I ought to make, I need a coat: I make a coat. [20] And the conclusion 'I must make a coat' is an action. And the action goes back to a starting-point. If there is to be a coat, there must first be this, and if this then this—and straightaway he does this. Now that the action is the conclusion is clear. But the premisses of action are of two kinds, of the good and of the possible.

[25] And as sometimes happens in dialectical questioning, so here the intellect does not stop and consider at all the one proposition, the obvious one; for example if walking is good for man, one does not dwell upon the proposition 'I am a man'. And so what we do without reflection, we do quickly. For when a man is actually using [30] perception or imagination or thought in relation to that for the sake of which, what he desires he does at once. For the actualizing of desire is a substitute for inquiry or thinking. I want to drink, says appetite; this is drink, says sense or imagination or thought: straightaway I drink. In this way living creatures are impelled to move and [35] to act, and desire is the last cause of movement, and desire arises through perception or through imagination and thought. And things that desire to act make and act [701<sup>a</sup>] sometimes from appetite or impulse and sometimes from wish.

The movements of animals may be compared with those of automatic puppets, which are set going on the occasion of a tiny movement (the strings are released, and the pegs strike against one another); or with the toy wagon (for the child mounts on it and moves it straight forward, and yet it is moved in a circle owing to [5] its wheels being of unequal diameter—the smaller acts like a centre on the same principle as the cylinders). Animals have parts of a similar kind, their organs, the sinewy tendons to wit and the bones; the bones are like the pegs and the iron; the tendons are like the strings; for when these are slackened or released movement [10] begins. However, in the puppets and the toy wagon there is no change of quality, since if the inner wheels became smaller and greater by turns there would be the same circular movement set up. In an animal the same part has the power of becoming now larger and now smaller, and changing its form, as the parts increase [15] by warmth and again contract by cold and change their quality. This change of quality is caused by imaginations and sensations and by ideas. Sensations are obviously a form of change of quality, and imagination and thinking have

the same [20] power as the objects. For in a measure the form conceived be it of hot or cold<sup>5</sup> or pleasant or fearful is like what the actual objects would be, and so we shudder and are frightened merely by thinking. Now all these affections are actually changes of quality, and with those changes some parts of the body enlarge, others grow smaller. [25] And it is not hard to see that a small change occurring at the centre makes great and numerous changes at the circumference, just as by shifting the rudder a hair's breadth you get a wide deviation at the prow. And further, when by reason of heat or cold or some kindred affection a change is set up in the region of the heart, even in [30] an imperceptibly small part of the heart, it produces a vast difference in the body—blushing, let us say, or turning white, and tremblings and shivers and their opposites.

8 · But to return, the object we pursue or avoid in the field of action is, as has been explained, the origin of movement, and upon the thought and imagination of [35] this there necessarily follows a heating or chilling. For what is painful we avoid, what is pleasing we pursue, and anything painful or pleasing is generally speaking [702<sup>a</sup>1] accompanied by a chilling and heating (but we do not notice this when it happens in a small part). One may see this by considering the affections. Blind courage and panic fears, erotic motions, and the rest of the corporeal affections, pleasant and painful, are all accompanied by heating or chilling, some in a particular member, others in the body generally. So, memories and anticipations, using things of this [5] kind as likenesses, are now more and now less causes of the same changes of temperature. And so we see the reason of nature's handiwork in the inward parts, and in the centres of movement of the organic members; they change from solid to moist, and from moist to solid, from soft to hard and vice versa. And so when these [10] are affected in this way, and when besides the passive and active have the constitution we have many times described, as often as it comes to pass that one is active and the other passive, and neither of them falls short of the elements of its account, straightaway one acts and the other responds. And on this account [15] thinking that one ought to go and going are virtually simultaneous, unless there be something else to hinder action. The organic parts are suitably prepared by the affections, these again by desire, and desire by imagination. Imagination in its turn depends either upon thinking or upon sense-perception. And the simultaneity and [20] speed are due to the natural correspondence of the active and passive.

However, that which first moves the animal organism must be in a definite origin. Now we have said that a joint is the origin of one part of a limb, the end of another. And so nature employs it sometimes as one, sometimes as two. When movement arises from a joint, one of the extreme points must remain at rest, and the [25] other be moved (for as we explained above the mover must support itself against a point at rest); accordingly, in the case of the elbow-joint, the last point of the forearm is moved but does not move anything, while, in the flexion, one point of the elbow, which lies in the whole forearm that is being moved, is moved, but there must also be a point which is unmoved, and this is our meaning when we speak of a point [30] which is in potency one, but which becomes two in actual exercise. Now if the forearm were the living animal, somewhere in its elbow-joint would be the movement-imparting origin of the soul.

Since, however, it is possible for a lifeless thing to be so related to the hand as the forearm is to the upper (for example, when a man moves a stick in his hand), it is evident that the soul could not lie in either of the two extreme points, neither, that is, [35] in the last point of what is moved, nor in the other origin. For the stick too has an end point and an origin by reference to the hand. Accordingly, for this reason, if the [702<sup>b</sup>1] moving origin which derives from the soul is not in the stick, then it is not in the hand either; for a precisely similar relation obtains between the extremity of the hand and the wrist, and between the wrist and the elbow. In this matter it makes no difference whether the part is naturally connected to the body or not; the stick may [5] be looked at as a detached part-of the whole. It follows then of necessity that it cannot lie in any origin which is the end of another member, even though there may lie another part outside the one in question. For example, relatively to the end point of the stick the hand is the origin, but the origin of the hand's movement is in the [10] wrist. And so if it is not even in the hand, because there is still something higher up, neither is the origin here; for once more if the elbow is at rest the whole part below it can be moved as a continuous whole.

9 · Now since the left and the right sides are symmetrical, and these opposites are moved simultaneously, it cannot be that the left is moved by the right [15] remaining stationary, nor vice versa; the origin must always be in what lies above both. Therefore, the origin of the moving soul must be in the middle; for of both extremes the middle is the limiting



point; and this is similarly related to the movements from above and below—e.g. from the head—and to those which spring from the spinal column, in creatures that have a spinal column.

[20] And this is a reasonable arrangement. For the sensorium is in our opinion in the centre too; and so, if the region of the origin is altered through sense-perception and thus changes, the adjacent parts change with it and they too are extended or contracted, and in this way the movement of the creature necessarily follows. And [25] the middle of the body must needs be in potency one but in actuality more than one; for the limbs are moved simultaneously from the origin, and when one is at rest the other is moved. For example, in the line ABC, B is moved, and A is the mover. There [30] must, however, be a point at rest if one is to move, the other to be moved. A then being one in potency must be two in actuality, and so be a magnitude not a point. Again, C may be moved simultaneously with B. Both the origin then in A must move and be moved, and so there must be something other than them which moves [35] but is not moved. For otherwise, when the movement begins, the extremes, i.e. the origin, in A would rest upon one another, like two men putting themselves back to [703<sup>a</sup>1] back and so moving their legs. There must then be some one thing which moves both. This something is the soul, distinct from the magnitude just described and yet located therein.

10 · Although from the point of view of the account which gives the cause of [5] movement desire is the middle, and desire moves being moved, still in the animated body there must be some body of this kind. Now that which is moved, but whose nature is not to initiate movement, is capable of being passive to an external power, while that which initiates movement must needs possess a kind of force and power. Now it is clear that animals do both possess connatural spirit and derive force from [10] this. (How this connatural spirit is maintained in the body is explained in other passages of our works.) And this spirit appears to stand to the soul-origin in a relation analogous to that between the point in a joint which moves being moved and the unmoved. Now since this origin is for some animals in the heart, in the rest in a [15] part analogous with the heart, for this reason the connatural spirit is clearly there too. (The question whether the spirit remains always the same or constantly changes must be discussed elsewhere; for the same question arises about the rest of the parts of the body.) At all events we see that it is well disposed to excite movement and to exert force. Now the functions of

movement are thrusting and pulling. Accordingly, the organ of movement must be capable of expanding and [20] contracting; and this is precisely the characteristic of spirit. It contracts and expands without constraint, and so is able to pull and to thrust from one and the same cause, exhibiting weight compared with the fiery element, and lightness by comparison with the opposites of fire. Now that which is to initiate movement [25] without alteration must be of the kind described; for the natural bodies prevail over one another by dint of predominance; the light is overcome and kept down by the heavier, and the heavy kept up by the lighter.

We have now explained what the part is which is moved when the soul originates movement, and what is the reason for this. And the animal organism must be conceived after the similitude of a well-governed commonwealth. When [30] order is once established in a city there is no more need of a separate monarch to preside over each several task. The individuals each play their assigned part as it is ordered, and one thing follows another because of habit. So in animals the same thing happens because of nature, each part naturally doing its own work as nature [35] has composed it. There is no need then of a soul in each part, but it resides in a kind of origin of the body, and the remaining parts live by being naturally connected, and [703<sup>b</sup>1] play their parts because of their nature.

**11** · So much then for the voluntary movements of animal bodies, and the reasons for them. These bodies, however, display in certain members involuntary [5] movements too, but most often non-voluntary movements. By involuntary I mean motions of the heart and of the penis; for often upon an image arising and without express mandate of the intellect these parts are moved. By non-voluntary I mean sleep and waking and respiration, and other similar movements. For neither imagination nor desire is properly mistress of any of these. But since the animal [10] body must undergo natural changes of quality, and when the parts are so altered some must increase and others decrease, so that the body must straightaway be moved and change with the changes that nature makes dependent upon one another (the causes of the movements are heatings and chillings, both those coming from [15] outside the body, and those taking place naturally within it)—so the movements which occur in spite of reason in the aforesaid parts occur when a change of quality supervenes. For thinking and imagination, as we said above,

produce that which brings about the affections, since they produce the forms which bring them about. [20] And the parts aforesaid display this motion more conspicuously than the rest, because each is in a sense a separate animal, the reason being that each contains vital moisture.<sup>6</sup> In the case of the heart the cause is plain; for it contains the origins of the senses; while an indication that the generative organ too is vital is that there [25] flows from it the seminal potency, itself a kind of living creature. Again, it is a reasonable arrangement that the movements arise in the origin upon movements in the parts, and in the parts upon movements in the origin, and so reach one another. [30] Conceive A to be the origin. The movements then arrive at the origin from each letter in the diagram we have drawn, and back again from the origin which is moved and changes, (for it is potentially multiple) the movement of B goes to B, that of C to C, the movement of both to both; but from B to C the movements flow by dint of [35] going from B to A as to an origin, and then from A to C as from an origin. And a movement contrary to reason sometimes does and sometimes does not arise in the parts on the occasion of the same thoughts; the reason is that sometimes the matter [704<sup>a</sup>1] which is passive is there in sufficient quantity and of the right quality and sometimes not.

And so we have finished our account of the reasons for the parts of each kind of [704<sup>b</sup>1] animal, of the soul, and further of sense-perception, of sleep, of memory, and of movement in general; it remains to speak of generation.

**\*\*TEXT:** M. C. Nussbaum, *Aristotle's de Motu Animalium*, Princeton University Press, Princeton, N.J., 1978

<sup>1</sup>See *Physics* VIII; *On the Heavens* I.

<sup>2</sup>See *Iliad* VIII 20–22.

<sup>3</sup>See *On the Soul* I 3–4.

<sup>4</sup>See *Metaphysics* Λ 7.

<sup>5</sup>Nussbaum excises θερμοῦ ἢ ψυχροῦ ἥ.

<sup>6</sup>Nussbaum, following Jaeger, excises τούτου ... ζωτικήν.

# PROGRESSION OF ANIMALS\*\*

*A.S. L. Farquharson*

1 · We have now to consider the parts which are useful to animals for [704<sup>a</sup>5] movement in place; first, why each part is such as it is and to what end they possess them; and second, the differences between these parts both in one and the same creature, and again by comparison of the parts of creatures of different species with one another. First then let us lay down how many questions we have to consider.

The first is what are the fewest points of motion necessary to animal [10] progression, the second why sanguineous animals have four points and not more, but bloodless animals more than four, and generally why some animals are footless, others bipeds, others quadrupeds, others polypods, and why all have an even number of feet, if they have feet at all; why the points on which progression depends [15] are even in number.

Next, why are man and bird bipeds, but fish footless; and why do man and bird, though both bipeds, have an opposite curvature of the legs. For man bends his legs convexly, a bird has his bent concavely; again, man bends his arms and legs in [20] opposite directions, for he has his arms bent convexly, but his legs concavely. and a viviparous quadruped bends his limbs in opposite directions to a man's, and in opposite directions to one another; for he has his forelegs bent convexly, his hind [704<sup>b</sup>5] legs concavely. Again, quadrupeds which are not viviparous but oviparous have a peculiar curvature of the limbs laterally away from the body. Again, why do quadrupeds move their legs criss cross?

We have to examine the reasons for all these facts, and others cognate to them; that the facts are such is clear from our natural history, we have now to ask reasons [10] for the facts.

2 · At the beginning of the inquiry we must postulate the principles we are accustomed constantly to use for our scientific investigation of nature, that is we must take for granted principles of this universal

character which appear in all nature's work. Of these one is that nature creates nothing without a purpose, but [15] always the best possible in each kind of living creature by reference to its essential constitution. Accordingly if one way is better than another that is the way of nature. Next we must take for granted the different species of dimensions which inhere in [20] various things; of these there are three pairs of two each, superior and inferior, before and behind, to the right and to the left. Further we must assume that the sources of movements in place are thrusts and pulls. (These are the essential [705<sup>a</sup>1] place-movements, it is only accidentally that what is carried by another is moved; it is not thought to move itself, but to be moved by something else.)

3 · After these preliminaries, we go on to the next questions in order.

Now of animals which change their position some move with the whole body at [5] once, for example jumping animals, others with their parts, for example walking animals. In both these changes the moving creature always changes its position by pressing against what lies below it. Accordingly if what is below gives way too [10] quickly for that which is moving upon it to lean against it, or if it affords no resistance at all to what is moving, the latter can of itself effect no movement upon it. For an animal which jumps makes its jump both by leaning against its own upper [15] part and also against what is beneath its feet; for at the joints the parts do in a sense lean upon one another, and in general that which pushes down leans upon what is pushed down. That is why athletes jump further with weights in their hands than without, and runners run faster if they swing their arms; there is in extending the arms a kind of leaning against the hands and wrists. In all cases then that which [20] moves makes its change of position by the use of at least two parts of the body; one part so to speak squeezes, the other is squeezed; for the part that is still is squeezed as it has to carry the weight, the part that is lifted strains against that which carries the weight. It follows then that nothing without parts can move itself in this way, for [25] it has not in it the distinction of the part which is passive and that which is active.

4 · Again, the boundaries by which living beings are naturally determined are six in number, superior and inferior, before and behind, right and left. Of these [30] all living beings have a superior and an inferior part; for superior and inferior is in plants too, not only in animals. And this distinction is one of function, not merely of position

relatively to the earth and the sky. The superior is that from which flows in each kind the distribution of nutriment and the process of growth; the inferior is [705<sup>b</sup>1] that to which the process flows and in which it ends. One is a starting-point, the other an end, and the starting-point is the superior. And yet it might be thought that in the case of plants at least the inferior is rather the appropriate starting-point, for in them the superior and inferior are in position other than in animals. Still they are [5] similarly situated from the point of view of function, though not in their position relatively to the universe. The roots are the superior part of a plant, for from them the nutriment is distributed to the growing members, and a plant takes it with its roots as an animal does with its mouth.

Things that are not only alive but are animals have both a front and a back, [10] because they all have sense, and front and back are distinguished by reference to sense. The front is the part in which sense is naturally located, and whence each thing gets its sensations, the opposite parts are the back.

[15] All animals which partake not only in sense, but are able of themselves to make a change of place, have a further distinction of left and right besides those already enumerated; like the former these are distinctions of function and not of position. The right is that from which change of position naturally begins, the opposite which [20] naturally depends upon this is the left.

This distinction (of right and left) is more articulate and detailed in some than in others. For animals which make the aforesaid change by the help of organized parts (I mean feet for example, or wings or similar organs) have the left and right distinguished in greater detail, while those which are not differentiated into such [25] parts, but make the differentiation in the body itself and so progress, like some footless animals (for example snakes and caterpillars, and besides what men call earth-worms), all these have the distinction spoken of, although it is not made so manifest to us. That the beginning of movement is on the right is indicated by the [30] fact that all men carry burdens on the left shoulder; in this way they set free the side which initiates movement and enable the side which bears the weight to be moved. And so men hop easier on the left leg; for the nature of the right is to initiate [706<sup>a</sup>1] movement, that of the left to be moved. The burden then must rest on the side which is to be moved, not on that which is going to cause movement, and if it be set on the moving side, which is the source of movement, it will either not be moved at all or with more labour. Another indication that the right

is the source of movement is the [5] way we put our feet forward; all men lead off with the left, and after standing still prefer to put the left foot forward, unless something happens to prevent it. The reason is that their movement comes from the leg they step off, not from the one put forward. Again, men guard themselves with their right. And this is the reason why [10] the right is the same in all; for that from which motion begins is the same for all, and has its natural position in the same place, and the origin of motion is from the right. And for this reason the spiral-shaped testaceans have their shells on the right, for they do not move in the direction of the spiral but all go forward in the direction [15] opposite to the spiral. Examples are the murex and the trumpet-shell. As all animals then start movement from the right, and the right moves in the same direction as the whole, it is necessary for all to be alike right-handed. And man has the left limbs detached more than any other animal because he is natural in a higher degree than the other animals; now the right is naturally better than the left, being separate [20] from it, and so in man the right is more especially the right, more dextrous that is, than in other animals. The right then being differentiated it is only reasonable that in man the left should be less movable, and most detached. In man, too, the other starting-points are found most naturally and clearly distinct, the superior part that [25] is and the front.

5 · Animals which, like men and birds, have the superior part distinguished from the front are two-footed (biped). In them, of the four points of motion, two are wings in the one, hands and arms in the other. Animals which have the superior and the front parts identically situated are four-footed, many-footed, or footless. I use [30] the term foot for a member connected with a point on the ground which produces movement; for the feet appear to have got their name from the ground under our feet.<sup>1</sup>

Some animals, too, have the front and back parts identically situated, for [706<sup>b</sup>1] example cephalopods and spiral-shaped testaceans, and these we have discussed elsewhere in another connexion.

Now there is in place a superior, an intermediate, and an inferior; in respect to place bipeds have their superior part corresponding to the superior part of the [5] universe; polypods, and footless animals to the intermediate part, and plants to the inferior. The reason is that these have no power of locomotion, and the superior part is determined relatively to the nutriment, and their nutriment is from the earth. Quadrupeds,



polypods, and footless animals again have their superior part corresponding to the intermediate, because they are not erect. Bipeds have theirs corresponding to the superior part of the universe because they are erect, and of [10] bipeds, man *par excellence*; for man is the most natural of bipeds. And it is reasonable for the starting-points to be in these parts; for the starting-point is honourable, and the superior is more honourable than the inferior, the front than the back, and the right than the left. Or we may reverse the argument and say quite [15] well that these parts are more honourable than their opposites just because the starting-points are in them.

6 · The above discussion has made it clear that the source of movement is in the parts on the right. Now every continuous whole, one part of which is moved while the other remains at rest must, in order to be able to move as a whole while one [20] part stands still, have in the place where both parts have opposed movements some common part which connects the moving parts with one another. Further in this common part the source of the motion (and similarly of the absence of motion) of each of the parts must lie.

Clearly<sup>2</sup> then if any of the opposite pairs of parts (right and left, that is, superior and inferior, before and behind) have a movement of their own, each of [25] them has a common source of its movements at the juncture of the parts in question.

Now before and behind are not distinctions relatively to that which sets up its [30] own motion, because in nature nothing has a movement backwards, nor has a moving animal any division whereby it may make a change of position towards its front or back; but right and left, superior and inferior are so distinguished. [707<sup>a</sup>1] Accordingly, all animals which progress by the use of distinct members have these members distinguished not by the differences of before and behind, but only by those of the remaining two pairs; the prior difference dividing these members into right and left—for this difference must appear as soon as you have division into two, [5] the other difference appearing of necessity where there is division into four.

Since then the superior and inferior and the right and left are linked to one another by the same common source (by which I mean that which controls their movement), and further, everything which is going to make a movement in each such part properly must have the original cause of all the said movements arranged in a certain definite position relatively to

the distances from it of the said sources [10] (and these sources in the individual parts are in pairs arranged co-ordinately or diagonally, and the common centre is the source from which the animal's movements of right and left, and similarly of superior and inferior, start), and since each animal must have this source at a point where it is similarly related to each of [15] the sources in the four parts described—it is clear then how locomotion belongs to those animals only which make their changes of place by means of two or four points in their structure, or to such animals *par excellence*. Thus, since this property belongs almost peculiarly to sanguineous animals, we see that no sanguineous animal can progress at more points than four, and that if it is the nature of anything [20] so to progress at four points it must of necessity be sanguineous.

7 · What happens in the animal world is in agreement with the above account. For no sanguineous animal if it be divided into more parts can live for any appreciable length of time, nor can it enjoy the power of locomotion which it [25] possessed while it was a continuous and undivided whole. But some bloodless animals and polypods can live a long time, if divided, in each of the severed parts, and can move in the same way as before they were dismembered. Examples are what is termed the centipede and other insects that are long in shape; for even the hinder portion of all these goes on progressing in the same direction as the [707<sup>b</sup>1] fore-part.

The explanation of their living when thus divided is that each of them is constructed like a continuous body of many separate living beings. It is plain, too, from what was said above why they are like this. Animals constructed most [5] naturally are made to move at two or four points, and even limbless Sanguinea are no exception. They too move by dint of four points, whereby they achieve progression. They go forward by means of two flexions. For in each of their flexions there is a right and a left, both before and behind in their flat surface—in the part [10] towards the head a right and a left front point, and in the part towards the tail the two hinder points. They look as if they moved at two points only, where they touch before and behind, but that is only because they are narrow in breadth. Even in [15] them the right is the leading part, and there is an alternate correspondence behind, exactly as in quadrupeds. The reason of their flexions is their great length, for just as tall men walk with their backs hollowed and with their right shoulder leading in a forward direction (for their left hip is rather inclined backwards, so that their [20]

middle becomes hollowed), so we ought to conceive snakes as moving with hollowed backs upon the ground. And this is evidence that they move themselves like the quadrupeds, for they make the concave in its turn convex and the convex concave. When in its turn the left of the forward parts is leading, the concavity is in its turn reversed, for the right becomes the inner. (Let the right front point be A, the left B, [25] the left hind C, the right D.)

Among land animals this is the character of the movement of snakes, and among water animals of eels, and conger-eels and also lampreys, in fact of all that have their form snakelike. However, some marine animals of this shape have no fin, [708<sup>a</sup>1] lampreys for example, but put the sea to the same use as snakes do both land and water (for snakes swim precisely as they move on the ground). Others have two fins only, for example conger-eels and eels and a kind of mullet which breeds in the lake [5] of Siphæe. On this account too those that are accustomed to live on land, for example all the eels, move with fewer flexions in a fluid than on land, while the kind of mullet which has two fins, by its flexion in a fluid makes up the four points.

8 · The reason why snakes are limbless is first that nature makes nothing [10] without purpose, but always regards what is the best possible for each individual, preserving the peculiar substance of each and its essence, and secondly the principle we laid down above that no Sanguineous creature can move itself at more than four points. Granting this it is evident that sanguineous animals like snakes, whose [15] length is out of proportion to the rest of their dimensions, cannot possibly have limbs; for they cannot have more than four (or they would be bloodless), and if they had two or four they would be practically stationary; so slow and unprofitable would [20] their movement necessarily be.

But every footed animal has necessarily an even number of such feet. For those which only jump and so move from place to place do not need feet for this movement at least, but those which not only jump but also need to walk, finding that movement [25] not sufficient for their purposes, evidently either are better able to progress with even feet or cannot otherwise progress at all;<sup>3</sup> [for every animal which has limbs must have an even number]<sup>4</sup> for as this kind of movement is effected by part of the body at a time, and not by the whole at once as in the movement of leaping, some of [30] the feet must in turn remain at rest, and others be moved, and the animal must act in each of these cases with opposite

limbs, shifting the weight from the limbs [708<sup>b</sup>1] that are being moved to those at rest. And so nothing can walk on three limbs or on one; in the latter case it has no support at all on which to rest the body's weight, in the former only in respect of one pair of opposites, and so it must necessarily [5] fall in endeavouring so to move. Polypods however, like the centipede, can indeed make progress on an odd number of limbs, as may be seen by the experiment of wounding one of their limbs; for then the mutilation of one row of limbs is corrected by the number of limbs which remain on either side. Such mutilated creatures, [10] however, drag the wounded limb after them with the remainder, and do not properly speaking walk.<sup>5</sup> Moreover, it is plain that they, too, would make the change of place better if they had an even number, in fact if none were missing and they had the limbs which correspond to one another. In this way they could equalize their own weight, and not oscillate to one side, if they had corresponding supports instead of one [15] section of the opposite sides being unoccupied by a limb. A walking creature advances from each of its members alternately, for in this way it recovers the same figure that it had at first.

[20] **9** · The fact that all animals have an even number of feet, and the reasons for the fact have been set forth. What follows will explain that if there were no point at rest flexion and straightening would be impossible. Flexion is a change from a straight line to an arc or an angle, straightening a change from either of these to a straight line. Now in all such changes the flexion or the straightening must be [25] relative to one point. Moreover, without flexion there could not be walking or swimming or flying. For since limbed creatures stand and take their weight alternately on one or other of the opposite legs, if one be thrust forward the other must of necessity be bent. For the opposite limbs are naturally of equal length, and [30] the one which is under the weight must be a kind of perpendicular at right angles to the ground.

When then one leg is advanced it becomes the hypotenuse. Its square then is [709<sup>a</sup>1] equal to the square on the side at rest together with the square on the line between the legs. As the legs then are equal, the one at rest must bend either at the knee or, if there were any kneeless animal which walked, at some other articulation. The following exhibits the fact. If a man were to walk parallel to a wall ...<sup>6</sup> the line [5] described would be not straight but zigzag, becoming lower as he bends, and higher when he stands and lifts himself up.

It is, indeed, possible to move oneself even if the leg be not bent, in the way in which children crawl. This was the old though erroneous account of the movement [10] of elephants. But these kinds of movements involve a flexion in the shoulders or in the hips. Nothing could walk upright continuously and securely without flexions at the knee, but would have to move like men in the wrestling schools who crawl forward through the sand on their knees. For the upper part of the upright creature is long so that its leg has to be correspondingly long; in consequence there must be [15] flexion. For since a stationary position is perpendicular, if that which moves forward cannot bend it will either fall as the right angle becomes acute or will not be able to progress. For if one leg is at right angles to the ground and the other is advanced, the latter will be at once equal and greater. For it will be equal to the stationary leg and also equivalent to the hypotenuse. That which goes forward [20] therefore must bend, and while bending one, extend the other leg simultaneously, so as to incline forward and make a stride and still remain above the perpendicular; for the legs form an isosceles triangle, and the head sinks lower when it is perpendicularly above the base on which it stands.

Of limbless animals, some progress by undulations (and this happens in two [25] ways, either they undulate on the ground, like snakes, or up and down, like caterpillars), and undulation is a flexion; others by crawling, like what are called earthworms and leeches. These go forward, first one part leading and then drawing the whole of the rest of the body up to this, and so they change from place to place. [30] It is plain too that if the two curves were not greater than the one line which subtends them undulating animals could not move themselves; when the flexure is [709<sup>b</sup>1] extended they would not have moved forward at all if the flexure were equal; as it is, it reaches further when it is straightened out, and then this part stays still and it draws up what is left behind.

In all the changes described that which moves now extends itself in a straight [5] line to progress, and now is hooped; it straightens itself in its leading part, and is hooped in what follows behind. Even jumping animals all make a flexion in the part of the body which is underneath, and after this fashion make their leaps. So too [10] flying and swimming things progress, the one straightening and bending their wings to fly, the other their fins to swim. Of the latter some have four fins, others which are rather long, for example eels, have only two. These swim by substituting a flexion of the rest of their body for the pair of fins to complete the movement, as we [15] have said before. Flat fish use two

fins, and the flat of their body as a substitute for the absent pair of fins. Quite flat fish, like the ray, produce their swimming movement with the actual fins and with the outer peripheries of their body, bending and straightening themselves alternately.

[20] **10** · A difficulty might perhaps be raised about birds. How, it may be said, can they, either when they fly or when they walk, be said to move at four points? Now we did not say that all Sanguinea move at four points, but merely at not more than four. Moreover, they cannot as a fact fly if their legs be removed, nor walk [25] without their wings. Even a man does not walk without moving his shoulders. Everything indeed, as we have said, makes a change of place by flexion and straightening, for all things progress upon what being beneath them as it were gives way up to a point; accordingly, even if there be no flexion in another member, there [30] must be at least in the point whence motion begins, that is in sheath-winged insects and in birds at the base of the wing, in others at the base of the corresponding [710<sup>a</sup>1] member, the fins, for instance, in fishes. In others, for example snakes, the flexion begins in the joints of the body.

In winged creatures the tail serves, like a ship's rudder, to keep the flying thing in its course. The tail then must like other limbs be able to bend at the point of [5] attachment. And so flying insects, and birds whose tails are ill-adapted for the use in question, for example peacocks, and domestic cocks, and generally birds that hardly fly, cannot steer a straight course. Flying insects have absolutely no tail, and so drift along like a rudderless vessel, and beat against anything they happen upon; [10] and this applies equally to sharded insects, like the scarab-beetle and the chafer, and to unsharded, like bees and wasps. Further, birds that are not made for flight have a tail that is of no use; for instance the purple coot and the heron and all [15] water-fowl. These fly stretching out their feet as a substitute for a tail, and use their legs instead of a tail to direct their flight. The flight of insects is slow and frail because the character of their wings is not proportionate to the bulk of their body; this is heavy, their wings small and frail, and so the flight they use is like a cargo [20] boat attempting to make its voyage with oars; now the frailty both of the actual wings and of the outgrowths upon them contributes in a measure to the flight described. Among birds, the peacock's tail is at one time useless because of its size, at another because it is shed. But birds are in general at the opposite pole to flying [25] insects as regards their

feathers, but especially the swiftest flyers among them. (These are the birds with curved talons, for swiftness of wing is useful to their mode of life.) The rest of their bodily structure is in harmony with their swift movement, [30] the small head, the slight neck, the strong and acute breastbone (acute like the prow of a clipper-built vessel, so as to be compact, and strong by dint of its mass of flesh), in order to be able to push away the air that beats against it, and that easily and [710<sup>b</sup>1] without exhaustion. The hind-quarters, too, are light and taper again, in order to conform to the movement of the front and not by their breadth to sweep the air.

11 · So much then for these questions. But why an animal that is to stand [5] erect must necessarily be a biped, and must also have the superior parts of the body lighter, and those that lie under these heavier, is plain. Only if situated like this could it possibly carry itself easily. And so man, the only erect animal, has legs longer and stouter relatively to the upper parts of his body than any other animal [10] with legs. What we observe in children also is evidence of this. Children cannot walk erect because they are always dwarf-like, the upper parts of their bodies being too long and too stout in proportion to the lower. With advancing years the lower [15] increase disproportionately, until they get their appropriate size, and then they succeed in walking erect. Birds are light yet stand on two legs because their weight is set back, after the principle of horses fashioned in bronze with their forelegs [20] prancing. But their being bipeds and able to stand is above all due to their having the hip-bone shaped like a thigh, and so large that it looks as if they had two thighs, one in the leg before the knee-joint, the other joining this part to the fundament. Really this is not a thigh but a hip, and if it were not so large the bird could not be a [25] biped. As in a man or a quadruped, the thigh and the rest of the leg would be attached immediately to quite a small hip; consequently the whole body would be tilted too far forward. As it is, however, the hip is long and extends right along to the middle of the belly, so that the legs are attached at that point and carry as supports the whole frame. It is also evident from these considerations that a bird cannot [30] possibly be erect in the way in which man is. For as it holds its body now the wings are naturally useful to it, but if it were erect they would be as useless as the wings of [711<sup>a</sup>1] Cupids we see in pictures. It is clear at the same time from what we said that the form of no human nor any similar being permits of wings; not only because it would, though sanguineous, be moved at more than four points, but also because to have

[5] wings would be useless to it when moving naturally. And nature makes nothing contrary to nature.

12 · We have stated above that without flexion in the legs or shoulders and [10] hips no sanguineous animal with feet could progress, and that flexion is impossible except some point be at rest, and that men and birds, both bipeds, bend their legs in opposite directions, and further that quadrupeds bend theirs in opposite directions, and in the opposite way to a man's limbs. For men bend their arms backwards, their legs forwards; quadrupeds their forelegs forwards, their back legs backwards, and [15] in like manner also birds bend theirs. The reason is that nature's workmanship is never purposeless, as we said above, but everything for the best possible in the circumstances. Inasmuch, therefore, as all creatures which naturally have the power of changing position by the use of limbs, must have one leg stationary with [20] the weight of the body on it, and when they move forward the leg which has the leading position must be unencumbered, and the progression continuing the weight [25] must be shifted to it again, it is evidently necessary for the leg from being bent to become straight again, while the point of movement of the leg thrust forward and its lower part remain still. And it is possible for this to take place and at the same time for the animal to go forward, if the leading leg has its articulation forwards, [30] impossible if it be backwards. For, if it be forwards the stretching out of the leg will occur while the body is going forwards, but, if the other way, while it is going backwards. And again, if the flexion were backwards, the placing of the foot would be made by two movements and those contrary to one another, one, that is, [711<sup>b</sup>1] backwards and one forwards; for in the bending together of the limb the end of the thigh would go backwards, and the shin would move the foot forwards away from [5] the flexion; whereas, with the flexion forwards, the progression described will be performed not with contrary motions, but with one forward motion.

Now man, being a biped and making his change of position in the natural way with his two legs, bends them forward for the reasons set forth, but his arms bend [10] backwards reasonably enough. If they bent the opposite way they would be useless for the work of the hands, and for taking food. But quadrupeds which are viviparous<sup>7</sup> necessarily bend their front legs forwards. For these lead when they move, and are also in the fore-part of their body. The reason that they bend forward [15] is the same as in the case of man, for in this respect they are like mankind. And



so quadrupeds as well bend these legs forward in the manner described. Moreover, if the flexion is like this, they are enabled to lift their feet high; if they bent them in the [20] opposite way they would only lift them a little way from the ground, because the whole thigh and the joint from which the shin-bone springs would lie under the belly as the beast moved forward. If, however, the flexion of the hind legs were forwards the lifting of these feet would be similar to that of the forefeet (for the hind legs, too, [25] would in this case have only a little room for their lifting inasmuch as both the thigh and the knee-joint would fall under the position of the belly); but the flexion being backwards, as in fact it is, nothing comes in the way of their progression with this mode of moving the feet. Moreover, it is necessary or at least better for their legs to [30] bend thus when they are suckling their young, with a view to such ministrations. If the flexion were inwards it would be difficult to keep their young under them and to shelter them.

[712<sup>a</sup>1] **13** · Now there are four modes of flexion if we take the combinations in pairs.<sup>8</sup> Fore and hind may bend either both backwards, as the figures marked A, or in the opposite way both forwards, as in B, or in converse ways and not in the same [5] direction, as in C where the fore bend forwards and the hind bend backwards, or as in D, the opposite way to C, where the convexities are turned towards one another and the concavities outwards. Now no biped or quadruped bends his limbs like the [10] figures A or B, but the quadrupeds like C, and like D only the elephant among quadrupeds and man if you consider his arms as well as his legs. For he bends his arms concavely and his legs convexly.

In man, too, the flexions of the limbs are always alternately opposite; for example the elbow bends back, but the wrist of the hand forwards, and again the [15] shoulder forwards. In like fashion, too, in the case of the legs, the hip backwards, the knee forwards, the ankle in the opposite way backwards. And plainly the lower limbs are opposed in this respect to the upper, because the first principles are opposed, the shoulder bending forwards, the hip backwards; and that is why the [20] ankle bends backwards, and the wrist of the hand forwards.

**14** · This is the way then the limbs bend, and for the reasons given. But the hind limbs move criss-cross with the fore limbs; after the right fore they move the [25] left hind, then the left fore, and then the right hind. The reason is that if they moved the forelegs together and first, the

animal would be wrenched or the progression would be a stumbling forwards with the hind parts as it were dragged after. Again, [30] that would not be walking but jumping, and it is hard to make a continuous change of place, jumping all the time. Here is evidence of what I say; even as it is, all horses that move in this way soon begin to refuse, for example the horses in a religious procession. For these reasons the fore limbs and the hind limbs do not move in this [712<sup>b</sup>1] separate way. And if they moved both the right legs first the weight would be outside the supporting limbs and they would fall. If then it is necessary to move in one or other of these ways or criss-cross fashion, and neither of these two is possible, [5] they must move criss-cross; for moving in the way we have said they cannot possibly experience either of these results. And this is why horses and such-like animals stand still with their legs put forward criss-cross, not with the right or the left put forward together at once. In the same fashion animals with more than four legs [10] make their movements; if you take two consecutive pairs of legs the hind always move criss-cross with the forelegs; you can see this if you watch them moving slowly. Even crabs move in this way, and they are polypods. They, too, always move criss-cross in whichever direction they are making progress. For this animal has a [15] movement all its own; it is the only animal that moves not forwards, but obliquely. Yet since forwards is a distinction relative to the line of vision, nature has made its eyes able to conform to its limbs; for its eyes can move themselves obliquely, and therefore after a fashion crabs too in this sense move forwards. [20]

**15** · Birds bend their legs in the same way as quadrupeds. For their natural construction is broadly speaking nearly the same. That is, in birds the wings are a substitute for the forelegs; and so they are bent in the same way as the forelegs of a [25] quadruped, since when they move to progress the natural beginning of change is from the wings. Flight in fact is their appropriate movement. And so if the wings be cut off a bird can neither stand still nor go forwards.

Again, the bird though a biped is not erect, and has the forward parts of the [30] body lighter than the hind, and so it is necessary (or at least better) for the standing posture to have the thigh so placed below the body as it actually is, I mean growing towards the back. If then it must have this situation the flexion of the leg must be backwards, as in the hind legs of quadrupeds. The reasons are the same as those [713<sup>a</sup>1] given

in the case of viviparous quadrupeds.

In general, in the case of birds and winged insects, and animals which swim in [5] a watery medium, all I mean that make their progress in water by dint of organs of movement, it is not difficult to see that it is better to have the attachment of the parts in question oblique to the frame, exactly as in fact we see it to be both in birds and insects. And this same arrangement obtains also among fishes. Among birds [10] the wings are attached obliquely; so are the fins in water animals, and the wings of insects.<sup>9</sup> In this way they divide<sup>10</sup> the air or water most quickly and with most force and so effect their movement. For the hinder parts in this way would follow [15] forwards as they are carried along in the yielding medium, some in the water, others in the air.

Of oviparous quadrupeds all those that live in holes, like crocodiles, lizards, spotted lizards, freshwater tortoises, and turtles, have their legs attached obliquely [20] and stretched out over the ground, and bend them obliquely. The reason is that this is useful for ease in creeping into holes, and for sitting upon their eggs and guarding them. And as they project outwards they must of necessity tuck in their thighs and put them under them in order to achieve the lifting of the whole body. In view of this [25] they cannot bend them otherwise than outwards.

16 · We have already stated the fact that non-sanguineous animals with limbs are polypods and none of them quadrupeds. And the reason why their legs, except the extreme pairs, are necessarily attached obliquely and have their flexions [30] upwards, and the legs themselves are somewhat bowed backwards is plain. In all such creatures the intermediate legs both lead and follow. If then they were under [713<sup>b</sup>1] them, they would have to have their flexion both forwards and backwards; on account of leading, forwards; and on account of following, backwards. Now since they have to do both, for this reason their limbs are bowed and bent obliquely, [5] except the extreme pairs. (These are more natural in their movement, the front leading and the back following.) Another reason for this kind of flexion is the number of their legs; arranged in this way they would interfere less with one another in progression and not knock together. But the reason that they are bandy is that all [10] of them or most of them live in holes; for creatures living so cannot possibly be high above the ground.

But crabs are in nature the oddest of the polypods; they do not progress forwards except in the sense explained above, and they are the

only animals which have more than one pair of leading limbs. The explanation of this is the hardness of [15] their limbs, and the fact that they use them not for swimming but for walking; they always keep on the ground. However, the flexion of the limbs of all polypods is oblique, like that of the quadrupeds which live in holes—for example lizards and [20] crocodiles and many of the oviparous quadrupeds. And the explanation is that some of them in their breeding periods, and some all their life, live in holes.

17 · Now the rest have bandy legs because they are soft-skinned, but the crayfish is hard-skinned and its limbs are for swimming and not for walking. Crabs, too, have their limbs bent obliquely, but not bandy like oviparous quadrupeds and [25] non-sanguineous polypods, because their limbs have a hard and shell-like skin, although they do not swim but live in holes; they live in fact on the ground. Moreover, their shape is round, and they have not a tail like the crayfish; a tail is useful to the crayfish for swimming, but the crab is not a swimming creature. [30] Further, it alone has its side equivalent to a hinder part, because it has many leading feet. The explanation of this is that its flexions are not forward nor its legs bandy. [714<sup>a</sup>1] We have given above the reason why its legs are not bandy, that is the hardness and shell-like character of its integument.

For these reasons then it must lead off with all its legs and move obliquely; obliquely, because the flexion is oblique; and with all its legs, because otherwise the [5] limbs that were still would have got in the way of those that were moving.

Fishes of the flat kind swim as one-eyed men walk; they have their natural shape distorted. Web-footed birds swim with their feet; because they take in air and breathe they are bipeds, but because they have their home in the water they are [10] webbed; by this arrangement their feet serve them instead of fins. They have their legs too, not like the rest of birds in the centre of their body, but rather set back. Their legs are short, and being set back are serviceable for swimming. The reason for their having short legs is that nature has added to their feet by subtracting from [15] the length of their limbs and instead of length has given stoutness to the legs and breadth to the feet. Broad feet are more useful than long for pushing away the water when they are swimming.

18 · There is reason, too, for winged creatures having feet, but fish none. [20] The former have their home in the dry medium, and cannot

remain always in mid air; they must therefore have feet. Fish on the contrary live in the wet medium, and take in water, not air. Fins are useful for swimming, but feet not. And if they had [714<sup>b</sup>1] both they would be non-sanguineous. There is a broad similarity between birds and fishes: birds have their wings on the superior part, similarly fish have two pectoral fins; again, birds have legs on their under parts and most fish have fins on the under [5] parts and near the pectorals. Birds, too, have a tail and fish a tail-fin.

19 · A difficulty may be suggested as to the movements of molluscs, that is, as to where that movement originates; for they have no distinction of left and right. Now observation shows them moving. We must, I think, treat all this class as [10] mutilated, and as moving in the way in which limbed creatures do when one cuts off their legs, or<sup>11</sup> as analogous with the seal and the bat. Both the latter are quadrupeds but misshapen. Now molluscs do move, but move in a manner contrary to nature. They are not moving things, but are moving if regarded as sedentary [15] creatures and creatures attached by growth, sedentary if classed with progressing animals.

As to right and left, crabs, too, show the distinction poorly, still they do show it. You can see it in the claw; the right claw is larger and stronger, as though the right and left sides were trying to get distinguished.

[20] The structure of animals, both in their other parts, and especially in those which concern progression and any movement in place, is as we have now described. It remains, after determining these questions, to investigate the soul.

**\*\***TEXT: W. W. Jaeger, Teubner, Leipzig, 1913

<sup>1</sup>ποῦς derived from πέδον.

<sup>2</sup>Reading στάσεως, δῆλον ὅτι.

<sup>3</sup>Reading τοῖς δ' ἄλλως ὅλως.

<sup>4</sup>Excised by Jaeger.

<sup>5</sup>Jaeger excises 'and do not . . . walk'.

<sup>6</sup>The text is corrupt: Michael of Ephesus explains that the man has a brush tied to his head which traces a line along the wall as he walks.

<sup>7</sup>Reading καὶ ζωοτόκα.

<sup>8</sup>Reading συνδυασμούς.

<sup>9</sup>Jaeger excises 'and the wings of insects'.

<sup>10</sup>Omitting συστέλλοντα καί.

<sup>11</sup>Reading ἢ σπερ.

# GENERATION OF ANIMALS\*\*

*A. Platt*

## BOOK I

1 · We have now discussed the other parts of animals, both generally and [715<sup>a</sup>1] with reference to the peculiarities of each kind, explaining how each part exists on account of such a cause, and I mean by this the cause for the sake of something.

There are four causes: first, the final cause, that for the sake of which; secondly, the definition of essence (and these two we may regard pretty much as one [5] and the same); thirdly, the material; and fourthly, that from which the source of movement comes.

We have then already discussed the other three causes, for the definition and the final cause are the same, and the material of animals is their parts—of the whole animal the non-homogeneous parts, of these again the homogeneous, and of [10] these last the so-called elements of bodies. It remains to speak of those parts which contribute to the generation of animals and of which nothing definite has yet been said, and to explain what is the moving cause. To inquire into this last and to inquire into the generation of each animal is in a way the same thing; and, therefore, my plan has united them together, arranging the discussion of these parts last, and the [15] beginning of the question of generation next to them.

Now some animals come into being from the union of male and female, i.e. all those kinds of animal which possess the two sexes. This is not the case with all of them; though in the sanguinea with few exceptions the creature, when its growth is [20] complete, is either male or female, and though some bloodless animals have sexes so that they generate offspring of the same kind, yet other bloodless animals generate indeed, but not offspring of the same kind; such are all that come into being not from a union of the sexes, but from decaying earth and

excrements. To speak [25] generally, if we take all animals which change their locality,<sup>1</sup> some by swimming, others by flying, others by walking, we find in these the two sexes, not only in the sanguinea but also in some of the bloodless animals; and this applies in the case of [715<sup>b</sup>1] the latter sometimes to the whole class, as the cephalopoda and crustacea, but in the class of insects only to the majority. Of these, all which are produced by union of animals of the same kind generate also after their kind, but all which are not [5] produced by animals, but from decaying matter, generate indeed, but produce another kind, and the offspring is neither male nor female; such are some of the insects. This is what might have been expected; for if those animals which are not produced by parents had themselves united and produced others, then their offspring must have been either like or unlike themselves. If like, then their parents [10] ought to have come into being in the same way; this is only a reasonable postulate to make, for it is plainly the case with other animals. If unlike, and yet able to copulate, then there would have come into being again from them another kind of creature and again another from these, and this would have gone on to infinity. But [15] nature flies from the infinite; for the infinite is imperfect, and nature always seeks an end.

But all those creatures which do not move, as the testacea and animals that live by clinging to something else, inasmuch as their nature resembles that of plants, have no sex any more than plants have, but as applied to them the word is only used [20] in virtue of a similarity and analogy. For there is a slight distinction of this sort, since even in plants we find in the same kind some trees which bear fruit and others which, while bearing none themselves, yet contribute to the ripening of the fruits of those which do, as in the case of the fig-tree and caprifig.

[25] The same holds good also in plants, some coming into being from seed and others, as it were, by the spontaneous action of nature, arising either from decomposition of the earth or of some parts in other plants; for some are not formed [716<sup>a</sup>1] by themselves separately but are produced upon other trees, as the mistletoe. Plants, however, must be investigated separately.

2 · Of the generation of animals we must speak as various questions arise in order in the case of each, and we must connect our account with what has been said. [5] For, as we said above, the male and female principles may be put down first and foremost as origins of generation, the former as containing the efficient cause of generation, the latter the



material of it. The most convincing proof of this is drawn from considering how and whence comes the semen; for it is out of this that those creatures are formed which are produced in the ordinary course of nature; but we [10] must observe carefully the way in which this semen actually comes into being from the male and female. For it is just because the semen is secreted from the two sexes, the secretion taking place *in* them and *from* them, that they are first principles of generation. For by a male animal we mean that which generates in another, and by a female that which generates in itself; that is why in the macrocosm also, men [15] think of the earth as female and a mother, but address heaven and the sun and other like entities as progenitors and fathers.

Male and female differ in their definition by each having a separate faculty, [20] and to perception by certain parts; by definition the male is that which is able to generate in another, as said above; the female is that which is able to generate in itself and out of which comes into being the offspring previously existing in the generator. And since they are differentiated by a faculty and by their function, and since instruments are needed for all functioning, and since the bodily parts are the instruments to serve the faculties, it follows that certain parts must exist for union [25] and production of offspring. And these must differ from each other, so that consequently the male will differ from the female. (For even though we speak of the animal as a whole as male or female, yet really it is not male or female in virtue of the whole of itself, but only in virtue of a certain faculty and a certain part—just as [30] with sight or locomotion—which part is also plain to sense-perception.)

Now as a matter of fact such parts are in the female the so-called uterus, in the male the testes and the penis, in all the sanguinea; for some of them have testes and others the corresponding passages. There are corresponding differences of male and female in all the bloodless animals also which have this division into opposite sexes. [716<sup>b</sup>1] But if in the sanguinea the parts concerned in copulation differ in their forms, we must observe that a small change in a first principle is usually attended by changes in many of the things depending on it. This is plain in the case of castrated animals; [5] for, though only the generative part is disabled, yet pretty well the whole form of the animal changes in consequence so much that it seems to be female or not far short of it, and thus it is clear that an animal is not male or female in virtue of any random part or faculty. Clearly, then, the distinction of sex is a first principle; at any rate, [10] when that which distinguishes male and female suffers change, many other changes accompany it, as would be the case if a first principle is

changed.

3 · The sanguinea are not all alike as regards testes and uterus. Taking the former first, we find that some of them have not testes at all, as the classes of fish [15] and of serpents, but only two spermatic ducts. Others have testes indeed, but internally by the loin in the region of the kidneys, and from each of these a duct, as in the case of those animals which have no testes at all; these ducts unite also as with [20] those animals; this applies (among animals breathing air and having a lung) to all birds and oviparous quadrupeds. For all these have their testes internal near the loin, and two ducts from these in the same way as serpents; I mean the lizards and tortoises and all the scaly reptiles. But all the vivipara have their testes in front; [25] some of them inside at the end of the abdomen, as the dolphin, not with ducts but with a penis projecting externally from them as in the ox-fish; others outside, either pendent as in man or towards the fundament as in swine. They have been [30] discriminated more accurately in the *History of Animals*.<sup>2</sup>

The uterus is always double, just as the testes are always two in the male. It is situated either near the pudendum (as in women, and all those animals which bring forth alive not only externally but also internally, and all fish that lay eggs [717<sup>a</sup>1] externally) or up towards the hypozoma (as in all birds and in viviparous fishes). The uterus is also double in the crustacea and the cephalopoda; for the membranes which include their so-called eggs are of the nature of a uterus. It is particularly [5] hard to distinguish in the case of the octopus, so that it seems to be single, but the reason of this is that the bulk of the body is everywhere similar.

It is double also in the larger insects; in the smaller it is indistinct owing to the [10] small size of the body.

Such is the description of the aforesaid parts of animals.

4 · With regard to the difference of the spermatic organs in males, if we are to investigate the causes of their existence, we must first grasp the final cause of the [15] testes. Now if nature makes everything either because it is necessary or because it is better so, this part also must be for one of these two reasons. But that it is not necessary for generation is plain; for in that case it would have been possessed by all creatures that generate, but as it is neither serpents have testes nor have fish; for [20] they have been seen uniting and with their ducts full of milt. It remains

then that it must be because it is somehow better so. Now it is true that the business of most animals is, you may say, nothing else than to produce young, as the business of a plant is to produce seed and fruit. But still as, in the case of nutriment, animals with straight intestines are more violent in their desire for food, so those which have not [25] testes but only ducts, or which have them indeed but internally, are all quicker in accomplishing copulation. But those which are to be more temperate in the one case have not straight intestines, and in the other have their ducts twisted to prevent their desire being too violent and hasty. It is for this that the testes are contrived; for [30] they make the movement of the spermatic secretion steadier, preserving the folding back of the passages in the vivipara, as horses and the like, and in man. (For details see the *History of Animals*.)<sup>3</sup> For the testes are no part of the ducts but are only attached to them, as women fasten stones to the loom when weaving; if they are [717<sup>b</sup>1] removed the ducts are drawn up internally, so that castrated animals are unable to generate; if they were not drawn up they would be able, and before now a bull mounting immediately after castration has caused conception in the cow because [5] the ducts had not yet been drawn up. In birds and oviparous quadrupeds the testes receive the spermatic secretion, so that its expulsion is slower than in fishes. This is clear in the case of birds, for their testes are much enlarged at the time of copulation, and all those which pair at one season of the year have them so small when this time is past that they are almost indiscernible, but during the season they are very large. When the testes are internal the act of copulation is quicker, for [10] when the testes are external the semen is not emitted before the testes are drawn up.

5 · Besides, quadrupeds have the organ of copulation, since it is possible for [15] them to have it, but for birds and the footless animals it is not possible, because the former have their legs under the middle of the abdomen and the latter have no legs at all; now the penis depends from that region and is situated there. (That is why the [20] legs are strained in intercourse, both the penis and the legs being sinewy.) So that, since it is not possible for them to have this organ, they must necessarily either have no testes also, or at any rate not have them there, as those animals that have both penis and testes have them in the same situation.

Further, with those animals at any rate that have external testes, the semen is collected together before emission, and emission is due to the penis being heated by its movement; it is not ready for emission at

immediate contact as in fishes. [25]

All the vivipara have their testes in front, internally or externally, except the hedgehog; he alone has them near the loin. This is for the same reason as with birds, because their union must be quick, for the hedgehog does not, like the other [30] quadrupeds, mount upon the back of the female, but they conjugate standing upright because of their spines.

So much for the reasons why those animals have testes which have them, and why they are sometimes external and sometimes internal.

6 · All those animals which have no testes are deficient in this part, as has been said, not because it is better to be so but simply because of necessity, and secondly because it is necessary that their copulation should be speedy. Such is the nature of fish and serpents. Fish copulate throwing themselves alongside of the [718<sup>a</sup>1] females and separating again quickly. For as men and all such creatures must hold their breath before emitting the semen, so fish at such times must cease taking in the sea-water, and then they perish easily. Therefore they must not mature the [5] semen during copulation, as viviparous land-animals do, but they have it all matured together at the time, so as not to be maturing it while in contact but to emit it ready matured. So they have no testes, and the ducts are straight and simple. [10] There is a small part similar to this connected with the testes in the system of quadrupeds, for part of the folded duct is sanguineous and part is not; the fluid is already semen when it is received by and passes through this latter part, so that once it has arrived there it is soon emitted in these quadrupeds also. Now in fishes the *whole* passage resembles the last section of the folded part of the duct in man and [15] similar animals.

7 · Serpents copulate twining round one another, and, as said above, have neither testes nor penis, the latter because they have no legs, the former because of their length, but they have ducts like fish; for on account of their extreme length the [20] seminal fluid would take too long in its passage and be cooled if it were further delayed by testes. (This happens also if the penis is large; such men are less fertile than when it is smaller because the semen, if cold, is not generative, and that which is carried too far is cooled.) So much for the reason why some animals have testes [25] and others not. Serpents intertwine because of their inaptitude to cast themselves alongside of one another. For they are too long to unite closely with so small a part and have no organs of attachment, so they

make use of the suppleness of their [30] bodies, intertwining. That is why they seem to be slower in copulation than fish, not only on account of the length of the ducts but also of this elaborate arrangement in uniting.

[35] 8 · It is not easy to state the facts about the uterus in female animals, for there are many points of difference. The vivipara are not all alike in this part; women and all the vivipara with feet have the uterus low down by the pudendum, [718<sup>b</sup>1] but the viviparous selachia have it higher up near the hypozoma. In the ovipara, again, it is low in fish (as in women and the viviparous quadrupeds), high in birds [5] and all oviparous quadrupeds. Yet even these differences are on a principle. To begin with the ovipara, they differ in the manner of laying their eggs, for some produce them imperfect, as fishes whose eggs increase and are finally developed outside of them. The reason is that they produce many young, and this is their [10] function as it is with plants. If then they perfected the egg in themselves they must needs be few in number, but as it is, they have so many that each uterus seems to be an egg, at any rate in the small fishes. For these are the most productive, just as with the other animals and plants whose nature is analogous to theirs, for the increase of [15] size turns with them to seed.

But the eggs of birds and the quadrupedal ovipara are perfect when produced. In order that these may be preserved they must have a hard covering (for their envelope is soft so long as they are increasing in size), and the shell is made by heat [20] squeezing out the moisture from the earthy material; consequently the place must be hot in which this is to happen. But the part about the hypozoma is hot, as is shown by that being the part which concocts the food. If then the eggs must be within the uterus, then the uterus must be near the hypozoma in those creatures which produce their eggs in a perfect form. Similarly it must be low down in those which produce them imperfect, for it is advantageous that it should be so. And it is [25] more natural for the uterus to be low down than high up, when nature has no other business in hand to hinder it; for its end is low down, and where is the end, there is the function, and the uterus itself is naturally where the function is.

9 · We find differences in the vivipara also as compared with one another. Some produce their young alive, not only externally, but also internally, as men, [30] horses, dogs, and all those which have hair, and among aquatic animals, dolphins, whales, and such cetacea.

10 · But the selachia and the vipers produce their young alive externally, but first produce eggs internally. The egg is perfect, for so only can an animal be generated from an egg, and nothing comes from an imperfect one. It is because they [35] are of a cold nature, not hot as some assert, that they do not lay their eggs externally.

11 · At least they certainly produce their eggs in a soft envelope, the reason being that they have but little heat and so their nature does not complete the process of drying the egg-shell. Because, then, they are cold they produce soft-shelled eggs, [719<sup>a</sup>1] and because the eggs are soft they do not produce them externally; for that would have caused their destruction.

When an animal is produced from an egg, the process is for the most part the same as in birds, for the egg descends and the young is hatched from it near the vagina, where the young is produced in those animals which are viviparous from the beginning. Therefore in such animals the uterus is dissimilar to that of both the [5] vivipara and ovipara, because they participate in both classes; for it is at once near the hypozoma and also stretching along downwards in all the selachia. But the facts about this and the other kinds of uterus must be gathered from the *Anatomies* and [10] from the *History*.<sup>4</sup> Thus, because they are oviparous, laying perfect eggs, they have the uterus placed high, but, as being viviparous, low, participating in both classes.

Animals that are viviparous from the beginning all have it low, nature here having no other business to interfere with her, and their production having no double character. Besides this, it is impossible for animals to be produced alive near the hypozoma, for the foetus must needs be heavy and move, and that region in the [15] mother is vital and would not be able to bear the weight and the movement. Thirdly, parturition would be difficult because of the length of the passage to be traversed; even as it is there is difficulty with women if they draw up the uterus in parturition by yawning or anything of the kind, and even when empty it causes a feeling of [20] suffocation if moved upwards. For if a uterus is to hold a living animal it must be stronger than in ovipara, and therefore in all the vivipara it is fleshy, whereas when the uterus is near the hypozoma it is membranous. And this is clear also in the case of the animals which produce young by the mixed method, for their eggs are high up [25] and sideways, but the living young are produced in the lower part of the uterus.

So much for the reason why differences are found in the uterus of various animals, and generally why it is low in some and high in others near the hypozoma. [30]

**12** · Why is the uterus always internal, but the testes sometimes internal, sometimes external? The reason for the uterus always being internal is that in this is contained the offspring which needs guarding, shelter, and concoction, while the outer surface of the body is easily injured and cold. The testes vary in position because they also need shelter and a covering to preserve them and to mature the [719<sup>b</sup>1] semen; for it would be impossible for them, if chilled and stiffened, to be drawn up and discharge it. Therefore, whenever the testes are visible, they have a cuticular covering known as the scrotum. If the nature of the skin is opposed to this, being too [5] hard to be adapted for enclosing them or for being soft like a true skin,<sup>5</sup> as with the scaly integument of fish and reptiles, then the testes must be internal. Therefore they are so in dolphins and all the cetacea which have them, and in the oviparous [10] quadrupeds among the scaly animals. The skin of birds also is hard so that it will not conform to the size of anything and enclose it neatly. (This is another reason with all these animals for their testes being internal besides those previously mentioned as arising necessarily from the details of copulation.) For the same reason they are internal in the elephant and hedgehog, for the skin of these, too, is not well suited to [15] keep the protective part separate.

The position of the uterus differs in animals viviparous within themselves and those externally oviparous, and in the latter class again it differs in those which have [20] the uterus low and those which have it near the hypozoma, as in fishes compared with birds and oviparous quadrupeds. And it is different again in those which produce young in both ways, being oviparous internally and viviparous externally. For those which are viviparous both internally and externally have the uterus placed [25] on the abdomen, as men, cattle, dogs, and the like, since it is expedient for the safety and growth of the foetus that no weight should be upon the uterus.

**13** · The passages also are different through which the solid and liquid [30] excreta pass out in all the vivipara. That is why both males and females in this class all have a part whereby the urine is voided, and this serves also for the issue of the semen in males, of the offspring in

females. This passage is situated above and in front of the passage of the solid excreta. Those ovipara that produce imperfect eggs; [720<sup>a</sup>1] e.g. the oviparous fish, have their uterus not under the abdomen but near the loin; for the growth of the egg does not hinder this, since the growing creature is perfected and develops externally.<sup>6</sup> The passage is the same as that of the solid [5] nutriment in all those animals that have no penis, in all the ovipara, even those of them that have a bladder, as the tortoises. For it is for the sake of generation, not for the evacuation of the urine, that the passages are double; but because the semen is naturally liquid, the liquid excretion also shares the same passage. This is clear [10] from the fact that all animals produce semen, but all do not void liquid excrement. Now the spermatic passages of the male must be fixed and must not wander, and the same applies to the uterus of the female, and this fixing must take place at either the front or the back of the body. To take the uterus first, it is in the front of the [15] body in vivipara because of the foetus, but at the loin and the back in ovipara. All animals which are internally oviparous and externally viviparous are in an intermediate condition because they participate in both classes, being at once oviparous and viviparous. For the upper part of the uterus, where the eggs are [20] produced, is under the hypozoma by the loin and the back, but as it advances<sup>7</sup> is low at the abdomen; for it is in that part that the animal is viviparous. In these also the passage for solid excrement and for copulation is the same, for none of these, as has been said already, has a separate pudendum.

[25] The same applies to the passages in the male, whether they have testes or no, as to the uterus of the ovipara. For in all of them, the ducts adhere to the back and the region of the spine. For they must not wander but be settled, and that is the character of the region of the back, which gives continuity and stability. Now in [30] those which have internal testes, the ducts are fixed from the first, and they are fixed in like manner if the testes are external; then they meet together towards the region of the penis.

The like applies to the ducts in the dolphins, but they have their testes hidden [35] under the abdominal cavity.

We have now discussed the situation of the parts contributing to generation, and the causes thereof. [720<sup>b</sup>1]

14 · The bloodless animals do not agree either with the sanguinea or with each other in the fashion of the parts contributing to generation.



There are four classes still left to deal with, first the crustacea, secondly the cephalopoda, thirdly [5] the insects, and fourthly the testacea. We cannot be certain about all of them, but that most of them do not copulate is plain; in what manner they unite must be stated later.

The crustacea copulate like the retromingent quadrupeds, fitting their tails to [10] one another, the one supine and the other prone. For the fins attached to the sides of the tail being long prevent them from uniting with the belly against the back. The males have fine spermatic ducts, the females a membranous uterus alongside the intestine, cloven on each side, in which the egg is produced. [15]

15 · The cephalopoda entwine together at the mouth, pushing against one another and enfolding their tentacles. This attitude is necessary, because nature has bent backwards the end of the intestine and brought it round near the mouth, as has been said before in the treatise on *Parts of Animals*<sup>8</sup> The female has a part [20] corresponding to the uterus, plainly to be seen in each of these animals, for it contains an egg which is at first indistinct but afterwards splits up into many; each of these eggs is imperfect when deposited, as with the oviparous fishes. In the cephalopoda (as also in the crustacea) the same passage serves to void the [25] excrement and leads to the part like a uterus,<sup>†</sup> for the male discharges the seminal fluid through this passage. And it is<sup>†</sup><sup>9</sup> on the lower surface of the body, where the mantle is open and the sea-water enters the cavity. Hence the union of the male with the female takes place at this point, for it is necessary, if the male discharges either [30] semen or a part of himself or any other force, that he should unite with her at the uterine passage. But the insertion, in the case of the octopus, of the tentacle of the male into the funnel of the female, by which tentacle the fishermen say the male copulates with her, is only for the sake of attachment, and it is not an organ useful [35] for generation, for it is outside the passage and indeed outside the body.

Sometimes also cephalopoda unite by the male mounting on the back of the female, but whether for generation or some other cause has not yet been [721<sup>a</sup>1] observed.

16 · Some insects copulate and the offspring are produced from animals of the same name, just as with the sanguinea; such are the locusts, cicadae, spiders, wasps, and ants. Others unite indeed and generate; but the result is not a creature of [5] the same kind, but only a

grub, and these insects do not come into being from animals but from putrefying matter, liquid or solid; such are fleas, flies, and cantharides. Others again are neither produced from animals nor unite with each [10] other; such are gnats, mosquitoes, and many similar kinds. In most of those which unite the female is larger than the male. The males do not appear to have spermatric passages. In most cases the male does not insert any part into the female, but the female from below upwards into the male; this has been observed in many cases (as [15] also that the male mounts the female),<sup>10</sup> the opposite in few cases; but observations are not yet comprehensive enough to enable us to make a distinction of classes. And generally it is the rule with most of the oviparous fish and oviparous quadrupeds that the female is larger than the male because this is expedient in view of the [20] increase of bulk in conception by reason of the eggs. In the female the part analogous to the uterus is cleft and extends along the intestine, as with the other animals; in this are produced the results of conception. This is clear in locusts and [25] all other large insects whose nature it is to unite—most insects are too small.

Such is the character of the generative organs in animals which were not spoken of before. It remains now to speak of the homogeneous parts concerned, the seminal fluid and milk. We will take the former first, and treat of milk afterwards.

[30] **17** · Some animals manifestly emit semen, as all the sanguinea, but whether the insects and cephalopoda do so is uncertain. Therefore this is a question to be considered, whether all males do so, or not all; and if not all, why some do and some not; and whether the female also contributes any semen or not; and, if not semen, [721<sup>b</sup>1] whether she does not contribute anything else either, or whether she contributes something else which is not semen. We must also inquire what those animals which emit semen contribute by means of it to generation, and generally what is the nature [5] of semen, and of the menstrual flow in all animals which discharge this liquid.

Now it is thought that all animals are generated out of semen, and that the semen comes from the parents. That is why it is part of the same inquiry to ask whether both male and female produce it or only one of them, and to ask whether it comes from the whole of the body or not from the whole; for if the latter is true it is [10] reasonable to suppose that it does not come from both parents either. Accordingly, since some say that it comes from the whole of the body, we must investigate this

question first.

The proofs from which it can be argued that the semen comes from each and every part of the body<sup>11</sup> may be reduced to four. First, the intensity of the pleasure [15] of coition; for the same state of feeling is more pleasant if multiplied, and that which affects all the parts is multiplied as compared with that which affects only one or a few. Secondly, the argument that mutilated parents produce mutilated offspring; for they argue that since the parent is deficient in this part the semen does not come from thence, and the result is that the corresponding part is not formed in the [20] offspring. Thirdly, the resemblances to the parents; for the young are born like them part for part as well as in the whole body; if then the coming of the semen from the whole body is cause of the resemblance of the whole, so the parts would be like because it comes from each of the parts. Fourthly, it would seem to be reasonable to say that as there is some first thing from which the whole arises, so it is also with [25] each of the parts, and therefore if semen is cause of the whole so each of the parts would have a seed peculiar to itself. And these opinions are plausibly supported by such evidence as that children are born with a likeness to their parents, not only in congenital but also in acquired characteristics; for before now, when the parents [30] have had scars, the children have been born with a mark in the form of the scar in the same place, and there was a case at Chalcedon where the father had a brand on his arm and the letter was marked on the child, only confused and not clearly articulated. That is pretty much the evidence on which some believe that the semen comes from all the body.

18 · On examining the question, however, the opposite appears more likely; [722<sup>a</sup>1] for it is not hard to refute the above arguments and besides the view involves impossibilities. First, then, the resemblance of children to parents is no proof that the semen comes from the whole body, because the resemblance is found also in voice, nails, hair, and way of moving, from which nothing comes. And men generate [5] before they yet have certain characters, such as a beard or grey hair. Further, children are like their more remote ancestors from whom nothing has come; for the resemblances recur at an interval of many generations, as in the case of the woman in Elis who had intercourse with a negro; her daughter was not negroid but the son [10] of that daughter was. The same thing applies also to plants; for it is clear that if this theory was true the seed would

come from all parts of plants also; but often a plant does not possess one part, and another part may be removed, and a third grows afterwards. Besides, the seed does not come from the pericarp, and yet this also comes into being with the same form as in the parent plant. [15]

We may also ask whether the semen comes from each of the homogeneous parts only, such as flesh and bone and sinew, or also from the heterogeneous, such as face and hands. For if from the former only, we object that the resemblance exists rather in the latter; if then it is not because of the semen coming from all parts that children resemble their parents in *these*, what is there to stop the homogeneous [20] parts also from being like for some other reason than this? If the semen comes from the heterogeneous alone, then it does not come from all parts; but it is more fitting that it should come from the homogeneous parts, for they are prior to the heterogeneous which are composed of them; and as children are born like their [25] parents in face and hands, so they are in flesh and nails. If the semen comes from both, what would be the manner of generation? For the heterogeneous parts are composed of the homogeneous, so that to come from the former would be to come from the latter and from their composition. Similarly, take a written name: if anything came from the whole of it, it would be from each of the syllables, and if [30] from these, from the letters and their composition. So that if really flesh and bones are composed of fire and the like elements, the semen would come rather from the elements; for how can it come from their composition? Yet without this composition there would be no resemblance. If again something creates this composition later, it [722<sup>b</sup>1] would be *this* that would be the cause of the resemblance, not the coming of the semen from every part of the body.

Further, if the parts of the future animal are separated in the semen, how do they live? and if they are connected, they would form a small animal.

[5] And what about the generative parts? For that which comes from the male is not similar to what comes from the female.

Again, if the semen comes from all parts of both parents alike, the result is *two* animals; for the offspring will have all the parts of both. That is why Empedocles seems to say what agrees pretty well with this view (if we are to adopt it), to a [10] certain extent at any rate, but to be wrong if we think otherwise.<sup>12</sup> For he declares that there is a sort of tally in the male and female, and that the whole offspring does not come from either, 'but sundered is the fashion of limbs, some in man's . . .'.<sup>13</sup> For why does not the female generate from herself if the semen comes from all parts

[15] alike and she has a receptacle? But, it seems, either it does not come from all the parts, or if it does it is in the way Empedocles says, not the same parts coming from each parent, which is why they need intercourse with each other.

Yet this also is impossible, just as much as it is impossible for the parts when full grown to survive and have life in them when torn apart, as Empedocles accounts [20] for the creation of animals in the time of his Reign of Love, saying that ‘many heads sprang up without necks’,<sup>14</sup> and later on these isolated parts combined into animals. Now that *this* is impossible is plain, for neither would the separate parts be able to survive without having any soul or life in them, nor if they were living things, so to say, could several of them combine so as to become one animal again. Yet those who [25] say that semen comes from the whole of the body really have to talk in that way, and as it happened then in the earth during the Reign of Love, so it happens according to them in the body. Now it is impossible that the parts should be united together when they come into being and should come from different parts of the parent, meeting together in one place. Then how can the upper and lower, right and left, front and [30] back parts have been sundered? All these points are unintelligible. Further, some parts are distinguished by possessing a faculty, others by being in certain conditions; the heterogeneous, as tongue and hand, by the faculty of doing something, the homogeneous by hardness and softness and the other similar conditions. Blood, then, will not be blood, nor flesh flesh, in any and every state. It is clear, then, that that which comes from any part, as blood from blood or flesh from [723<sup>a</sup>1] flesh, will not be synonymous with that part. But if it is something different from which the blood comes, the coming of the semen from all the parts will not be the cause of the resemblance, as is held by the supporters of this theory. For if blood is formed from something which is not blood, it is enough that the semen come from [5] one part only; for why should not all the parts be formed from one part? Indeed, this theory seems to be the same as that of Anaxagoras, that none of the homogeneous parts come into being, except that these theorists assume, in the case of the generation of animals, what he assumed of everything.

Then, again, how will these parts that came from all the body grow? It is true [10] that Anaxagoras plausibly says that flesh out of the food is added to the flesh. But if we do not say this (while saying that semen comes from all parts of the body), how will the foetus become greater by the addition of something else if that which is added remain unchanged?

But if that which is added *can* change, then why not say that the semen from the very first is of such a kind that blood and flesh can be made [15] out of it, instead of saying that it itself *is* blood and flesh? Nor can we say that it is increased later by a process of mixing, as wine when water is poured into it. For in that case each element would be itself *at first* while still unmixed, but the fact rather is that flesh and bone and each of the other parts is such *later*. And to say [20] that some part of the semen is sinew and bone is quite above us, as the saying is.

Besides all this there is a difficulty if the sex is determined in conception (as Empedocles says: 'it is shed in clean vessels; some wax female, if they fall in with [25] cold').<sup>15</sup> Anyhow, it is plain that both men and women change not only from infertile to fertile, but also from bearing female to bearing male offspring, which looks as if the cause does not lie in the semen coming from all the parent or not, but in the mutual proportion or disproportion of that which comes from the woman and [30] the man, or in something of this kind. It is clear, then, if we are to put this down as being so, that the female sex is not determined by the semen coming from any particular part, and consequently neither is the special sexual part so determined (if really the same semen can become either a male or female child, which shows that the sexual part does not exist in the semen). Why, then, should we assert this of *this* part any more than of the others? For if semen does not come from the uterus, the [723<sup>b</sup>1] same account may be given of the others.

Again, some creatures come into being neither from parents of the same kind nor from parents of a different kind, as flies and the various kinds of what are called [5] fleas; from these are produced animals indeed, but not in this case of similar nature, but a kind of grub. It is plain in this case that the young of a different kind are not produced by semen coming from all parts of the parent, for they would then resemble them, if indeed resemblance is a sign of its coming from all parts.

Further, even among animals some produce many young from a single coition (and something like this is universal among plants, for it is plain that they bear all [10] the fruit of a whole season from a single movement). And yet how would this be possible if the semen were secreted from all the body? For from a single coition and a single segregation must follow only a single secretion. Nor is it possible for it to be separated in the uterus; for this would no longer be a separation of semen, but, as it [15] were, a severance from an animal.

Again, the cuttings from a plant bear seed; clearly, therefore, even before they were cut, they bore their fruit from their own mass alone, and

the seed did not come from *all* the plant.

But the greatest proof of all is derived from observations we have sufficiently established on insects. For, if not in all, at least in most of these, the female in the [20] act of copulation inserts a part of herself into the male, This, as we said before, is the way they copulate; for the females manifestly insert this from below into the males above, not in all cases, but in most of those observed. Hence it seems clear that, [25] when the males do emit semen, then also the cause of the generation is not its coming from all the body, but something else which must be investigated hereafter. For even if it were true that it comes from all the *body*, as they say, they ought not to claim that it comes from all *parts* of it, but only from the creative part—from the [30] workman, so to say, not the material he works in. Instead of that, they talk as if one were to say that the semen comes from the shoes; for, generally speaking, if a son is like his father, the shoes he wears are like his father's shoes.

As to the vehemence of pleasure in sexual intercourse, it is not because the semen comes from all the body, but because there is a strong friction (wherefore if this intercourse is often repeated the pleasure is diminished in the persons [724<sup>a</sup>1] concerned). Moreover, the pleasure is at the end of the act, but it ought, on the theory, to be in each of the parts, and not at the same time, but sooner in some and later in others.

If mutilated young are born of mutilated parents, it is for the same reason as [5] that for which they are like them. And the young of mutilated parents are not always mutilated, just as they are not always like their parents; the cause of this must be inquired into later, for this problem is the same as that.

Again, if the female does not produce semen, it is reasonable to suppose it does not come from all the body of the male either. And if it does not come from all the male it is not unreasonable to suppose that it does not come from the female, but [10] that the female is cause of the generation in some other way. Into this we must next inquire, since it is plain that the semen is not secreted from all the parts.

In this investigation and those which follow from it, the first thing to do is to [15] understand what semen is, for then it will be easier to inquire into its operations and the phenomena connected with it. Now the object of semen is to be of such a nature that from it as their origin come into being those things which are naturally formed,† not because there is any agent which makes them from it as . . . but simply [20] because this is the semen.†<sup>16</sup> Now we speak of one thing coming *from* another in many senses; it is one thing when we say that night comes *from* day or a man

becomes man *from* boy, meaning that the one comes after the other; it is another if we say that a statue is made *from* bronze and a bed *from* wood, and so on in all the other cases where we say that the thing made is made *from* a material, meaning [25] that the whole is formed from something pre-existing, which is put into shape. In a third sense a man becomes unmusical *from* being musical, sick *from* being well, and generally in this sense contraries arise from contraries. Fourthly, as in the ‘climax’ [30] of Epicharmus; thus *from* slander comes railing and *from* this fighting, and all these are *from* something in the sense that it is the efficient cause.<sup>17</sup> In this last class sometimes the efficient cause is in the things themselves, as in the last mentioned (for the slander is a part of the whole trouble), and sometimes external, as the art is external to the work of art or the torch to the burning house.

[35] Now the semen plainly falls under one of the two following senses—either the semen is the material from which it is made, or it is the first efficient cause. For assuredly it is not in the sense of one thing being *after* another, as the voyage comes [724<sup>b</sup>1] *from* the Panathenaea; nor yet as contraries come from contraries, for then one of the two contraries ceases to be, and a third substance must exist as an immediate underlying basis from which the new thing comes into being. We must discover, then, in which of the two other classes the semen is to be put, whether it is to be [5] regarded as matter, and therefore acted upon by something else, or as a form, and therefore acting upon something else, or as both at once. For perhaps at the same time we shall see clearly also how all the products of semen come into being from contraries, since coming into being from contraries is also a natural process, for some animals do so, i.e. from male and female, others from only one parent, as is the [10] case with plants and all those animals in which male and female are not separately differentiated. Now that which comes from the generating parent is called the seminal fluid, being that which first has in it a principle of generation, in the case of all animals whose nature it is to unite; semen is that which has in it the principles from *both* united parents (as in the case of plants and of those animals in which [15] male and female are not separated), as the first mixture which arises from the union of male and female, be it a foetus or an egg, for these already have in them that which comes from both. (Semen and fruit differ only in the one being earlier and the other later, fruit in that it comes from something else, and seed in that something [20] else comes from *it*, for both are really the same thing.)

We must again take up the question what the primary nature of what



is called semen is.<sup>18</sup> Everything which we find in the body must either be one of the natural parts, whether homogeneous or heterogeneous, or an unnatural part such as a [25] growth, or a residue or waste-product, or nutriment. (By residue I mean what is left of the nutriment, by waste-product that which is given off from the growth by an unnatural decomposition.)

Now that semen cannot be a part of the body is plain; for it is homogeneous, but from it nothing is composed, as things are from sinew or flesh; nor is it separated [30] as are all the other parts. But neither is it contrary to nature nor a defect; for it exists in all alike, and the natural organism comes from it. Nutriment, again, is obviously introduced from without.

It remains, then, that it must be either a waste-product or a residue. Now the ancients seem to think that it is a waste-product; for when they say that it comes [35] from all the body by reason of the heat of the movement, they imply that it is a kind of waste-product. But these are contrary to nature, and from such arises nothing [725<sup>a</sup>1] according to nature. So then it must be a residue.

But every residue is either of useless or useful nutriment; by 'useless' I mean that from which nothing further is contributed to natural growth, but which is [5] particularly mischievous to the body if too much of it is consumed; by 'useful' I mean the opposite. Now it is evident that it cannot be of the former character, for such is most abundant in persons of the worst condition of body through age or sickness; semen, on the contrary, is least abundant in them, for either they have [10] none at all or it is not fertile, because a useless and morbid residue is mingled with it.

Semen, then, is part of a useful residue. But the *most* useful is the last and that from which finally is formed each of the parts of the body. For residues are either earlier or later; of the nutriment in the first stage the residue is phlegm and the like, [15] for phlegm also is a residue of the useful nutriment, an indication of this being that if it is mixed with pure nutriment it is nourishing, and that it is used up in cases of illness. The final residue is the smallest in proportion to the quantity of nutriment. But we must reflect that the daily nutriment by which animals and plants grow is [20] but small; for if a very little added of the same thing is the size of it will become excessive.

So we must say the opposite of what the ancients said. For whereas *they* said that semen is that which comes *from* all the body, *we* shall say it is that whose nature is to go *to* all of it, and what they thought a waste-

product seems rather to be [25] a residue. For it is more reasonable to suppose that the last extract of the nutriment which goes to all parts resembles it, just as part of a painter's colour is often left over resembling that which he has used up. Waste-products, on the contrary, are always due to corruption and to a departure from nature.

[30] A further proof that it is not a waste-product, but rather a residue, is the fact that the large animals have few young, the small many. For the large must have more waste and less residue, since the great size of the body causes most of the nutriment to be used up, so that the residue is small.

Again, no place has been set apart by nature for waste-products but they flow [725<sup>b</sup>1] wherever they can find an easy passage in the body, but a place has been set apart for all the natural residues; thus the lower intestine serves for the excretion of the solid nutriment, the bladder for that of the liquid; for the useful part of the nutriment we have the upper intestine, for the spermatic secretions the uterus and pudenda and breasts, for it is collected and flows together into them.

[5] And the resulting phenomena are evidence that semen is what we have said, and these result because such is the nature of the residue. For the exhaustion consequent on the loss of even a very little of the semen is conspicuous because the body is deprived of the ultimate gain drawn from the nutriment. With some few persons, it is true, during a short time in the flower of their youth the loss of it, if it be excessive in quantity, is an alleviation (just as in the case of the nutriment in its [10] first stage, if too much have been taken, since getting rid of this also makes the body more comfortable), and so it may be also when other residues come away with it, for in that case it is not only semen that is lost but also other influences come away [15] mingled with it,<sup>19</sup> and these are morbid. That is why, with some men at least, that which comes from them proves sometimes incapable of procreation because the seminal element in it is so small. But still in most men and as a general rule the result of intercourse is exhaustion and weakness rather than relief, for the reason [20] given. Moreover, semen does not exist in them either in childhood or in old age or in sickness—in the last case because of weakness, in old age because their constitution does not concoct enough, and in childhood because they are growing and so all the nutriment is used up too soon—for in about five years, in the case of human beings at any rate, the body seems to gain half the height that is gained in all the rest of life. [25]

In many animals and plants we find a difference in this connexion not only between kinds as compared with kinds, but also between similar

individuals of the same kind as compared with each other, e.g. man with man or vine with vine. Some have much semen, others little, others again none at all, not through weakness but [30] the contrary, at any rate in some cases. This is because the nutriment is used up to form the body, as with some human beings, who, being in good condition and developing much flesh or getting rather too fat, produce less semen and are less desirous of intercourse. Like this is what happens with those vines which 'play the goat', that is, luxuriate through too much nutrition, for he-goats when fat are less inclined to mount the female; for which reason they thin them before breeding from [726<sup>a</sup>1] them, and say that the vines 'play the goat', so calling it from the condition of the goats. And fat people, women as well as men, appear to be less fertile than others from the fact that the residue when in process of concoction turns to fat with those [5] who are too well-nourished. For fat also is a healthy residue due to good living.

In some cases no semen is produced at all, as by the willow and poplar. This condition is due to each<sup>20</sup> of the two causes, weakness and strength; the former prevents concoction of the nutriment, the latter causes it to be all consumed, as said above. In like manner other animals produce much semen through weakness as well [10] as through strength, [when a great quantity of a useless residue is mixed with it; this sometimes results in actual disease when a passage is not found to carry off the impurity, and though some recover of this, others actually die of it. For they are affected by waste-products here as in the urine, which also has been known to cause [15] disease.

Further, the same passage serves for residue and semen; and whatever animals have both kinds of excrement, that of liquid and that of solid nutriment, discharge the semen by the same passage as the liquid excrement (for it is a residue of a liquid, since the nutriment of all animals is rather liquid than solid), but those which have [20] no liquid excrement discharge it at the passage of the solid residua. Moreover, waste-products are always morbid, but the removal of the residue is useful; now the discharge of the semen participates in both characteristics because it takes up some of the non-useful nutriment. But if it were a waste-product it would be always harmful; as it is, it is not so.]<sup>21</sup> [25]

From what has been said, it is clear that semen is a residue of useful nutriment, and that in its last stage, whether it is produced by all or no.

19 · After this we must distinguish of what sort of nutriment it is a residue, and must discuss the menstrual discharges which occur in certain

of the vivipara. [30] For thus we shall make it clear whether the female also produces semen like the male and the foetus is a mixture of two semens, or whether no semen is secreted by the female, and, if not, whether she contributes nothing else either to generation but only provides a receptacle, or whether she does contribute something, and how and [726<sup>b</sup>1] in what manner she does so.

We have previously stated that the final nutriment is the blood in the sanguinea and the analogous fluid in the other animals. Since the semen is also a residue of the nutriment, and that in its final stage, it follows that it will be either blood or that which is analogous to blood, or something formed from this. But since [5] it is from the blood, when concocted and somehow divided up, that each part of the body is made, and since the semen if properly concocted is quite of a different character from the blood when it is separated from it, but if not properly concocted has been known in some cases to issue in a bloody condition if one forces oneself too [10] often to coition, therefore it is plain that semen will be a residue of the nutriment when reduced to blood, being that which is finally distributed to the parts of the body. And this is the reason why it has so great power, for the loss of the pure and healthy blood is an exhausting thing; for this reason also it is natural that the offspring should resemble the parents, for that which goes to all the parts of the [15] body resembles that which is left over. So that the semen which is to form the hand or the face or the whole animal is already the hand or face or whole animal undifferentiated, and what each of them is actually such is the semen potentially, either in virtue of its own mass or because it has a certain power in itself. (For we have not yet made it clear from the distinctions drawn hitherto whether it is the [20] matter of the semen that is the cause of generation, or whether it has in it some faculty and efficient cause thereof). For the hand also or any other bodily part is not hand or other part in a true sense if it be without soul or some other power, but is only called by the same name.

[It is clear also that in cases where seminal waste-products occur, they too are [25] residues. This happens when it is dissolved into what preceded it—as when plaster falls away at once from the wall; for what comes away is the same as what was at first applied. In the same way, the last residue is the same as the first wasteproduct.]<sup>22</sup>

[30] On this subject, then, so much may be laid down. But since it is necessary that the weaker animal also should have a residue greater in quantity and less concocted, and that being of such a nature it should be a mass of sanguineous liquid, and since that which has by nature a

smaller portion of heat is weaker, and since it has already been stated that such is the character of the female—it is necessary that the [727<sup>a1</sup>] sanguineous matter discharged by the female is also a residue. And such is the discharge of the so-called menstrual fluid.

It is plain, then, that the menstrual discharge is a residue, and that it is analogous in females to the semen in males. The circumstances connected with them [5] are evidence that this view is correct. For the semen begins to appear in males and to be emitted at the same time of life that the menstrual flow begins in females, and that they change their voice and their breasts begin to develop. So, too, in the decline of life the generative power fails in the one sex and the menstrual discharge in the other. [10]

The following signs also indicate that this discharge in females is a residue. Generally speaking women suffer neither from haemorrhoids nor bleeding at the nose nor anything else of the sort except when the menstrual discharges are ceasing, and if anything of the kind occurs the flow is interfered with because the discharge is diverted to it. [15]

Further, the blood-vessels of women stand out less than those of men, and women are rounder and smoother because the residue which in men goes to these vessels is drained away with the menstrual discharge. We must suppose, too, that the same cause accounts for the fact that the bulk of the body is smaller in females [20] than in males among the vivipara, since this is the only class in which menstrual fluids are discharged from the body. And in this class the fact is clearest in women, for the discharge is greater in women than in the other animals. That is why her pallor and the absence of prominent blood-vessels is always most conspicuous, and the deficient development of her body compared with a man's is obvious. [25]

Now since this is what corresponds in the female to the semen in the male, and since it is not possible that two seminal discharges should be found together, it is plain that the female does not contribute semen to the generation of the offspring. For if she had semen she would not have the menstrual fluid; but, as it is, because she has the latter she has not the former. [30]

It has been stated then that the menstrual fluids are a residue as the semen is, and confirmation of this view may be drawn from some of the phenomena of animals. For fat creatures produce less semen than lean ones, as observed before. The reason is that fat also, like semen, is a residue and is in fact concocted blood, [35] only not concocted in the same way as the semen. Thus, if the residue is consumed to form fat the

semen is naturally deficient. And so among the bloodless animals the [727<sup>b</sup>1] cephalopoda and crustacea are in best condition about the time of producing eggs, for, because they are bloodless and no fat is formed in them, that which is analogous in them to fat is at that season drawn off to form the seminal residue. [5]

And a sign that the female does not emit similar semen to the male, and that the offspring is not formed by a mixture of both, as some say, is that often the female conceives without the sensation of pleasure in intercourse, and if again the pleasure is experienced by her no less than by the male and the two sexes reach their goal together, yet often no conception takes place unless the liquid of the menstrual [10] discharge is present in a right proportion. Hence the female does not produce young if the discharge is absent altogether, nor often when, it being present, the efflux still continues; but she does so *after* the purgation. For in the one case she has not the nutriment or material from which the foetus can be framed by the power coming [15] from the male and inherent in the semen, and in the other it is washed away with the discharge because of its abundance. But when after its occurrence the greater part has been evacuated, the remainder is formed into a foetus. Cases of conception when the discharge does not occur at all, or of conception during the discharge instead of after it, are due to the fact that in the former instance there is only so [20] much liquid to begin with as remains behind after the discharge in fertile women, and no greater quantity is secreted so as to come away from the body, while in the latter instance the mouth of the uterus closes after the discharge. When, therefore, the quantity already expelled from the body is great but the discharge still continues, only not on such a scale as to wash away the semen, then it is that [25] conception accompanies coition. Nor is it at all strange that the discharges should still continue after conception (for even after it they recur to some extent, but are scanty and do not last during all the period of gestation; this, however, is a morbid phenomenon, and that is why it is found only in a few cases and seldom, whereas it is [30] that which happens as a regular thing that is according to nature).

It is clear then that the female contributes the material for generation, and that this is in the substance of the menstrual discharges, and that they are a residue.

20 · Some think that the female contributes semen in coition because the [35] pleasure she experiences is sometimes similar to that of

the male, and also is attended by a liquid discharge. But this discharge is not seminal; it is merely proper [728<sup>a</sup>1] to the part concerned in each case. For there is a discharge from the uterus which occurs in some women but not in others. It is found in those who are fair-skinned and of a feminine type generally, but not in those who are dark and of a masculine appearance. The amount of this discharge, when it occurs, is sometimes on a [5] different scale from the emission of semen and far exceeds it. Moreover, different kinds of food cause a great difference in the quantity of such discharges; for instance some pungently-flavoured foods cause them to be conspicuously increased. And as to the pleasure which accompanies coition it is due to emission not only of [10] semen, but also of a breath, the coming together of which precedes the emission. This is plain in the case of boys who are not yet able to emit semen, but are near the proper age, and of men who are impotent, for all these are capable of pleasure by rubbing. And those who have been injured in the generative organs sometimes [15] suffer from diarrhoea because the residue, which they are not able to concoct and turn into semen, is diverted into the intestine. Now a boy is like a woman in form, and the woman is as it were an impotent male, for it is through a certain incapacity that the female is female, being incapable of concocting the nutriment in its last [20] stage into semen (and this is either blood or that which is analogous to it in animals which are bloodless) owing to the coldness of her nature. As then diarrhoea is caused in the bowels by the insufficient concoction of the blood, so are caused in the blood-vessels all discharges of blood, including the menstrual blood, for this also is such a discharge, only it is natural whereas the others are morbid.

[25] Thus it is clear that it is reasonable to suppose that generation comes from this. For the menstrual blood is semen not in a pure state but in need of working up, just as in the formation of fruits the nutriment is present, when it is not yet sifted thoroughly, but needs working up to purify it. Thus the menstrual blood causes generation by mixture with the semen, as this impure nutriment in plants is [30] nutritious when mixed with pure nutriment.

And a sign that the female does not emit semen is the fact that the pleasure of intercourse is caused by touch in the same region of the female as of the male; and yet is it not from thence that this flow proceeds. Further, it is not all females that have it at all, but only the sanguinea, and not all even of these, but only those whose [35] uterus is not near the hypozoma and which do not lay eggs; it is not found in the animals which have no blood but only the analogous fluid (for what is

blood in the [728<sup>b</sup>1] former is represented by another fluid in the latter). The reason why neither the latter nor those sanguinea mentioned (i.e. those whose uterus is low and which do not lay eggs)<sup>23</sup> have this effluxion is the dryness of their bodies; this allows but little [5] matter to be secreted, only enough for generation but not enough to be discharged from the body. All animals that are viviparous without producing eggs first (such are man and all quadrupeds which bend their hind-legs inwards; for all these are viviparous without producing eggs)—all these have the menstrual flow, unless they [10] are defective in development as the mule, only the efflux is not abundant as in women. Details of the facts in each animal have been given in the *History of Animals*.<sup>24</sup>

The menstrual flow is more abundant in women than in the other animals, and men emit the most semen in proportion to their size. The reason is that the [15] composition of their bodies is liquid and hot compared to others, for more matter must be secreted in such a case. Further, man has no such parts in his body as those to which the superfluous matter is diverted in the other animals; for he has no great quantity of hair in proportion to his body, nor outgrowths of bones, horns, and [20] teeth.

There is evidence that the semen is in the menstrual blood, for, as said before, this residue appears in the male at the same time of life as the menstrual flow in the female; this indicates that the parts destined to receive each of these residues are differentiated at the same time in both sexes; and as the neighbouring parts in both [25] become swollen the hair of puberty springs forth in both alike. As the parts in question are on the point of differentiating they are distended by the breath; this is clearer in males in the testes, but appears also about the breasts; in females it is more marked in the breasts, for it is when they have risen two fingers' breadth that [30] the menstrual flow generally begins.

Now, in all living things in which the male and female are not separated the semen is a sort of embryo; by embryo I mean the first mixture of male and female; hence, from one semen comes one body,—for example, one stalk of wheat from one [35] grain, as one animal from one egg (for twin eggs are really two eggs). But in whatever kinds the sexes are distinguished, in these many animals may come from [729<sup>a</sup>1] one emission of semen, showing that the semen differs in its nature in plants and animals. A sign of this is that animals which can bear more than one young one at a time do so in consequence of only one coition. Hence, too, it is plain that the semen [5] does not come from the whole of the body; for neither would the different parts of the semen already be



separated as soon as discharged from the same part, nor could they be separated in the uterus if they had once entered it all together; but what does happen is just what one would expect, since what the male contributes to [10] generation is the form and the efficient cause, while the female contributes the material. In fact, as in the coagulation of milk, the milk being the material, the fig-juice or rennet is that which contains the curdling principle, so acts the secretion of the male, being divided into the parts in the female. Why it is sometimes divided [15] into more or fewer parts, and sometimes not divided at all, will be the subject of another discussion. But because it does not differ in kind at any rate, several offspring are produced provided only that the divided semen is proportionate to the material, being neither too little to concoct it and fix it into form, nor too much so as to dry it up; and from this first formative semen, if it remains one, and is not divided, [20] only one young one comes into being.

That, then, the female does not contribute semen to generation, but does contribute something, and that this is the matter of the menstrual flow, or that which is analogous to it in bloodless animals, is clear from what has been said, and also from a general survey of the question. For there must needs be that which [25] generates and that from which it generates; even if these be one, still they must be distinct in form and their essence must be different; and in those animals that have these powers separate in two sexes the body and nature of the active and the passive sex must also differ. If, then, the male stands for the effective and active, and the [30] female for the passive, it follows that what the female would contribute to the semen of the male would not be semen but material for the semen to work upon. This is just what we find to be the case, for the menstrual blood has in its nature an affinity to the primitive matter.

21 · So much for the discussion of this question. At the same time the answer to the next question we have to investigate is clear from these considerations, [729<sup>b</sup>1] I mean how it is that the male contributes to generation and how it is that the semen from the male is the cause of the offspring. Does it exist in the body of the embryo as a part of it from the first, mingling with the material which comes from [5] the female? Or does the semen communicate nothing to the material body of the embryo but only to the power and movement in it? For this power is that which acts and makes, while that which is made and receives the form is the

residue of the secretion in the female. Now the latter alternative appears to be the right one both *a priori* and in view of the facts. For, if we consider the question on general grounds, [10] we find that, whenever one thing is made from two of which one is active and the other passive, the active agent does not exist in that which is made; and, still more generally, the same applies when one thing moves and another is moved. But the female, as female, is passive, and the male, as male, is active, and the principle of the movement comes from him. Therefore, if we take the highest genera under [15] which they each fall, the one being active and motive and the other passive and moved, that one thing which is produced comes from them only in the sense in which a bed comes into being from the carpenter and the wood, or in which a ball comes into being from the wax and the form. It is plain then that it is not necessary that anything at all should come away from the male, and if anything does come away it does not follow that this gives rise to the embryo as being in the embryo, but only as that which imparts the motion and as the form; so the medical art cures the [20] patient.

This *a priori* argument is confirmed by the facts. For it is for this reason that some males which unite with the female do not, it appears, insert any part of themselves into the female, but on the contrary the female inserts a part of herself into the male; this occurs in some insects. For the effect produced by the semen in [25] the female is produced in the case of these insects by the heat and power in the male animal itself when the female inserts that part of herself which receives the residue. And therefore such animals remain united a long time, and when they are separated the young are produced quickly. For the union lasts until that which is analogous to [30] the semen has done its work, and when they separate the female produces the embryo quickly; for the young is imperfect inasmuch as all such creatures give birth to grubs.

What occurs in birds and oviparous fishes is the greatest proof that neither does the semen come from all parts of the male nor does he emit anything of such a [730<sup>a</sup>1] nature as to exist within that which is generated, as part of the material embryo, but that he only makes a living creature by the power which resides in the semen (as we said in the case of those insects whose females insert a part of themselves into the male). For if a hen-bird is in process of producing wind-eggs and is then trodden by the cock before the egg has begun to whiten and while it is all still yellow, then they [5] become fertile instead of being wind-eggs. And if while it is still yellow she be trodden by another cock, the whole brood of chicks turn out like the second cock. Hence some of those who are

anxious to rear fine birds act thus; they change the [10] cocks for the first and second treading, not as if they thought that the semen is mingled with the egg or exists in it, or that it comes from all parts of the cock; for if it did it would have come from both cocks, so that the chick would have all its parts doubled. But it is by its force that the semen of the male gives a certain quality to the material and the nutriment in the female, for the second semen added to the [15] first can produce this effect by heat and concoction, as the egg acquires nutriment so long as it is growing.

The same thing happens in the generation of oviparous fishes. When the female has laid her eggs, the male sprinkles the milt over them, and those eggs are fertilized which it reaches, but not the others; this shows that the male does not [20] contribute anything to the quantity but only to the quality of the embryo.

From what has been said it is plain that the semen does not come from the whole of the body of the male in those animals which emit it, and that the [25] contribution of the female to the generative product is not the same as that of the male, but the male contributes the principle of movement and the female the material. This is why the female does not produce offspring by herself, for she needs a principle, i.e. something to begin the movement in the embryo and to define the form it is to assume. Yet in some animals, as birds, the nature of the female [30] unassisted can generate to a certain extent, for they do form something, only it is incomplete; I mean the so-called wind-eggs.

22 · For the same reason the development of the embryo takes place in the female; neither the male himself nor the female emits semen into the male, but the [730<sup>b</sup>1] female receives within herself the share contributed by both, because in the female is the material from which is made the resulting product. Not only must the mass of material exist there from which the embryo is formed in the first instance, but further material must constantly be added that it may increase in size. Therefore [5] the birth must take place in the female. For the carpenter must keep in close connexion with his timber and the potter with his clay, and generally all workmanship and the ultimate movement imparted to matter must be connected with the material concerned, as, for instance, architecture is *in* the buildings it makes.

From these considerations we may also gather how it is that the male [10] contributes to generation. The male does not emit semen at all in some animals, and where he does this is no part of the resulting embryo;

just so no material part comes from the carpenter to the material, i.e. the wood in which he works, nor does any part of the carpenter's art exist within what he makes, but the shape and the form [15] are imparted from him to the material by means of the motion he sets up. It is his hands that move his tools, his tools that move the material; it is his knowledge of his art, and his soul, in which is the form, that move his hands or any other part of him with a motion of some definite kind, a motion varying with the varying nature of the [20] object made. In like manner, in the male of those animals which emit semen, nature uses the semen as a tool and as possessing motion in actuality, just as tools are used in the products of any art, for in them lies in a certain sense the motion of the art. Such, then, is the way in which these males contribute to generation. But when the [25] male does not emit semen, but the female inserts some part of herself into the male, this is parallel to a case in which a man should carry the material to the workman. For by reason of weakness in such males nature is not able to do anything by any secondary means, but the movements imparted to the material are scarcely strong enough when nature itself watches over them. Thus here nature resembles a [30] modeller in clay rather than a carpenter, for she does not touch the work she is forming by means of tools, but with her own hands.

**23** · In all animals which can move about, the sexes are separated, one individual being male and one female, though both are the same in species, as with [731<sup>a</sup>1] man and horse. But in plants these powers are mingled, female not being separated from male. That is why they generate out of themselves, and do not emit semen but produce an embryo, what is called the seed. Empedocles puts this well in the line: [5] 'and thus the tall trees lay their eggs; first olives ...'<sup>25</sup> For as the egg is an embryo, a certain part of it giving rise to the animal and the rest being nutriment, so also from a part of the seed springs the growing plant, and the rest is nutriment for the shoot and the first root.

[10] In a certain sense the same thing happens also in those animals which have the sexes separate. For when there is need for them to generate the sexes are no longer separated any more than in plants, their nature desiring that they shall become one; and this is plain to view when they copulate and are united [that one animal is made out of both].<sup>26</sup>

It is the nature of those creatures which do not emit semen to remain united a [15] long time until the male element has formed the embryo, as

with those insects which copulate. The others so remain only until the male has discharged from the parts of himself introduced something which will form the embryo in a longer time, as among the sanguinea. For the former remain paired some part of a day, while the semen forms the embryo in several days. And after emitting this they cease their [20] union.

And animals seem to be almost like divided plants, as though one should separate and divide them, when they bear seed, into the male and female existing in them.

In all this nature acts like an intelligent workman. For to the essence of plants [25] belongs no other function or business than the production of seed; since, then, this is brought about by the union of male and female, nature has mixed these and set them together in plants, so that the sexes are not divided in them. Plants, however, have been investigated elsewhere. But the function of the animal is not only to [30] generate (which is common to all living things), but they all of them participate also in a kind of knowledge, some more and some less, and some very little indeed. For they have sense-perception, and this is a kind of knowledge. (If we consider the value of this we find that it is of great importance compared with the class of lifeless objects, but of little compared with the use of the intellect. For against the latter the [731<sup>b1</sup>] mere participation in touch and taste seems to be practically nothing, but beside plants and stones it seems most excellent; for it would seem a treasure to gain even this kind of knowledge rather than to lie in a state of death and non-existence.) Now it is by sense-perception that an animal differs from those organisms which have only life. But since, if it is a living animal, it must also live; therefore, when it is [5] necessary for it to accomplish the function of that which has life, it unites and copulates, becoming like a plant, as we said before.

Testaceous animals, being intermediate between animals and plants, perform the function of neither class as belonging to both. As plants they have no sexes, and [10] one does not generate in another; as animals they do not bear fruit from themselves like plants; but they are formed and generated from a liquid and earthy concretion. However, we must speak later of the generation of these animals.<sup>27</sup>

## BOOK II

1 · That the male and female are the principles of generation has been previously stated, as also what is their power and their essence. But why is it that [20] one thing becomes and is male, another female? It is the business of our discussion as it proceeds to try and point out that the sexes arise from necessity and the first efficient cause, from what sort of material they are formed. That they exist because it is better and on account of the final cause, takes us back to a principle still further remote.

Now some existing things are eternal and divine whilst others admit of both [25] existence and non-existence. But that which is noble and divine is always, in virtue of its own nature, the cause of the better in such things as admit of being better or worse, and what is not eternal does admit of existence and non-existence, and can partake in the better and the worse. And soul is better than body, and the living, having soul, is thereby better than the lifeless which has none, and being is better [30] than not being, living than not living. These, then, are the reasons of the generation of animals. For since it is impossible that such a class of things as animals should be of an eternal nature, therefore that which comes into being is eternal in the only way possible. Now it is impossible for it to be eternal as an individual—for the substance of the things that are is in the particular; and if it were such it would be eternal—but it is possible for it as a species. This is why there is always a class of [732<sup>a</sup>1] men and animals and plants. But since the male and female are the first principles of these, they will exist in those things that possess them for the sake of generation. Again, as the first efficient or moving cause, to which belong the definition and the form, is better and more divine in its nature than the material on which it works, it is [5] better that the superior principle should be separated from the inferior. Therefore, wherever it is possible and so far as it is possible, the male is separated from the female. For the first principle of the movement, whereby that which comes into being is male, is better and more divine, and the female is the matter. The male, [10] however, comes together and mingles with the female for the work of generation, because this is common to both.

A thing lives, then, in virtue of participating in the male and female principles; that is why even plants have some kind of life; but the class of

animals exists in virtue of sense-perception. The sexes are divided in nearly all of these that can move [15] about, for the reasons already stated, and some of them, as said before, emit semen in copulation, others not. The reason for this is that the higher animals are more independent in their nature, so that they have greater size, and this cannot exist without vital heat; for the greater body requires more force to move it, and heat is a [20] motive force. Therefore, taking a general view, we may say that sanguinea are of greater size than bloodless animals, and those which move about than those which remain fixed. And these are just the animals which emit semen on account of their heat and size.

[25] So much for the cause of the existence of the two sexes. Some animals bring to perfection and produce into the world a creature like themselves, as all those which bring their young into the world alive; others produce something undeveloped which has not yet acquired its own form; in this latter division the sanguinea lay eggs, the bloodless animals give birth to a grub. The difference between egg and grub is this: [30] an egg is that from a part of which the young comes into being, the rest being nutriment for it; but the whole of a grub is developed into the whole of the young animal. Of the vivipara, which bring into the world an animal like themselves, some are internally viviparous (as men, horses, cattle, and of marine animals dolphins and the other cetacea); others first lay eggs within themselves, and only after this are externally viviparous (as the selachia). Among the ovipara some produce the [732<sup>b</sup>1] egg in a perfect condition (as birds and all oviparous quadrupeds and footless animals, e.g. lizards and tortoises and most snakes; for the eggs of all these do not increase when once laid). The eggs of others are imperfect; such are those of fishes, [5] crustaceans, and cephalopods, for their eggs increase after being produced.

All the vivipara and ovipara are sanguineous, and the sanguinea are either viviparous or oviparous, except those which are altogether infertile. Among bloodless animals the insects produce a grub, both those that are generated by [10] copulation and those that copulate themselves though not so generated. For there are some insects of this sort, which though they come into being by spontaneous generation are yet male and female; from their union something is produced, only it is imperfect; the reason of this has been previously stated.

These classes admit of much cross-division. Not all bipeds are viviparous (for [15] birds are oviparous), nor are they all oviparous (for man is viviparous), nor are all quadrupeds oviparous (for horses, cattle, and countless others are viviparous), nor are they all viviparous (for

lizards, crocodiles, and many others lay eggs). Nor does the presence or absence of feet make the difference between them, for not only are [20] some footless animals viviparous, as vipers and the Selachia, while others are oviparous, as the other fishes and serpents, but also among those which have feet many are oviparous and many viviparous, as the quadrupeds above mentioned. And some which are bipeds, as man, and some which have no feet, as the whale and [25] dolphin, are internally viviparous. By this character then it is not possible to divide them, nor is any of the locomotive organs the cause of this difference, but it is those animals which are more perfect in their nature and participate in a purer element which are viviparous, for nothing is internally viviparous unless it receives and [30] breathes out air. But the more perfect are those which are hotter in their nature and have more moisture and are not earthy in their composition. And the measure of natural heat is the lung when it has blood in it, for generally those animals which have a lung are hotter than those which have not, and in the former class again those whose lung is not spongy nor solid nor containing only a little blood, but soft and full of blood. And as the animal is perfect but the egg and the grub are imperfect, so the [733\*1] perfect is naturally produced from the perfect. If animals are hotter as shown by their possessing a lung but drier in their nature, or are colder but have more moisture, then they either lay a perfect egg or are viviparous after laying an egg [5] within themselves. For birds and scaly reptiles because of their heat produce a perfect egg, but because of their dryness it is only an egg; the Selachia have less heat than these but more moisture, so that they are intermediate, for they are both oviparous and viviparous within themselves, the former because they are cold, the [10] latter because of their moisture; for moisture is vivifying, whereas dryness is furthest removed from what has life. Since they have neither feathers nor scales such as either reptiles or other fishes have, all which are signs rather of a dry and earthy nature, the egg they produce is soft; for the earthy matter does not come to [15] the surface in their eggs any more than in themselves. This is why they lay eggs in themselves, for if the egg were laid externally it would be destroyed, having no protection.

Animals that are cold and rather dry than moist also lay eggs, but the egg is imperfect; at the same time, because they are of an earthy nature and the egg they produce is imperfect, therefore it has a hard integument that it may be preserved by [20] the protection of the shell-like covering. Hence fishes, because they are scaly, and crustacea, because they are of an earthy nature, lay eggs with a hard integument.



The cephalopods, having themselves bodies of a sticky nature, preserve in the same way the imperfect eggs they lay, for they deposit a quantity of sticky material about the embryo.

[25] All insects produce a grub. Now all the insects are bloodless, which is why all creatures that produce a grub from themselves are so. But we cannot say simply that all bloodless animals produce a grub; for there is an overlap between the insects that produce a grub and those animals that lay their egg imperfect, as the scaly fishes, the crustacea, and the cephalopoda. For the eggs of these latter resemble a [30] grub, in that they increase after oviposition, and the grub of insects again as it develops resembles an egg; how so we shall explain later.

We must observe how rightly nature orders generation in regular gradation. [733<sup>b</sup>1] The more perfect and hotter animals produce their young perfect in respect of quality (in respect of quantity this is so with no animal, for the young always increase in size after birth), and these generate living animals within themselves from the first. The second class do not generate perfect animals within themselves [5] from the first (for they are only viviparous after first laying eggs), but still they are externally viviparous. The third class do not produce a perfect animal, but an egg, and this egg is perfect. Those whose nature is still colder than these produce an egg, but an imperfect one, which is perfected outside the body, as the class of scaly [10] fishes, the crustacea, and the cephalopods. The fifth and coldest class does not even lay an egg from itself; but so far as the young ever attain to this condition at all, it is outside the body of the parent, as has been said already. For insects produce a grub first; the grub after developing becomes egg-like (for the so-called chrysalis is [15] equivalent to an egg); then from this it is that a perfect animal comes into being, reaching the end of its development in the third change.

Some animals then, as said before, do not come into being from semen, but all the sanguinea do so which are generated by copulation, the male emitting semen [20] into the female; when this has entered into her the young are formed and assume their peculiar character, some within the animals themselves when they are viviparous, others in eggs.<sup>1</sup>

There is a considerable difficulty in understanding how the plant is formed out [25] of the seed or any animal out of the semen. Everything that comes into being or is made must be made out of something, be made by the agency of something, and must become something. Now that out of which it is made is the material; this some animals have in its first form within themselves, taking it from the female parent, as all those

which are not born alive but produced as a grub or an egg; others receive it [30] from the mother for a long time by sucking, as the young of all those which are not only externally but also internally viviparous. Such, then, is the material out of which things come into being, but we now are inquiring not out of what the parts of an animal are made, but by what agency. Either it is something external which makes them, or else something existing in the seminal fluid and the semen; and this must either be soul or a part of soul, or something containing soul. [734<sup>a</sup>1]

Now it would appear irrational to suppose that any of either the internal organs or the other parts is made by something external, since one thing cannot set up a motion in another without touching it, nor can a thing be affected in any way by anything that does not set up a motion in it. Something then of the sort we require exists in the embryo itself, being either a part of it or separate from it. To [5] suppose that it should be something else separate from it is irrational. For after the animal has been produced does this something perish or does it remain in it? But nothing of the kind appears to be in it, nothing which is not a part of the whole plant or animal. Yet, on the other hand, it is absurd to say that it perishes after making either all the parts or only some of them. If it makes some of the parts and then perishes, what is to make the rest of them? Suppose this something makes the heart [10] and then perishes, and the heart makes another organ, by the same argument either all the parts must perish or all must remain. Therefore it is preserved. Therefore it is a part of the embryo itself which exists in the semen from the beginning; and if indeed there is no part of the soul which does not exist in some part of the body, it [15] would also be a part containing soul in it from the beginning.

How, then, does it make the other parts? Either all the parts, as heart, lung, liver, eye, and all the rest, come into being together or in succession, as is said in the verse ascribed to Orpheus, for there he says that an animal comes into being in the same way as the knitting of a net. That the former is not the fact is plain even to the [20] senses, for some of the parts are clearly visible as already existing in the embryo while others are not; that it is not because of their being too small that they are not visible is clear, for the lung is of greater size than the heart, and yet appears later than the heart in the original development. Since, then, one is earlier and another [25] later, does the one make the other, and does the later part exist on account of the part which is next to it, or rather does the one come into being only *after* the other? I mean, for instance, that it is not the fact that the heart, having come into being first, then

makes the liver, and the liver again another organ, but that the liver only comes into being *after* the heart, and not by the agency of the heart, as a man becomes a man *after* being a boy, not by his agency. An explanation of this is that, in all the [30] productions of nature or of art, what already exists potentially is brought into being only by what exists actually; therefore if one organ formed another the form and the character of the later organ would have to exist in the earlier, e.g. the form of the liver in the heart. And otherwise also the theory is strange and fictitious.

Yet again, if the whole animal or plant is formed from semen or seed, it is impossible that any part of it should exist ready made in the semen or seed, whether that part be able to make the other parts or no. For it is plain that, if it exists in it from the first, it was made by that which made the semen. But semen must be made [734<sup>b</sup>1] first, and that is the function of the generating parent. So, then, it is not possible that any part should exist in it, and therefore it has not within itself that which makes the parts.

But neither can this agent be external, and yet it must needs be one or other of the two. We must try, then, to solve this difficulty, for perhaps some one of the [5] statements made cannot be made without qualification, e.g. the statement that the parts cannot be made by what is external to the semen. For if in a certain sense they cannot, yet in another sense they can. (Now it makes no difference whether we say 'the semen' or 'that from which the semen comes', in so far as the semen has in itself the movement initiated by the other.) It is possible, then, that A should move B, and [10] B move C; that, in fact, the case should be the same as with the automatic puppets. For the parts of such puppets while at rest have a sort of potentiality of motion in them, and when any external force puts the first of them in motion, immediately the next is moved in actuality. As, then, in these automatic puppets the external force moves the parts in a certain sense (not by touching any part at the moment, but by having touched one previously), in like manner also that from which the semen [15] comes, or in other words that which made the semen, sets up the movement in the embryo and makes the parts of it by having first touched something though not continuing to touch it. In a way it is the innate motion that does this, as the act of building builds the house. Plainly, then, while there is something which makes the parts, this does not exist as a definite object, nor does it exist in the semen at the first as a complete part.

But how is each part formed? We must answer this by starting in the first [20] instance from the principle that, in all products of nature or art,

a thing is made by something actually existing out of that which is potentially such as the finished product. Now the semen is of such a nature, and has in it such a principle of motion, that when the motion is ceasing each of the parts comes into being, and that as a part having life or soul. For there is no such thing as face or flesh without soul in it; [25] it is only homonymously that they will be called face or flesh if the life has gone out of them, just as if they had been made of stone or wood. And the homogeneous parts and the organic come into being together. And just as we should not say that an axe or other instrument or organ was made by the fire alone, so neither shall we say that [30] foot or hand were made by heat alone. The same applies also to flesh, for this too has a function. While, then, we may allow that hardness and softness, stickiness and brittleness, and whatever other qualities are found in the parts that have life and soul, may be caused by mere heat and cold, yet, when we come to the principle in virtue of which flesh is flesh and bone is bone, that is no longer so; what makes them [35] is the movement set up by the male parent, who is in actuality what that out of which the offspring is made is in potentiality. This is what we find in the products of [735<sup>a</sup>1] art; heat and cold may make the iron soft and hard, but what makes a sword is the movement of the tools employed, this movement containing the principle of the art. For the art is the starting-point and form of the product; only it exists in something else, whereas the movement of nature exists in the product itself, issuing from another nature which has the form in actuality.

[5] Has the semen soul, or not? The same argument applies here as in the question concerning the parts. As no part, if it participate not in soul, will be a part except homonymously (as the eye of a dead man is still called an eye), so no soul will exist in anything except that of which it is soul; it is plain therefore that semen both has soul, and is soul, potentially.

But a thing existing potentially may be nearer or further from its realization in [10] actuality, just as a sleeping geometer is further away than one awake and the latter than one actually studying. Accordingly it is not any part that is the cause of the soul's coming into being, but it is the first moving cause from outside. (For nothing generates itself, though when it has come into being it thenceforward increases itself.) Hence it is that only one part comes into being first and not all of them together. But that must first come into being which has a principle of increase (for [15] this nutritive power exists in all alike, whether animals or plants, and this is the same as the power that enables an animal or plant to generate

another like itself, that being the function of them all if naturally perfect). And this is necessary for the reason that whenever a living thing is produced it must grow. It is produced, then, by something else of the same name, as e.g. man is produced by man, but it is [20] increased by means of itself. There is, then, something which increases it. If this is a single part, this must come into being first. Therefore if the heart is first made in some animals, and what is analogous to the heart in the others which have no heart, it is from this or its analogue that the first principle of movement would arise. [25]

We have thus discussed the difficulties previously raised on the question what is the efficient cause of generation in each case, as the first moving and formative power.

2 · The next question to be mooted concerns the nature of semen. For whereas when it issues from the animal it is thick and white, yet on cooling it [30] becomes liquid as water, and its colour is that of water. This would appear strange, for water is not thickened by heat; yet semen is thick when it issues from within the animal's body which is hot, and becomes liquid on cooling. Again, watery fluids freeze, but semen, if exposed in frosts to the open air, does not freeze but liquefies, [35] as if it was thickened by the opposite of cold. Yet it is unreasonable, again, to suppose that it is thickened by heat. For it is only substances having a predominance of earth in their composition that coagulate and thicken on boiling, e.g. milk. It [735<sup>b</sup>1] ought then to solidify on cooling, but as a matter of fact it does not become solid in any part but the whole of it goes like water.

This then is the difficulty. If it is water, water evidently does not thicken through heat, whereas the semen is thick and both it and the body whence it issues [5] are hot. If it is made of earth or a mixture of earth and water, it ought not to liquefy entirely.

Perhaps, however, we have not discriminated all the possibilities. It is not only the liquids composed of water and earthy matter that thicken, but also those composed of water and air; foam, for instance, becomes thicker and white, and the [10] smaller and less visible the bubbles in it, the whiter and firmer does the mass appear. The same thing happens also with oil; on mixing with air it thickens, wherefore that which is whitening becomes thicker, the watery part in it being [15] separated off by the heat and turning to air. And if oxide of lead is mixed with water or even with oil and stirred, the mass increases greatly and changes from

liquid and dark to firm and white, the reason being that air is mixed in with it which increases [20] the mass and makes the white shine through, as in foam and snow (for snow is foam). And water itself on mingling with oil becomes thick and white, because air is entangled in it by the act of pounding them together, and oil itself has much air in it [25] (for shininess is a property of air, not of earth or water). This too is why it floats on the surface of the water, for the air contained in it as in a vessel bears it up and makes it float, being the cause of its lightness. So too oil is thickened without freezing in cold weather and frosts; it does not freeze because of its heat (for the air [30] is hot and will not freeze), but because the air is forced together and compressed the oil becomes thicker by the cold. These are the reasons why semen is firm and white when it issues from within the animal; it has a quantity of hot air in it because of the [35] internal heat; afterwards, when the heat has evaporated and the air has cooled, it turns liquid and dark; for the water, and any small quantity of earthy matter there may be, remain in semen as it dries, as they do in phlegm.

[736<sup>a</sup>1] Semen, then, is a compound of breath and water, and the former is hot air; hence semen is liquid in its nature because it is made of water. What Ctesias the Cnidian has asserted of the semen of elephants is manifestly untrue; he says that it [5] hardens so much in drying that it becomes like amber. But this does not happen, though it is true that one semen must be more earthy than another, and especially so with animals that have much earthy matter in them because of the bulk of their bodies. And it is thick and white because it is mixed with breath, for it is also an [10] invariable rule that it is white, and Herodotus does not report the truth when he says that the semen of the Ethiopians is black, as if everything must needs be black in those who have a black skin, and that too when he saw their teeth were white. The reason of the whiteness of semen is that it is a foam, and foam is white, especially [15] that which is composed of the smallest parts, small in the sense that each bubble is invisible, which is what happens when water and oil are mixed and stirred, as said before. (Even the ancients seem to have noticed that semen is of the nature of foam; [20] at least it was from this they named the goddess who presides over union.)<sup>2</sup>

This then is the explanation of the problem proposed, and it is plain too that this is why semen does not freeze; for air will not freeze.

3 · The next question to raise and to answer is this. If, in the case of

those [25] animals which emit semen into the female, that which enters makes no part of the resulting embryo, where is the material part of it diverted if (as we have seen) it acts by means of the power residing in it? It is not only necessary to decide whether what is forming in the female receives anything material, or not, from that which has entered her, but also concerning the soul in virtue of which an animal is so called [30] (and this is in virtue of the sensitive part of the soul)—does this exist originally in the semen and in the embryo or not, and if it does whence does it come? For nobody would put down the embryo as soulless or in every sense bereft of life (since both the semen and the embryo of an animal have every bit as much life as a plant), and it is productive up to a certain point. That then they possess the nutritive soul is plain [35] (and plain is it from the discussions elsewhere about soul why this soul must be acquired first). As they develop they also acquire the sensitive soul in virtue of [736<sup>b</sup>1] which an animal is an animal, . . .<sup>3</sup> For e.g. an animal does not become at the same time an animal and a man or a horse or any other particular animal. For the end is developed last, and the peculiar character of the species is the end of the generation in each individual. Hence arises a question of the greatest difficulty, which we must strive to solve to the best of our ability and as far as possible. When and how and [5] whence is a share in reason acquired by those animals that participate in this principle? It is plain that the semen and the embryo, while not yet separate, must be assumed to have the nutritive soul potentially, but not actually, until (like those [10] embryos that are separated from the mother) it absorbs nourishment and performs the function of the nutritive soul. For at first all such embryos seem to live the life of a plant. And it is clear that we must be guided by this in speaking of the sensitive and the rational soul. For all three kinds of soul, not only the nutritive, must be possessed potentially before they are possessed in actuality. And it is necessary [15] either that they should all come into being in the embryo without existing previously outside it, or that they should all exist previously, or that some should so exist and others not. Again, it is necessary that they should either come into being in the material supplied by the female without entering with the semen of the male, or come from the male and be imparted to the material in the female. If the latter, then either all of them, or none, or some must come into being in the male from [20] outside.

Now that it is impossible for them all to pre-exist is clear from this consideration. Plainly those principles whose activity is bodily cannot exist without a body, e.g. walking cannot exist without feet. For the same

reason also they cannot enter from outside. For neither is it possible for them to enter by themselves, being [25] inseparable from a body, nor yet in a body, for the semen is only a residue of the nutriment in process of change. It remains, then, for the reason alone so to enter and alone to be divine, for no bodily activity has any connexion with the activity of reason.

Now it is true that the faculty of all kinds of soul seems to have a connexion with a matter different from and more divine than the so-called elements; but as one [30] soul differs from another in honour and dishonour, so differs also the nature of the corresponding matter. All have in their semen that which causes it to be productive; I mean what is called vital heat. This is not fire nor any such force, but it is the [35] breath included in the semen and the foam-like, and the natural principle in the breath, being analogous to the element of the stars. Hence, whereas fire generates [737<sup>a</sup>1] no animal and we do not find any living thing forming in either solids or liquids under the influence of fire, the heat of the sun and that of animals does generate them. Not only is this true of the heat that works through the semen, but whatever other residue of the animal nature there may be, this also has still a vital principle in [5] it. From such considerations it is clear that the heat in animals neither is fire nor derives its origin from fire.

Let us return to the material of the semen, in and with which is emitted<sup>4</sup> the principle of soul. Of this principle there are two kinds; the one is not connected with matter, and belongs to those animals in which is included something divine (to wit, [10] what is called the reason), while the other is inseparable from matter. This material of the semen dissolves and evaporates because it has a liquid and watery nature. Therefore we ought not to expect it always to come out again from the female or to form any part of the embryo that has taken shape from it; the case resembles that of [15] the fig-juice which curdles milk, for this too changes without becoming any part of the curdling masses.

It has been settled, then, in what sense the embryo and the semen have soul, and in what sense they have not; they have it potentially but not actually.

Now semen is a residue and is moved with the same movement as that in virtue [20] of which the body increases (this increase being due to subdivision of the nutriment in its last stage). When it has entered the uterus it puts into form the corresponding residue of the female and moves it with the same movement wherewith it is moved itself. For the female's contribution also is a residue, and has all the parts in it



potentially though none of them actually; it has in it potentially even those parts [25] which differentiate the female from the male, for just as the young of mutilated parents are sometimes born mutilated and sometimes not, so also the young born of a female are sometimes female and sometimes male instead. For the female is, as it were, a mutilated male, and the menstrual fluids are semen, only not pure; for there is only one thing they have not in them, the principle of soul. For this reason, [30] whenever a wind-egg is produced by any animal, the egg so forming has in it the parts of both sexes potentially, but has not the principle in question, so that it does not develop into a living creature, for this is introduced by the semen of the male. When such a principle has been imparted to the residue of the female it becomes an embryo.

[35] Liquid by corporeal substances become surrounded by a solid layer like that which forms on boiled foods when cooling. All bodies are held together by the [737<sup>b</sup>1] glutinous; this quality, as the embryo develops and increases in size, is acquired by the sinewy substance, which holds together the parts of animals, being actual sinew in some and its analogue in others. To the same class belong also skin, blood-vessels, [5] membranes and the like, for these differ in being more or less glutinous and generally in excess and deficiency.<sup>5</sup>

4 · In those animals whose nature is comparatively imperfect, when a perfect embryo (which, however, is not yet a perfect animal) has been formed, it is cast out [10] from the mother, for reasons previously stated. An embryo is then complete when it is either male or female, in the case of those animals who possess this distinction; for some (i.e. all those which are not themselves produced from a male or female parent nor from a union of the two) produce an offspring which is neither male nor female. Of the generation of these we shall speak later. [15]

The perfect animals, those internally viviparous, keep the developing embryo within themselves and in close connexion until they give birth to a complete animal and bring it to light.

A third class is externally viviparous but first internally oviparous; they develop the egg into a perfect condition, and then in some cases the egg is set free as with creatures externally oviparous, and the animal is produced from the egg within [20] the mother's body; in other cases, when the nutriment from the egg is consumed, development is completed by connexion with the uterus, and therefore the egg is not set free from the uterus. This character marks the Selachian fish, of which we must

6  
speak later by themselves.

Here we must make our first start from the first class; these are the perfect or [25] viviparous animals, and of these the first is man. Now the secretion of the semen takes place in all of them just as does that of any other residual matter. For each is conveyed to its proper place without any force from the breath or compulsion of any [30] other cause, as some assert, saying that the generative parts attract the semen like cupping-glasses, aided by the force of the breath, as if it were possible for either this residue or that of the solid and liquid nutriment to go anywhere else than they do without the exertion of such a force. Their reason is that the discharge of both is attended by holding the breath, but this is a common feature of all cases when it is necessary to move anything, because strength arises through holding the breath. [738<sup>a</sup>1] For even without this force the residues are discharged in sleep if the parts concerned are full of them and are relaxed. One might as well say that it is by the breath that the seeds of plants are always segregated to the places where they are [5] wont to bear fruit. No, the real cause, as has been stated already, is that there are special parts for receiving all the residues, alike the useless (as the residues of the liquid and solid<sup>7</sup> nutriment), and the blood, which has the so-called bloodvessels.

To consider now the region of the uterus in the female—the two blood-vessels, the great vessel and the aorta, divide higher up, and many fine vessels from them [10] terminate in the uterus. These become over-filled from the nourishment they convey, nor is the female nature able to concoct it, because it is colder than man's; so the blood is excreted through very fine vessels into the uterus, these being unable on account of their narrowness to receive the excessive quantity, and the result is a sort [15] of haemorrhage. The period is not accurately defined in women, but tends to return during the waning of the moon. This we should expect, for the bodies of animals are colder when the environment happens to become so, and the time of change from one month to another is cold because of the absence of the moon, whence also it [20] results that this time is stormier than the middle of the month. When then the residue of the nourishment has changed into blood, the menstrual discharges tend to occur at the above-mentioned period, but when it is not concocted a little matter at a [25] time is always coming away, and this is why 'whites' appear in females while still small, in fact mere children. If both these discharges of the residues are moderate, the body remains in good health, for they act as a purification of the residues which are the causes of a morbid state of body; if they do not occur at all

or if they are [30] excessive, they are injurious, either causing illness or pulling down the patient; hence whites, if continuous and excessive, prevent girls from growing. This residue then is necessarily discharged by females for the reasons given; for, the female nature being unable to concoct the nourishment thoroughly, there must not only be [35] left a residue of the useless nutriment, but also there must be a residue of the blood in the blood-vessels, and this filling the channels of the finest vessels must overflow. [738<sup>b</sup>1] Then nature, aiming at the best and the end, uses it up in this place for the sake of generation, that another creature may come into being of the same kind as the former was going to be, for the menstrual blood is already potentially such as the body from which it is discharged.

In all females, then, there must necessarily be such a residue, more indeed in [5] those that have blood and of these most of all in man, but in the others also some matter must be collected in the uterine region. The reason why there is more in those that have blood and most in man has been already given; but why, if all [10] females have such a residue, have not all males one to correspond? For some of them do not emit semen but, just as those which do emit it fashion by the movement in the semen the mass forming from the material supplied by the female, so do the animals in question bring the same to pass and exert the same formative power by [15] the movement within themselves in that part from which the semen is secreted. This is the region about the diaphragm in all those animals which have one, for the heart or its analogue is the first principle of a natural body, while the lower part is a mere addition for the sake of it. Now the reason why it is not all males that have a generative residue, while all females do, is that the animal is a body with soul; the [20] female always provides the material, the male that which fashions it, for this is the power that we say they each possess, and this is what it is for them to be male and female. Thus while it is necessary for the female to provide a body and a material mass, it is not necessary for the male, because it is not within what is produced that [25] the tools or the maker must exist. While the body is from the female, it is the soul that is from the male, for the soul is the substance of a particular body. For this reason if animals of a different kind are crossed (and this is possible when the periods of gestation are equal and conception takes place nearly at the same season and there is no great difference in the size of the animals), the first cross has a [30] common resemblance to both parents, as the hybrid between fox and dog, partridge and domestic fowl, but as time goes on and one generation springs from another, the final

result resembles the female in form, just as foreign seeds produce plants varying in accordance with the country in which they are sown. For it is the soil that [35] gives to the seeds the material and the body of the plant. And hence the part of the female which receives the semen is not a mere passage, but the uterus has a [739<sup>a</sup>1] considerable width, whereas the males that emit semen have only passages for this purpose, and these are bloodless.

Each of the residues becomes such at the moment when it is in its proper place; before that there is nothing of the sort unless with much violence and contrary to nature.

We have thus stated the reason for which the generative residues are formed in [5] animals. But when the semen from the male (in those animals which emit semen) has entered, it puts into form the purest part of the female residue (for the greater part of the menstrual flow is useless, being fluid, as is the most fluid part of the male secretion, i.e. in a single emission, the earlier discharge being in most cases apt to be [10] infertile rather than the later, having less vital heat through want of concoction, whereas that which is concocted is thick and of a more material nature).

If there is no external discharge, either in women or other animals, on account of there not being much useless residue in the secretion, then the quantity forming [15] within the female altogether is as much as what is retained within those animals which have an external discharge; this is put into form by the power of the male residing in the semen secreted by him, or, as is clearly seen to happen in some insects, by the part in the female analogous to the uterus being inserted into the male.

It has been previously stated that the discharge accompanying sexual pleasure [20] in the female contributes nothing to the embryo. The chief argument for the opposite view is that what are called wet dreams occur by night with women as with men; but this is no proof, for the same thing happens to young men also who do not [25] yet emit semen, and to those who do emit semen but whose semen is infertile.

It is impossible to conceive without the emission of the male in union and without the residue of the female, whether it be discharged externally or whether there is only enough within the body. Women conceive, however, without experiencing the pleasure usual in such intercourse, if the part chance to be in heat [30] and the uterus to have descended. But generally speaking the opposite is the case, because the mouth of the uterus is not closed when the discharge takes place which is usually accompanied by pleasure in women as well as men, and when this is so there is a readier way from the semen of the male to be drawn into

the uterus. [35]

The actual discharge does not take place within the uterus as some think, the mouth being too narrow, but it is in the region in front of this, where the female discharges the moisture found in some cases, that the male emits the semen. [739<sup>b</sup>1] Sometimes it remains in this place; at other times, if the uterus chance to be conveniently placed and hot on account of the purgation, it draws it within itself. A proof of this is that pessaries, though wet when applied, are removed dry. Moreover, [5] in all those animals which have the uterus near the hypozoma, as birds and viviparous fishes, it is impossible that the semen should be so discharged as to enter it; it must be drawn into it. This region, on account of the heat which is in it, attracts the semen. The discharge and collection of the menstrual blood also excite heat in [10] this part. Hence it acts like cone-shaped vessels which, when they have been washed out with hot water, their mouth being turned downwards, draw water into themselves. And this is the way things are drawn up, but some say that nothing of the kind happens with the organic parts concerned in copulation. Precisely the [15] opposite is the case of those who say the woman emits semen as well as the man, for if she emits it outside the uterus this must then draw it back again into itself if it is to be mixed with the semen of the male. But this is a superfluous proceeding, and nature does nothing superfluous.

[20] When the material secreted by the female in the uterus has been fixed by the semen of the male (this acts in the same way as rennet acts upon milk, for rennet is a kind of milk containing vital heat, which brings into one mass and fixes the similar material, and the relation of the semen to the menstrual blood in the same, milk and [25] the menstrual blood being of the same nature)—when, I say, the more solid part comes together, the liquid is separated off from it, and as the earthy parts solidify membranes form all round it; this is both a necessary result and for the sake of something, the former because the surface of a mass must solidify on heating as well as on cooling, the latter because the foetus must not be in a liquid but be separated [30] from it. Some of these are called membranes and others choria, the difference being one of more or less, and they exist in ovipara and vivipara alike.

When the embryo is once formed, it acts like the seeds of plants. For seeds also [35] contain the first principle of growth in themselves, and when this (which previously exists in them only potentially) has been differentiated, the shoot and the root are [740<sup>a</sup>1] sent off from it, and it is by the root the plant gets nourishment; for it needs growth. So also in the embryo all the parts exist potentially in a way, but the first principle is

furthest on the road to realization. Therefore the heart is first differentiated in [5] actuality. This is clear not only to the senses (for it is so) but also on theoretical grounds. For whenever the young animal has been separated from both parents it must be able to manage itself, like a son who has set up house away from his father. Hence it must have a first principle from which comes the ordering of the body at a later stage also, for if it is to come in from outside at a later period to dwell in it, not [10] only may the question be asked at what time it is to do so, but also we may object that, when each of the parts is separating from the rest, it is necessary that this principle should exist first from which comes growth and movement to the other parts. (That is why all who say, as did Democritus, that the external parts of animals are first differentiated and the internal later, are much mistaken; it is as if [15] they were talking of animals of stone or wood. For such as these have no principle of growth at all, but all animals have, and have it within themselves.) Therefore it is that the heart appears first distinctly marked off in all the sanguinea, for this is the first principle of both homogeneous and heterogeneous parts, since from the [20] moment that the animal or organism needs nourishment, from that moment does this deserve to be called its principle. For that which exists grows, and the nutriment, in its final stage, of an animal is the blood or its analogue, and of this the blood-vessels are the receptacle, and that is why the heart is the principle of these also. (This is clear from the *Histories*<sup>8</sup> and the *Anatomies*.)

Since the embryo is already potentially an animal but an imperfect one, it must [25] obtain its nourishment from elsewhere; accordingly it makes use of the uterus and the mother, as a plant does of the earth, to get nourishment, until it is perfected to the point of being now an animal potentially locomotive. So nature has first designed the two blood-vessels from the heart, and from these smaller vessels branch off to the uterus, forming what is called the umbilicus. For the umbilicus is a [30] blood-vessel, consisting of one or more vessels in different animals. Round these is a skin-like integument, because the weakness of the vessels needs protection and shelter. The vessels join on to the uterus like the roots of plants, and through them the embryo receives its nourishment. This is why the animal remains in the uterus, [35] not, as Democritus says, that the parts of the embryo may be moulded in conformity with those of the mother. This is plain in the ovipara, for they have their parts [740<sup>b</sup>1] differentiated in the egg after separation from the matrix.

Here a difficulty may be raised. If the blood is the nourishment, and if the heart, which first comes into being, already contains blood, and the

nourishment comes from outside, whence did the first nourishment enter? Perhaps it is not true that *all* of it comes from outside. Just as in the seeds of plants there is something of [5] this nature, the substance which at first appears milky, so also in the material of the animal embryo the superfluous matter of which it is formed is its nourishment from the first.

The embryo, then, grows by means of the umbilicus in the same way as a plant by its root, or as animals themselves, when separated, from the nutriment within [10] themselves—of this we must speak later at the time appropriate for discussing them. But the parts are not differentiated, as some suppose, because like is naturally carried to like. Besides many other difficulties involved in this theory, it results from [15] it that the homogeneous parts ought to come into being each one separate from the rest, as bones and sinews by themselves, and flesh by itself, if one should accept this cause. The real cause why each of them comes into being is that the residue of the female is potentially such as the animal is naturally, and all the parts are potentially [20] present in it, but none actually. It is also because when the active and the passive come in contact with each other in that way in which the one is active and the other passive (I mean in the right manner, in the right place, and at the right time), straight-way the one acts and the other is acted upon. The female, then, provides matter, the male the principle of motion. And as the products of art are made by [25] means of the tools of the artist, or to put it more truly by means of their movement, and this is the activity of the art, and the art is the form of what is made in something else, so is it with the power of the nutritive soul. As later on in the case of mature animals and plants this soul causes growth from the nutriment, using heat [30] and cold as its tools (for in these is the movement of the soul and each comes into being in accordance with a certain formula), so also from the beginning does it form the product of nature. For the material by which this latter grows is the same as that from which it is constituted at first; consequently also the power which acts upon it [35] is identical with that at the beginning (but greater than it); thus if it is the nutritive soul, it is also the generative soul, and this is the nature of every organism, existing [741<sup>a</sup>1] in all animals and plants. But the other parts of the soul exist in some living things and not in others. In plants, then, the female is not separated from the male, but in those animals in which it is separated the female needs the male besides. [5]

female possesses the same soul and if it is the residue of the female which is the material of the embryo, she needs the male besides instead of generating entirely from herself. The reason is that the animal differs from the plant by having sense-perception; if the sensitive soul is not present, either actually or potentially, and either with or [10] without qualification, it is impossible for face, hand, flesh, or any other part to exist; it will be no better than a corpse or part of a corpse. Thus if it is the male that has the power of making the sensitive soul, then where the sexes are separated it is [15] impossible for the female to generate an animal from itself alone, for the process in question was what being male is. Certainly that there is a good deal in the difficulty stated is plain in the case of the birds that lay wind-eggs, showing that the female can generate up to a certain point unaided. But this still involves a difficulty; in what way are we to say that their eggs live? It is neither possible that they should [20] live in the same way as fertile eggs (for then they would produce a chick actually alive), nor yet can they be called eggs only in the sense in which an egg of wood or stone is so called, for the fact that these eggs go bad shows that they previously participate in some way in life. It is plain, then, that they have some soul potentially. What sort of soul will this be? It must be the lowest surely, and this is the nutritive, [25] for this exists in all animals and plants alike. Why then does it not perfect the parts and the animal? Because they must have a sensitive soul, for the parts of animals are not like those of a plant. And so the female animal needs the help of the male, for in these animals we are speaking of the male is separate. This is exactly what we [30] find, for the wind-eggs become fertile if the male tread the female in a certain space of time. About the cause of these things, however, we shall enter into detail later.

If there is any kind of animal which is female and has no male separate from it, it is possible that this may generate a young one from itself. No instance of this worthy of credit has been observed up to the present at any rate, but one case in the [35] class of fishes makes us hesitate. No male of the so-called erythrinus has ever yet been seen, but females, and specimens full of roe, have been seen. Of this, however, we have as yet no proof worthy of credit. Again, some members of the class of fishes [741<sup>b1</sup>] are neither male nor female, as eels and a kind of mullet found in stagnant waters. But whenever the sexes are separate the female cannot generate perfectly by herself alone, for then the male would exist in vain, and nature makes nothing in vain. [5] Hence in such animals the male always perfects the work of generation, for he imparts the sensitive soul, either by means of the semen or by himself. Now the parts of the



embryo already exist potentially in the material, and so when once the principle of movement has been imparted to them they develop in a chain one after another, as in the case of the automatic puppets. When some of the natural [10] philosophers say that like is brought to like, this must be understood, not in the sense that the parts are moved as changing place, but that they stay where they are and the movement is a change of quality (such as softness, hardness, colour, and the other differences of the homogeneous parts); thus they become in actuality what [15] they previously were in potentiality. And what comes into being first is the first principle; this is the heart in the sanguinea and its analogue in the rest, as has been often said already. This is plain not only to the senses (that it is first to come into being), but also in view of its end; for life fails in the heart last of all, and it happens in all cases that what comes in to being last fails first, and the first last, nature [20] running a double course, so to say, and turning back to the point from whence she started. For the process of becoming is from the non-existent to the existent, and that of perishing is back again from the existent to the non-existent.

6 · After this, as said already, the internal parts come into being before the [25] external. The greater become visible before the less, even if some of them do not come into being before them. First the parts above the hypozoma are differentiated and are superior in size; the part below is both smaller and less differentiated. This happens in all animals in which exists the distinction of upper and lower, except in [30] the insects; the growth of those that produce a grub is towards the upper part, for this is smaller in the beginning. The cephalopoda are the only locomotive animals in which the distinction of upper and lower does not exist. What has been said applies to plants also, that the upper portion is earlier in development than the lower, for the [35] roots push out from the seed before the shoots.

The agency by which the parts of animals are differentiated is air, not however that of the mother nor yet of the embryo itself, as some of the physicists say. This is manifest in birds, fishes, and insects. For some of these are separated from the [742<sup>a</sup>1] mother and produced from an egg, within which the differentiation takes place; other animals do not breathe at all, but are produced as a grub or an egg; those which do breathe and whose parts are differentiated within the mother's uterus yet [5] do not breathe until the lung is perfected, and the lung and the preceding parts are differentiated before they breathe. Moreover, all polydactylous

quadrupeds, as dog, lion, wolf, fox, jackal, produce their young blind, and the eyelids do not separate till after birth. Manifestly the same holds also in all the other parts; as the qualitative, [10] so also the quantitative differentia comes into being, pre-existing potentially but being actualized later by the same causes by which the qualitative distinction is produced, and so the eyelids become two instead of one. Of course air must be present, because heat and moisture are present, the former acting and the latter [15] being acted upon.

Some of the ancient nature-philosophers made an attempt to state which part comes into being after which, but were not sufficiently acquainted with the facts. It is with the parts as with other things; one naturally exists prior to another. But the word 'prior' is used in more senses than one. For there is a difference between the end or final cause and that which exists for the sake of it; the latter is prior in order [20] of development, the former is prior in essence. Again, that which exists for the sake of the end admits of division into two classes, first the origin of the movement, and then that which is used by the end; I mean, for instance, that which can generate, and that which serves as an instrument to what is generated, for the one of these, that which makes, must exist first, as the teacher before the learner, and the other [25] later, as the pipes are later than he who learns to play upon them, for it is superfluous that men who do not know how to play should have pipes. Thus there are three things: first, the end, by which we mean that for the sake of which something else exists; secondly, the principle of movement and of generation, [30] existing for the sake of the end (for that which can make and generate, considered simply as such, exists only in relation to what is made and generated); thirdly, the useful, that is to say what the end uses. Accordingly, there must first exist some part in which is the principle of movement (I say a part because this is from the first one [35] part of the end and the most important part too); next after this the whole and the end; thirdly and lastly, the organic parts serving these for certain uses. Hence if there is anything of this sort which must exist in animals, containing the principle [742<sup>b</sup>1] and end of all their nature, this must be the first to come into being—first, that is, considered as the moving power, but simultaneous with the whole embryo if considered as a part of the end. Therefore all the organic parts whose nature is to bring others into being must always themselves exist before them, for they are for [5] the sake of something else, as the beginning for the sake of the end; all those parts which are for the sake of something else but are not of the nature of beginnings must come into being later. So it is not easy to

distinguish which of the parts are prior, those which are for the sake of another or that for the sake of which are the former. For the parts which cause the movement, being prior to the end in order of development, come in to cause confusion, and it is not easy to distinguish these as [10] compared with the organic parts. And yet it is in accordance with this method that we must inquire what comes into being after what; for the end is later than some parts and earlier than others. And for this reason that part which contains the first principle comes into being first, next to this the upper half of the body. This is why [15] the parts about the head, and particularly the eyes, appear largest in the embryo at an early stage, while the parts below the umbilicus, as the legs, are small; for the lower parts are for the sake of the upper, and are neither parts of the end nor able to form it.

But they do not say well nor do they assign a necessary cause who say simply that it always happens so, and imagine that this is a first principle in these cases. [20] Thus Democritus of Abdera says that there is no beginning of the infinite;<sup>9</sup> now the cause is a beginning, and the eternal is infinite; in consequence, to ask the cause of anything of this kind is to seek for a beginning of the infinite. Yet according to this argument, which forbids us to seek the cause, there will be no proof of any eternal [25] truth whatever; but we see that there is a proof of many such, whether by 'eternal' we mean what always happens or what exists eternally; it is an eternal truth that the angles of a triangle are always equal to two right angles, or that the diagonal of a square is incommensurable with the side, and nevertheless a cause and a proof can be given for these truths. While, then, it is well said that we must not take on us to [30] seek a beginning of all things, yet this is not well said of all things whatever that always are or always happen, but only of those which really are first principles of the eternal things; for it is by another method, not by proof, that we acquire knowledge of the first principle. Now in that which is immovable and unchanging the first principle is simply the essence of the thing, but when we come to those things which come into being the principles are more than one, varying in kind and not all of the same kind; one of this number is the principle of movement, and [35] therefore in all the sanguinea the heart is formed first, as was said at the beginning, and in the other animals that which is analogous to the heart.

From the heart the blood-vessels extend throughout the body as in the [743<sup>a</sup>1] anatomical diagrams which are represented on the walls, for the parts lie round these because they are formed out of them. The

homogeneous parts are formed by heat and cold, for some are put together and solidified by the one and some by the [5] other. The difference between these has already been discussed elsewhere, and it has been stated what kinds of things are soluble by liquid and fire, and what are not soluble by liquid and cannot be melted by fire. The nutriment then oozes through the blood-vessels and the passages in each of the parts, like water in unbaked pottery, and thus is formed the flesh or its analogues, being solidified by cold, which [10] is why it is also dissolved by fire. But all the particles given off which are too earthy, having but little moisture and heat, cool as the moisture evaporates along with the heat; so they become hard and earthy in character, as nails, horns, hoofs, and beaks, [15] and therefore they are softened by fire but none of them is melted by it, while some of them, as egg-shells, are soluble in liquids. The sinews and bones are formed by the internal heat as the moisture dries, and hence the bones are insoluble by fire like pottery, for like it they have been as it were baked in an oven by the heat in the [20] process of development. But it is not anything whatever that is made into flesh or bone by the heat, but only something naturally fitted for the purpose; nor is it made in any place or time whatever, but only in a place and time naturally so fitted. For neither will that which exists potentially be made except by that moving agent which possesses the actuality, nor will that which possesses the actuality make anything out of anything whatever; the carpenter would not make a box except out [25] of wood, nor will a box be made out of the wood without the carpenter. The heat exists in the seminal residue, and the movement and activity in it is sufficient in kind and in quantity to correspond to each of the parts. In so far as there is any deficiency or excess, the resulting product is in worse condition or physically defective, in like [30] manner as in the case of external substances which are thickened by boiling that they may be more palatable or for any other purpose. But in the latter case it is we who apply the heat in due measure for the motion required; in the former it is the nature of the male parent that gives it, or with animals spontaneously generated it is the movement and heat imparted by the right season of the year that is the [35] cause.

Cooling, again, is mere deprivation of heat. Nature makes use of both; they have of necessity the power of bringing about different results, but in the [743<sup>b1</sup>] development of the embryo we find that the one cools and the other heats for some definite purpose, and so each of the parts is formed; thus it is in one sense by necessity, in another for a final cause, that they make the flesh soft, the sinews solid and elastic, the bones solid

and brittle. The skin, again, is formed by the drying of [5] the flesh, like the scum upon boiled substances; it is so formed not only because it is on the outside, but also because what is glutinous, being unable to evaporate, remains on the surface. While in other animals the glutinous is dry, for which [10] reason the covering of the bloodless animals is testaceous or crustaceous, in the sanguinea it is rather of the nature of fat. In all of these which are not of too earthy a nature the fat is collected under the covering of the skin, a fact which points to the [15] skin being formed out of such a glutinous substance, for fat is somewhat glutinous. As we said, all these things must be understood to be formed in one sense of necessity, but in another sense not of necessity but for a final cause.

The upper half of the body, then, is first marked out in the order of development; as time goes on the lower also reaches its full size in the sanguinea. All [20] the parts are first marked out in their outlines and acquire later on their colour and softness or hardness, exactly as if nature were a painter producing a work of art, for painters, too, first sketch in the animal with lines and only after that put in the colours.

[25] Because the source of the sensations is in the heart, therefore this is the part first formed in the whole animal, and because of the heat of this organ the cold forms the brain, where the blood-vessels terminate above, corresponding to the heat [30] of the heart. Hence the parts about the head begin to form next in order after the heart, and surpass the other parts in size, for the brain is from the first large and fluid.

There is a difficulty about what happens with the eyes of animals. Though from the beginning they appear very large in all creatures, whether they walk or swim or fly, yet they are the last of the parts to be formed completely, for in the [35] intervening time they collapse. The reason is this. The sense-organ of the eyes is set upon certain passages, as are the other sense-organs. Whereas those of touch and [744<sup>a1</sup>] taste are simply the body itself or some part of the body of animals, those of smell and hearing are passages connecting with the external air and full themselves of innate breath; these passages end at the small blood-vessels about the brain which [5] run thither from the heart. But the eye is the only sense-organ that has a bodily constitution peculiar to itself. It is fluid and cold, and does not exist from the first in the place which it occupies later in the same way as the other parts do, for they exist potentially to begin with and actually come into being later, but the eye is the purest part of the liquidity about the brain drained off through the passages which are [10] visible running from them to the membrane round the brain. A proof of this is that, apart from the brain, there is no other part

in the head that is cold and fluid except the eye. Of necessity therefore this region is large at first but falls in later. For the [15] same thing happens with the brain: at first it is liquid and large, but in course of evaporation and concoction it becomes more solid and falls in—and so does the size of the eyes. The head is very large at first, on account of the brain, and the eyes [20] appear large because of the liquid in them. They are the last organs to reach completion because the brain is formed with difficulty; for it is at a late period that it gets rid of its coldness and fluidity; this applies to all animals possessing a brain, but especially to man. For this reason the anterior fontanelle is the last of the bones to be formed; even after birth this bone is still soft in children. The cause of this [25] being so with men more than with other animals is the fact that their brain is the most fluid and largest. This again is because the heat in man's heart is purest. His intellect shows how well he is tempered, for man is the wisest of animals. And babies [30] for a long time have no control over their heads on account of the heaviness of the brain; and the same applies to the parts which it is necessary to move, for it is late that the principle of motion gets control over the upper parts, and last of all over those whose motion is not connected directly with it, as that of the legs is not. Now [35] the eyelid is such a part. But since nature makes nothing superfluous nor in vain, it is clear also that she makes nothing too late or too soon, for if she did the result would be either in vain or superfluous. Hence it is necessary that the eyelids should [744b1] be separated at the same time as the heart is able to move them. So then the eyes of animals are perfected late because of the amount of concoction required by the brain, and last of all the parts because the motion must be very strong before it can affect parts so far from the first principle of motion and so cold. And it is plain that [5] such is the nature of the eyelids, for if the head is affected by the slightest heaviness through sleepiness or drunkenness or anything else of the kind, we cannot raise the eyelids though their own weight is so small. So much for the question how the eyes come into being, and why and for what cause they are the last to be fully [10] developed.

Each of the other parts is formed out of the nutriment, the noblest and those participating in the sovereign principle from the nutriment which is first and purest and fully concocted, those which are only necessary for the sake of the former parts from the inferior nutriment and the residues left over from the other. For nature, [15] like a good householder, is not in the habit of throwing away anything from which it is possible to make anything useful. Now in a household the best part of

the food that comes in is set apart for the free men, the inferior and the residue of the best for the slaves, and the worst is given to the animals that live with them. Just as the [20] intellect acts thus from outside with a view to the growth of the persons concerned, so in the case of the embryo itself does nature form from the purest material the flesh and the body of the other sense-organs, and from the residues thereof bones, sinews, hair, and also nails and hoofs and the like; hence these are last to assume [25] their form, for they have to wait till the time when nature has some residue to spare.

The bones, then, are made in the first conformation of the parts from the seminal residue. As the animal grows the bones also grow from the natural nourishment, being the same as that of the sovereign parts,<sup>4</sup> but of this they only [30] take up the superfluous residues. For everywhere the nutriment may be divided into two kinds, the first and the second; the former is nutritious, being that which brings into being both the whole and the parts; the latter is concerned with growth, being that which causes quantitative increase. But these must be distinguished more fully [35] later on. The sinews are formed in the same way as the bones and out of the same materials, the seminal and nutritious residue. Nails, hair, hoofs, horns, beaks, the [745<sup>a</sup>1] spurs of cocks, and any other similar parts, are on the contrary formed from the nutriment which is taken later and only concerned with growth, in other words that which is derived from the mother, or from the outer world after birth. For this [5] reason the bones on the one hand only grow up to a certain point (for there is a limit of size in all animals, and therefore also of the growth of the bones; if these had been always able to grow, all animals that have bone or its analogue would grow as long as they lived, for these set the limit of size to animals. What is the reason of their not [10] always increasing in size must be stated later). Hair, on the contrary, and growths akin to hair go on growing as long as they exist at all, and increase yet more in diseases and when the body is getting old and wasting, because more residual matter is left over, as owing to old age and disease less is expended on the important [15] parts, though when the residual matter also fails through age the hair fails with it. But the contrary is the case with the bones, for they waste away along with the body and the other parts. Hair actually goes on growing after death; it does not, however, begin growing then.

About the teeth a difficulty may be raised. They have actually the same nature [20] as the bones, and are formed out of the bones, but nails, hair, horns, and the like are formed out of the skin, and that is why they

change in colour along with it, for they become white, black, and all sorts of colours according to that of the skin. But the teeth do nothing of the sort, for they are made out of the bones in all animals that [25] have both bones and teeth. Of all the bones they alone go on growing through life, as is plain with the teeth which grow out of the straight line so as no longer to touch each other. The reason for their growth, as a final cause, is their function, for they [30] would soon be worn down if there were not some means of saving them; even as it is they are altogether worn down in old age in some animals which eat much and have not large teeth, for they are worn away faster than they grow. And so nature has contrived well to meet the case in this also, for she causes the failure of the teeth to synchronize with old age and death. If life lasted for a thousand or ten thousand years the original teeth would have had to be very large indeed, and many sets of them would have had to have been produced, for even if they had grown [745<sup>b</sup>1] continuously they would still have been worn smooth and become useless for their work. The final cause of their growth has been now stated, but besides this as a matter of fact the nature of the teeth is not the same as that of the other bones. The latter all come into being in the first formation of the embryo and none of them [5] later, but the teeth do so later. Therefore it is possible for them to grow again after the first set falls out, for though they touch the bones they are not naturally connected to them. They are formed, however, out of the nutriment distributed to the bones, and so have the same nature, even when the bones have their own number complete.

[10] Other animals are born in possession of teeth or their analogue (unless in cases contrary to nature), because when they are set free from the parent they are more perfect than man; but man (also unless in cases contrary to nature) is born without them.

The reason will be stated later why some teeth are formed and fall out but [15] others do not fall out.

It is because such parts are formed from a residue that man is the most naked in body of all animals and has the smallest nails in proportion to his size; he has the least amount of earthy residue, but what is not concocted is the residue, and the earthy part in the bodies of all animals is the least concocted. We have now stated [20] how each of the parts is formed and what is the cause of their generation.

7 · In viviparous animals, as said before, the embryo gets its growth through the umbilical cord. For since the nutritive power of the soul, as



well as the others, is present in animals, it straightway sends off this cord like a root to the uterus. The [25] cord consists of blood-vessels in a sheath, more numerous in the larger animals as cattle and the like, one in the smallest, two in those of intermediate size. Through this cord the embryo receives its nourishment in the form of blood, for the uterus is the termination of many blood-vessels. All non-ambidentates and all ambidentates [30] whose uterus has not one great blood-vessel running through it but many close together instead—all these have in the uterus the so-called cotyledons with which the umbilical cord connects and is closely united; for the vessels which pass through the cord run backwards and forwards and split up all over the uterus; where they terminate, there are found the cotyledons. Their convexity is turned towards the uterus, the concavity towards the embryo. Between uterus and embryo are the chorion and the membranes. As the embryo grows and approaches perfection the cotyledons become smaller and finally disappear when it is perfected. For nature [746<sup>a</sup>1] sends the sanguineous nutriment for the embryo into this part of the uterus as it were into breasts, and because the cotyledons are gradually aggregated from many into a few the body of the cotyledon becomes like an eruption or inflammation. So [5] long as the embryo is comparatively small, being unable to receive much nutriment, they are plain and large, but when it has increased in size they shrink.

But most of the animals which are stunted and ambidentate have no cotyledons in the uterus, but the umbilical cord runs to meet one blood-vessel, which [10] is large and extends throughout the uterus. Of such animals some produce one young at a time, some more than one, but the same description applies to both these classes. (This should be studied with the aid of the examples drawn in the *Anatomies* and the *Histories*.) For the young are attached each to its umbilical [15] cord, and this to the blood-vessel; they are arranged next to one another along the stream of the blood-vessel as along a canal; and each embryo is enclosed in its membranes and chorion.

Those who say that children are nourished in the uterus by sucking some lump [20] of flesh or other are mistaken. If so, the same would have been the case with other animals, but as it is we do not find this (and this can easily be observed by dissection). Secondly, all embryos alike, whether of creatures that fly or swim or walk, are surrounded by fine membranes separating them from the uterus and from the fluids which are formed in it; but neither in these themselves is there anything of [25] the kind, nor is it possible for the embryo to take nourishment by means

of any of them. And it is plain that all creatures developed in eggs grow when separated from the uterus. Thus those, e.g. Democritus, who put forward this view are mistaken.

Copulation takes place naturally between animals of the same kind. However, [30] those also unite whose nature is near akin and whose form is not very different, if their size is much the same and if the periods of gestation are equal. In other animals such cases are rare, but they occur with dogs and foxes and wolves and jackals; the Indian dogs also spring from the union of a dog with some wild dog-like [746<sup>b</sup>1] animal. A similar thing has been seen to take place in those birds that are salacious, as partridges and hens. Among birds of prey hawks of different form are thought to unite, and the same applies to some other birds. Nothing worth mentioning has been [5] observed in the inhabitants of the sea, but the so-called 'rhinobates' especially is thought to spring from the union of the rhinè and the batus. And the proverb about Libya, that Libya is always producing something new, is said to have originated from animals of different species uniting with one another in that country, for it is [10] said that because of the want of water all meet at the few places where springs are to be found, and that even different kinds unite in consequence.

Of the animals that arise from such union all except mules are found to copulate again with each other and to be able to produce young of both sexes, but [15] mules alone are sterile, for they do not generate by union with one another or with other animals. The problem why any individual, whether male or female, is sterile is a general one, for some men and women are sterile, and so are other animals in their [20] several kinds, as horses and sheep. But this kind, that of mules, is universally so. The causes of sterility in other animals are several. Both men and women are sterile from birth when the parts useful for union are imperfect, so that men never grow a beard but remain like eunuchs, and women do not attain puberty; the same thing [25] may befall others as their years advance, sometimes on account of the body being too well nourished (for in men who are in too good condition and women who are too fat the seminal residue is taken up into the body, and the former have no semen, the latter no menstrual discharge); at other times by reason of sickness men emit the [30] semen in a cold and liquid state, and the discharges of women are bad and full of morbid residues. Often, too, in both sexes this state is caused by deformities in the parts and regions contributory to copulation. Some such cases are curable, others incurable, but the subjects especially remain sterile if anything of the sort has happened in

the first formation of the parts in the embryo, for then are produced [747<sup>a</sup>1] women of a masculine and men of a feminine appearance, and in the former the menstrual discharge does not occur, in the latter the semen is thin and cold. Hence it is with good reason that the semen of men is tested in water to find out if it is infertile, for that which is thin and cold is quickly spread out on the surface, but the [5] fertile sinks to the bottom, for that which is well concocted is hot indeed, but that which is firm and thick is well concocted. They test women by pessaries to see if the smells permeate from below upwards to the breath from the mouth, and by colours [10] smeared upon the eyes to see if they colour the saliva. If these results do not follow it is a sign that the passages of the body, through which the residue is secreted, are clogged and closed. For the region about the eyes is, of all the head, the most [15] seminal part; a proof of this is that it alone is visibly changed in sexual intercourse, and those who indulge too much in this are seen to have their eyes sunken in. The reason is that the nature of the semen is similar to that of the brain, for the material of it is watery (the heat being acquired later). And the seminal discharges are from the region of the diaphragm, for the first principle of nature is there, so that the [20] movements from the pudenda are communicated to the chest, and the smells from the chest are all perceived through the respiration.

8 · In men, then, and in other kinds, as said before, such deficiency occurs sporadically, but the whole of the mule kind is sterile. The reason has not been [25] rightly given by Empedocles and Democritus, of whom the former expresses himself obscurely, the latter more intelligibly. For they offer a single demonstration for all animals which unite against their affinities. Democritus says that the genital passages of mules are spoilt in the mother's uterus because the animals from the [30] first are not produced from parents of the same kind. But we find that though this is so with other animals they are none the less able to generate; yet, if this were the reason for their sterility, all others that unite in this manner ought to be sterile. Empedocles assigns as his reason that the mixture of the seeds becomes dense, each of the two seminal fluids out of which it is made being soft, for the hollows in each [747<sup>b</sup>1] fit into the densities of the other, and in such cases a hard substance is formed out of soft ones, like bronze mingled with tin. Now he does not give the correct reason in the case of bronze and tin—we have spoken of them in the *Problems*—nor, to take [5] general ground, does he take his principles from the intelligible. For how do the hollows and solids fit into one another to

make the mixing, e.g. in the case of wine and water? This saying is quite beyond us; for how we are to understand the hollows of the wine and water is too far beyond our perception. Again, when, as a matter of [10] fact, horse is born of horse, ass of ass, and mule of horse and ass (it does not matter which is the male and which the female), why in the last case does there result something so dense that the offspring is sterile, whereas the offspring of male and female horse, male and female ass, is not sterile? And yet the generative fluid of the [15] male and female horse is soft. But both sexes of the horse cross with both sexes of the ass, and the offspring of both crosses are sterile, according to Empedocles, because from both is produced something dense, the seeds being soft. If so, the offspring of stallion and mare ought also to be sterile. If one of them alone united [20] with the ass, it might be said that the cause of the mule's being unable to generate was the unlikeness of that one to the generative fluid of the ass; but, as it is, whatever be the character of that generative fluid with which it unites in the ass, such it is also in the animal of its own kind. Then, again, the demonstration is intended to apply to both male and female mules alike, but the male alone does generate at seven years of age, it is said, whereas the female is entirely sterile, and [25] even she is so only because she does not complete the development of the embryo, for a female mule has been known to conceive.

Perhaps an abstract proof might appear to be more plausible than those already given; I call it abstract because the more general it is the further is it removed from the appropriate principles. It runs somewhat as follows. From male [30] and female of the same species there are born in course of nature male and female of the same species as the parents, e.g. male and female puppies from male and female dog. From parents of different species is born a young one different in species; thus if a dog is different from a lion, the offspring of male dog and lioness or of lion and [748a1] bitch will be different from both parents. If this is so, then since mules are produced of both sexes and are not different in species from one another, and a mule is born of horse and ass and these are different in species from mules, it is impossible that anything should be produced from mules. For another kind cannot be, because the [5] product of male and female of the same species is also of the same species, and a mule cannot be, because that is the product of horse and ass which are different in form, and it was laid down that from parents different in form is born a different animal. Now this theory is too general and empty. For all theories not based on the appropriate principles are empty; they only

appear to be connected with the facts [10] without being so really. As geometrical arguments must start from geometrical principles, so it is with the others; that which is empty may seem to be something, but is really nothing. Now the basis of this particular theory is not true, for many animals produced from different species are fertile, as was said before. So we must not inquire into questions of natural science in this fashion any more than any other questions; we shall be more likely to find the reason by considering the facts [15] peculiar to the two kinds concerned, horse and ass. In the first place, each of them, if mated with its own kind, bears only one young one; secondly, the females are not always able to conceive from the male (that is why breeders put the horse to the [20] mare again at intervals). Indeed, the mare is deficient in menstrual flow, discharging less than any other quadruped, and the she-ass does not admit the impregnation, but ejects the semen with her urine, which is why men follow flogging her after intercourse. Again the ass is an animal of cold nature, and so is not wont to [25] be produced in wintry regions because it cannot bear cold, as in Scythia and the neighbouring country and among the Celts beyond Iberia, for this country also is cold. For this cause they do not put the jackasses to the females at the equinox, as they do with horses, but about the summer solstice, in order that the ass-foals may be born in a warm season, for the mothers bear at the same season as that in which [30] they are impregnated, the period of gestation in both horse and ass being one year. The animal, then, being, as has been said, of such a cold nature, its semen also must be cold. A proof of this is that if a horse mount a female already impregnated by an ass he does not destroy the impregnation of the ass, but if the ass be the second to mount her he does destroy that of the horse because of the coldness of his own [748<sup>b</sup>1] semen. When, therefore, they unite with each other, the generative elements are preserved by the heat of the one of them, that contributed by the horse being the hotter; for in the ass both the semen and the material are cold, and those of the horse are hotter. Now when either hot is added to cold or cold to hot so as to mix, the [5] result is that the embryo itself arising from these is preserved and thus these animals are fertile when crossed with one another, but the animal produced by them is no longer fertile but unable to produce perfect offspring.

And in general each of these animals naturally tends towards sterility. The ass has all the disadvantages already mentioned, and if it should not begin to generate [10] after the first shedding of teeth, it no longer generates at all; so near is the constitution of the ass to being sterile. The

horse is much the same; it tends naturally towards sterility, and to make it entirely so it is only necessary that its generative secretion should become colder; now this is what happens to it when mixed with the corresponding secretion of the ass. The ass in like manner comes [15] very near generating a sterile animal when mated with its own species. Thus when the difficulty of a cross contrary to nature is added to the difficulty they have in producing a single young one when united with their own species, the result of the cross, being still more sterile and contrary to nature, will need nothing further to make it sterile, but will be so of necessity.

We find also that the bodies of mules grow large because the matter which is [20] secreted in other animals to form the menstrual flow is diverted to growth. But since the period of gestation in such animals is a year, the mule must not only conceive but must also nourish the embryo till birth, and this is impossible if there is no menstrual discharge. But there is none in the mule; the useless part of the nutriment is discharged with the excretion from the bladder—this is why male mules do not [25] sniff at the pudenda of the females, as do the other solid-hoofed animals, but only at the excretion itself—and the rest of the nutriment is used up to increase the size of the body. Hence it is sometimes possible for the female to conceive, as has been known to happen before now, but it is impossible for her to complete the process of [30] nourishing the embryo and bringing it to birth.

The male, again, may sometimes generate, both because the male sex is naturally hotter than the female and because it does not contribute any material substance to the mixture. The result in such cases is a ginnus, that is to say, a [749<sup>a</sup>1] deformed mule; for ginni are produced also from the crossing of horse and ass when the embryo is diseased in the uterus. The ginnus is in fact like the so-called metachoera in swine, for a metachoerum also is a pig deformed in the uterus; this may happen to any pig. The origin of human dwarfs is similar, for these also have their parts and their whole development deformed during gestation, and resemble [5] ginni and metachoera.

## BOOK III

1 · We have now spoken about the sterility of mules, and about those [10] animals which are viviparous both externally and within themselves. The generation of the oviparous sanguinea is to a certain extent similar to that of the animals that walk, and all may be embraced in the same general statement; but in other respects there are differences in them both as compared with each other and with those that walk. All alike are generated from sexual union, the male emitting semen [15] into the female. But among the ovipara birds produce a perfect hard-shelled egg, unless it be injured by disease, and the eggs of birds are all two-coloured. The Selachian fishes, as has been often said already, are oviparous internally but [20] produce the young alive, the egg changing previously from one part of the uterus to another; and their egg is soft-shelled and of one colour. One of this class alone does not produce the young from the egg within itself, the so-called fishing-frog; the reason of which must be stated later. All other oviparous fishes produce an egg of [25] one colour, but this is imperfect, for its growth is completed outside the mother's body by the same cause as are those eggs which are perfected within.

Concerning the uterus, what differences there are among them and for what reasons, has been stated previously. For in some of the viviparous creatures it is high [30] up near the hypozoma, in others low down by the pudenda; the former in the Selachia, the latter in animals both internally and externally viviparous, such as man and horse and the rest; in the ovipara it is sometimes low, as in the oviparous fish, and sometimes high, as in birds.

Some embryos are formed in birds spontaneously, which are called wind-eggs [749<sup>b</sup>1] and 'zephyria' by some; these occur in birds which are not given to flight nor rapine but which produce many young, for these birds have much residual matter, whereas in the birds of prey such secretion is diverted to the wings and feathers, while the [5] body is small and dry and hot; and the menstrual secretion and the semen are residues. Since then both the wings and the semen are made from residual matter, nature cannot afford to spend much upon both. And for this same reason the birds [10] of prey are neither given to treading much nor to laying many eggs, as are the heavy birds and those flying birds whose bodies are bulky, as the pigeon and so forth. For such

residual matter is secreted largely in the heavy birds not given to flying, such [15] as fowls, partridges, and so on, and that is why their males tread often and their females produce much material. Of such birds some lay many eggs at a time and some lay often; for instance, the fowl, the partridge, and the Libyan ostrich lay many eggs, while the pigeon family do not lay many but lay often. For these are [20] between the birds of prey and the heavy ones; they are flyers like the former, but have bulky bodies like the latter; hence, because they are flyers and the residue is diverted that way, they lay few eggs, but they lay often because of their having bulky bodies and their stomachs being hot and very active in concoction, and [25] because moreover they can easily procure their food, whereas the birds of prey do so with difficulty.

Small birds also tread often and are very fertile, as are sometimes small plants, for what causes bodily growth in others turns in them to a seminal residuum. Hence the Adrianic fowls lay most eggs, for because of the smallness of their bodies the [30] nutriment is used up in producing young. And low-bred birds are more fertile than high-bred ones; for their bodies are more fluid and bulkier, whereas those of the latter are leaner and drier, since a high-bred spirit is found rather in such bodies as the latter. Moreover the thinness and weakness of the legs contribute to making the [750<sup>a</sup>1] former class of birds naturally inclined to tread and to be fertile, as we find also in the human species; for the nourishment which otherwise goes to the legs is turned in such into a seminal secretion, what nature takes from the one place being added at the other. Birds of prey, on the contrary, have a strong walk and their legs are thick [5] owing to their habits, so that for all these reasons they neither tread nor lay much. The kestrel is the most fertile; for this is nearly the only bird of prey which drinks, and its moisture, both innate and acquired, along with its heat is favourable to [10] generative products. Even this bird does not lay very many eggs, but four at the outside.



The cuckoo, though not a bird of prey, lays few eggs, because it is of a cold nature, as is shown by the cowardice of the bird, whereas a generative animal should be hot and moist. That it is cowardly is plain, for it is pursued by all the birds and lays eggs in the nests of others. [15]

The pigeon family are in the habit of laying two for the most part, for they neither lay one (no bird does except the cuckoo, and even that sometimes lays two) nor yet many, but they frequently produce two, or three at the most, generally two, for these numbers lie between one and many. [20]

It is plain from the facts that with the birds that lay many eggs the nutriment is diverted to the semen. For most trees, if they bear too much fruit, wither away after the crop when nutriment is not reserved for themselves, and this seems to be what happens to annuals, as leguminous plants, corn, and the like. For they consume all [25] their nutriment to make seed, their kind being prolific. And some fowls after laying too much, so as even to lay two eggs in a day, have died after this. For both the birds and the plants become as it were purged, and this condition is an excess of secretion [30] of residual matter. A similar condition is the cause of the later sterility of the lioness, for at the first birth she produces five or six, then in the next year four, and again three cubs, then the next number down to one, then none at all, showing that the residue is being used up and the semen is failing along with the advance of years.

We have now stated in which birds wind-eggs are found, and also what sort of [750b1] birds lay many eggs or few, and for what reasons. And wind-eggs, as said before, come into being because while seminal material exists in the female, birds have no menstrual discharge like viviparous sanguinea (for they occur in all these latter, [5] more in some, less in others, and in some only enough in quantity just to mark the class). The same applies to fish as to birds, and so in them too is found an embryonic formation without impregnation, but it is less obvious because their nature is [10] colder. The secretion corresponding to the menstrual fluid of vivipara is formed in birds at the appropriate season for the discharge of residue, and, because the region near the hypozoma is hot, it is perfected so far as size is concerned, but in birds and fishes alike it is imperfect for generation without the seminal fluid of the male; the [15] cause of this has been previously given. Wind-eggs are not formed in the flying birds, for the same reason as prevents their laying many eggs; for the residual matter in birds of prey is small, and they need the male to give an impulse for the [20] discharge of it. The wind-eggs are produced

in greater numbers than the impregnated but smaller in size for one and the same reason; they are smaller in size because they are imperfect, and because they are smaller in size they are more in number. They are less pleasant for food because they are less concocted, for in all foods the concocted is more agreeable. It has been sufficiently observed, then, that [25] neither birds' nor fishes' eggs are perfected for generation without the males. As for embryos being formed in fish also (though in a less degree) without the males, the fact has been observed especially in river fish, for some are seen to have eggs from [30] the first, as has been written in the *Histories*<sup>1</sup> concerning them. And generally speaking in the case of *birds* even the impregnated eggs are not wont for the most part to attain their full growth unless the hen be trodden continually. The reason of [751<sup>a</sup>1] this is that just as with women intercourse with men draws down the secretion (for the uterus being heated attracts the moisture and the passages are opened), so this happens also with birds; the residual matter corresponding to the menstrual fluid advances a little at a time, and is not discharged externally, because its amount is [5] small and the uterus is high up by the hypozoma, but trickles together into the uterus itself. For as the embryo of the vivipara grows by means of the umbilical cord, so the egg grows through this matter flowing to it through the uterus. For when once the hens have been trodden, they all continue to have eggs almost [10] without intermission, though very small ones. Hence some are wont to speak of wind-eggs as not coming into being independently but as mere relics from a previous impregnation. But this is a false view, for sufficient observations have been made of their arising without impregnation in chickens and goslings. Also the female partridges which are taken out to act as decoys, whether they have ever been [15] impregnated or not, immediately on smelling the male and hearing his call, become filled with eggs in the latter case and lay them in the former. The reason why this happens is the same as in men and quadrupeds, for if their bodies chance to be in rut they emit semen at the mere sight of the female or at a slight touch. And such birds [20] are of a lascivious and fertile nature, so that the impulse they need is but small when they are in this excited condition, and the secreting activity takes place quickly in them, wind-eggs forming in the unimpregnated and the eggs in those which have been impregnated growing and reaching perfection swiftly.

[25] Among creatures that lay eggs externally birds produce their egg perfect, fish imperfect, but the eggs of the latter complete their growth outside as has been said before. The reason is that the fish kind is very fertile; now it is impossible for many eggs to reach completion within the

mother and therefore they lay them outside. [30] They are quickly discharged, for the uterus of externally oviparous fishes is near the generative passage. While the eggs of birds are two-coloured, those of all fish are one-coloured. The cause of the double colour may be seen from considering the power of each of the two parts, the white and the yolk. For the matter of the egg is secreted from the blood [(no bloodless animal lays eggs)]<sup>2</sup> and that the blood is the [751<sup>b</sup>1] material of the body has been often said already. The one part, then, of the egg is nearer the form of the animal coming into being, that is the hot part; the more earthy part gives the substance of the body and is further removed. Hence in all two-coloured eggs the animal receives the first principle of generation from the [5] white (for the vital principle is in that which is hot), but the nutriment from the yolk. Now in animals of a hotter nature the part from which the first principle arises is separated off from the part from which comes the nutriment, the one being white [10] and the other yellow, and the white and pure is always more than the yellow and earthy; but in the moister and less hot the yolk is more in quantity and more fluid. This is what we find in lake birds, for they are of a moister nature and are colder than the land birds, so that the so-called yolk in the eggs of such birds is large and less yellow because the white is less separated off from it. But when we come to the [15] ovipara which are both of a cold nature and also moister (such is the fish kind), we find the white not separated at all because of the small size of the eggs and the quantity of the cold and earthy matter; therefore all fish eggs are of one colour, and white compared with yellow, yellow compared with white. Even the wind-eggs of [20] birds have this distinction of colour, for they contain that out of which will come each of the two parts, alike that whence arises the principle of life and that whence comes the nutriment; only both these are imperfect and need the influence of the male in addition; for wind-eggs become fertile if impregnated by the male within a certain period. The difference in colour, however, is not due to any difference of sex, [25] as if the white came from the male, the yolk from the female; both on the contrary come from the female, but the one is cold, the other hot. In all cases then where the hot part is considerable it is separated off, but where it is little it cannot be so; hence the eggs of such animals, as has been said, are of one colour. The semen of the male [30] only sets them; and therefore at first the egg in birds appears white and small, but as it advances it is all yellow as more of the sanguineous material is continually mixed with it; finally as the hot part is separated the white takes up a position all round it and equally distributed on all sides, as

when a liquid boils; for the white is naturally [752<sup>a</sup>1] liquid and contains in itself the vital heat; therefore it is separated off all round, but the yellow and earthy part is inside. And if we enclose many eggs together in a bladder or something of the kind and boil them over a fire so as not to make the [5] movement of the heat quicker than the separation of the white and yolk in the eggs, then the same process takes place in the whole mass of the eggs as in a single egg, all the yellow part coming into the middle and the white surrounding it.

We have thus stated why some eggs are of one colour and others of two. [10]

2 · The principle of the male is separated off in eggs at the point where the egg is attached to the uterus, and the reason why two-coloured eggs are unsymmetrical, and not perfectly round but sharper at one end, is that the part of the white in which is contained this principle must differ from the rest. Therefore the egg is harder at this point than below, for it is necessary to shelter and protect this [15] principle. And this is why the sharp end of the egg comes out of the hen later than the blunt end; for the part attached to the uterus comes out later, and the egg is attached at the point where is the said principle, and the principle is in the sharp end. The same is the case also in the seeds of plants; the principle of the seed is attached sometimes to the twig, sometimes to the husk, sometimes to the pericarp. [20] This is plain in the leguminous plants, for where the two cotyledons of beans and of similar seeds are united, there is the seed attached to the parent plant, and there is the principle of the seed.

A difficulty may be raised about the growth of the egg; how is it derived from the uterus? For if animals derive their nutriment through the umbilical cord, [25] through what do eggs derive it? They do not, like grubs, acquire their growth by their own means. If there is anything by which they are attached to the uterus, what becomes of this when the egg is perfected? It does not come out with the egg as the [30] cord does with animals; for when its egg is perfected the shell forms all round it. This problem is rightly raised, but it is not observed that the shell is at first only a soft membrane, and that it is only after the egg is perfected that it becomes hard and brittle; this is so nicely adjusted that it is still soft when it comes out (for otherwise it would cause pain in laying), but no sooner has it come out than it is fixed hard by cooling, the moisture quickly evaporating because there is but little of [752<sup>b</sup>1] it, and the

earthy part remaining. Now at first a certain part of this membrane at the sharp end of eggs resembles an umbilical cord, and projects like a pipe from them while they are still small. It is plainly visible in small aborted eggs, for if the bird be drenched with water or suddenly chilled in any other way and cast out the [5] egg too soon, it appears still sanguineous and with a small tail like an umbilical cord running through it. As the egg becomes larger this is more twisted round and becomes smaller, and when the egg is perfected this end is the sharp end. Under this is the inner membrane which separates the white and the yolk from this. When the [10] egg is perfected, the whole of it is set free, and naturally the umbilical cord does not appear, for it is now the extreme end of the egg itself.

The egg is discharged in the opposite way from the young of vivipara; the latter are born head-first, the part where is the first principle leading, but the egg is discharged as it were feet first; the reason of this being what has been stated, that [15] the egg is attached at the point where is the first principle.

The young bird is produced out of the egg by the mother's incubating and aiding the concoction, the creature developing out of part of the egg, and receiving growth and completion from the remaining part. For nature not only places the [20] material of the creature in the egg but also the nourishment sufficient for its growth; for since the mother bird cannot perfect her young within herself she produces the nourishment in the egg along with it. Whereas the nourishment, what is called milk, is produced for the young of vivipara in another part, in the breasts, nature does this for birds in the egg. The opposite, however, is the case to what [25] people think and what is asserted by Alcmaeon of Croton. For it is not the white that is the milk, but the yolk, for it is this that is the nourishment of the chick, whereas they think it is the white because of the similarity of colour.

The chick then, as has been said, comes into being by the incubation of the [30] mother; yet if the temperature of the season is favourable, or if the place in which the eggs happen to lie is warm, the eggs get concocted, both those of birds and those of oviparous quadrupeds. For these all lay their eggs upon the ground, where they are concocted by the heat in the earth. Such oviparous quadrupeds as do visit their eggs and incubate do so rather for the sake of protecting them.

[753<sup>a</sup>1] The eggs of these quadrupeds are formed in the same way as those of birds, for they are hard-shelled and two-coloured, and they are formed near the hypozoma as are those of birds, and in all other respects

resemble them both internally and externally, so that the inquiry into their causes is the same for all. But whereas the [5] eggs of quadrupeds are hatched out by the mere heat of the weather owing to their strength, those of birds are more exposed to destruction and need the mother-bird. Nature seems to wish to implant in animals a<sup>3</sup> sense of care for their young: in the inferior animals this lasts only to the moment of giving birth; in others it continues till they are perfect; in all that are more intelligent, during the bringing up of the [10] young also. In those which have the greatest portion in intelligence we find familiarity and love shown also towards the young when perfected, as with men and some quadrupeds; with birds we find it till they have produced and brought up their young, and therefore if the hens do not incubate after laying they get into worse [15] condition, as if deprived of something natural to them.

The young is perfected within the egg more quickly in warm weather, the season aiding in the work, for concoction is the work of heat. For the earth aids in the concoction by its heat, and the brooding hen does the same, for she infuses the [20] heat that is within her. And it is in the hot season, as we should expect, that the eggs are more apt to be spoilt and the so-called 'uria' are produced; for just as wines turn sour in the heats from the sediment getting stirred up (for this is the cause of their being spoilt), so is it with the yolk in eggs, for the sediment and yolk are the earthy [25] part in each case, and that is why the wine becomes turbid when the sediment mixes with it, and the like applies to the eggs that are spoiling because of the yolk. It is reasonable then that such should be the case with the birds that lay many eggs, for it is not easy to give the fitting amount of heat to all, but (while some have too little) others have too much and this makes them turbid, as it were by putrefaction. But [30] this happens none the less with the birds of prey though they lay few eggs, for often one of the two becomes rotten, and the third practically always, for being of a hot nature they make the moisture in the eggs to overboil so to say. For the nature of the white is opposed to that of the yolk; the yolk congeals in frosts but liquefies on [753<sup>b</sup>1] heating, and therefore it liquefies on concoction in the earth or by reason of incubation, and becoming liquid serves as nutriment for the developing chick. If exposed to heat and roasted it does not become hard, because though earthy in nature it is only so in the same way as wax is; accordingly on heating too much the [5] eggs become watery and rotten, †if they be not from a liquid residue.†<sup>4</sup> The white on the contrary is not congealed by frost but rather liquefies (the reason of which has been

stated before), but on exposure to heat becomes solid. Therefore being concocted in the development of the chick it is thickened. For it is from this that the [10] young is formed (whereas the yolk turns to nutriment) and it is from this that the parts derive their growth as they are formed one after another. This is why the white and the yolk are separated by membranes, as being different in nature. The precise details of the relation of the parts to one another both at the beginning of generation [15] and as the animals are forming, and also the details of the membranes and umbilical cords, must be learnt from what has been written in the *Histories*;<sup>5</sup> for the present investigation it is sufficient to understand this much clearly, that, when the heart has been first formed and the great blood-vessel has been marked off from it, two umbilical cords run from the vessel, the one to the membrane which encloses the [20] yolk, the other to the membrane resembling a chorion which surrounds the whole embryo; this latter runs round the membrane of the shell. Through the one of these the embryo receives the nutriment from the yolk, and the yolk becomes larger, for it [25] becomes more liquid by heating. This is because the nourishment, being of a material character, must become liquid, just as it is with plants, and at first this embryo, whether in an egg or in the mother's uterus, lives the life of a plant, for it receives its first growth and nourishment by being attached to something else.

[30] The second umbilical cord runs to the surrounding chorion. For we must understand that, in the case of animals developed in eggs, they have the same relation to the yolk as the embryo of the vivipara has to the mother so long as it is within the mother (for since the nourishment of the embryo of the ovipara is not completed within the mother, the embryo takes part of it away from her); and their relation to the outermost membrane, the sanguineous one, is like that of the viviparous embryo to the uterus. At the same time the egg-shell surrounds both the [754<sup>a</sup>1] yolk and the chorion analogous to the uterus, just as if it should be put round both the embryo itself and the whole of the mother. This is so because the embryo must [5] be in the uterus and attached to the mother. Now in the vivipara the uterus is within the mother, but in the ovipara it is the other way about, as if one should say that the mother was in the uterus, for that which comes from the mother, the nutriment, is the yolk. The reason is that the process of nourishment is not completed within the mother.

[10] As the creature grows the umbilicus running to the chorion collapses first, because it is here that the young is to come out; what is

left of the yolk, and the umbilical cord running to the yolk, collapse later. For the young must have nourishment as soon as it is hatched; it is not nursed by the mother and cannot immediately procure its nourishment for itself; therefore the yolk enters within it [15] along with its umbilicus and the flesh grows round it.

This then is the manner in which animals produced from perfect eggs are hatched in all those, whether birds or quadrupeds, which lay eggs with a hard shell. These details are plainer in the larger creatures; in the smaller they are obscure [20] because of the smallness of the masses concerned.

3 · The class of fishes is also oviparous. Those among them which have the uterus low down lay an imperfect egg for the reason previously given, but the so-called Selachia produce a perfect egg within themselves but are externally [25] viviparous except one which they call the fishing-frog; this alone lays a perfect egg externally. The reason is the nature of its body, for its head is many times as large as the rest of the body and is spiny and very rough. This is also why it does not receive its young again within itself nor produce them alive to begin with, for as the size and [30] roughness of the head prevents their entering so it would prevent their exit. And while the egg of the Selachia is soft-shelled (for they cannot harden and dry its circumference, being colder than birds), the egg of the fishing-frog alone is solid and firm to protect it outside, but those of the rest are of a moist and soft nature, for [754<sup>b</sup>1] they are sheltered within and by the body of the mother.

The young are produced from the egg in the same way both with those externally perfected (the fishing-frogs) and those internally, and the process in these eggs is partly similar to, partly different from that in birds' eggs. In the first place they have not the second umbilicus which runs to the chorion under the [5] surrounding shell. The reason of this is that they have not the surrounding shell, for it is no use to them since the mother shelters them, and the shell is a protection to the laid eggs against external injury. Secondly, the process in these also begins on the surface of the egg but not where it is attached to the uterus; for birds are [10] developed from the sharp end and that is where the egg was attached. The reason is that the egg of birds is separated from the uterus, but in most though not all Selachia the egg is still attached to the uterus when perfect. While the young develops upon the surface the egg is consumed by it just as in birds and the other [15] animals detached from the uterus,



and at last the umbilicus of the now perfect fish is left attached to the uterus. The like is the case with all those whose eggs are detached from the uterus, for in some of them the egg is so detached when it is perfect.

The question may be raised why the development of birds and fishes differs in [20] this respect. The reason is that in birds the white and yolk are separate, but fish eggs are one-coloured, the corresponding matter being completely mixed, so that there is nothing to stop the first principle being at the opposite end, for the egg is of the same nature both at the point of attachment and at the opposite end, and it is easy to draw [25] the nourishment from the uterus by passages running from this principle. This is plain in the eggs which are not detached, for in some of the *Selachia* the egg is not detached from the uterus, but is still connected with it as it comes downwards with a view to the production of the young alive; in these the young fish when perfected is [30] still connected by the umbilicus to the uterus when the egg has been consumed. From this it is clear that previously also, while the egg was still round the young, the passages ran to the uterus. This happens as we have said in the smooth dogfish.

In these respects and for the reasons given, the development of fishes differs from that of birds, but otherwise it takes place in the same way. For they have the one umbilicus in like manner as that of birds connecting with the yolk—only in [755<sup>a</sup>1] these fishes it connects with the whole egg (for it is not divided into white and yolk but all one-coloured)—and get their nourishment from this, and as it is being consumed the flesh in like manner encroaches upon and grows round it. [5]

Such is the process of development in those fish that produce a perfect egg within themselves but are externally viviparous.

4 · Most of the other fish are externally oviparous, all laying an imperfect egg except the fishing-frog; the reason for this exception has been previously stated, and the reason also why the others lay imperfect eggs. In these also the development [10] from the egg runs on the same lines as that of the *Selachian* and internally oviparous fishes, except that the growth is quick and from small beginnings and the outside of the egg is harder. The growth of the egg is like that of a grub, for those animals which produce grubs give birth to a small thing at first and this grows by itself and [15] not through any attachment to the parent. The reason is similar to that of the growth of yeast, for yeast also grows great from a

small beginning as the more solid part liquefies and the liquid is aerated. This is effected in animals by the nature of [20] the vital heat, in yeasts by the heat of the juice commingled with them. The eggs then grow of necessity through this cause (for they have in them a yeasty residue), but also for the sake of what is better; for it is impossible for them to attain their [25] whole growth in the uterus because these animals have so many eggs. Therefore they are very small when set free and grow quickly, small because the uterus is narrow for the multitude of the eggs, and growing quickly that the race may not perish, as it would if much of the time required for the whole development were [30] spent in this growth; even as it is most of those laid are destroyed. Hence the class of fish is prolific, for nature makes up for the destruction by numbers. Some fish actually burst because of the size of the eggs, as the fish called the pipe-fish—for its eggs are large instead of numerous, what nature has taken away in number being [35] added in size.

So much for the growth of such eggs and its reason.

[755<sup>b1</sup>] **5** · A proof that these fish also are oviparous is the fact that even viviparous fish, such as the Selachia, are first internally oviparous, for it is plain that the whole class of fishes is oviparous. Where, however, both sexes exist and the eggs are [5] produced in consequence of impregnation, the eggs do not arrive at completion unless the male sprinkle his milt upon them. Some erroneously assert that all fish are female except in the Selachian fishes, for they think that the females of fish differ from what are supposed to be males only in the same way as in those plants [10] where the one bears fruit but the other is fruitless, as olive and oleaster, fig and caprifig. They think the like applies to fish except the Selachia; for they do not dispute the sexes in these. And yet there is no difference in the males of Selachian fishes and those belonging to the oviparous class in respect of the organs for the [15] milt, and semen can be seen oozing out of males of both classes at the right season. The female also has a uterus. But if the whole class were females and some of them unproductive, then not only should those which lay eggs have a uterus but also the others, only the uterus of the latter should be different from that of the former. But, [20] as it is, some of them have organs for milt and others have a uterus, and this distinction obtains in all except two, the erythrinus and the channa, some of them having the milt organs, others a uterus. The difficulty which drives some thinkers to this conclusion is easily solved if we look at the facts. They say quite correctly

that [25] no animal which copulates produces many young, for of all those that generate from themselves perfect animals or perfect eggs none is prolific on the same scale as the oviparous fishes, for the number of eggs in these is enormous. But they had overlooked the fact that fish-eggs differ from those of birds in one circumstance. [30] Birds and all oviparous quadrupeds, and any of the Selachia that are oviparous, produce a perfect egg, and it does not increase outside of them, whereas the eggs of fish are imperfect and do so complete their growth. Moreover the same thing applies to cephalopods also and crustacea, yet these animals are actually seen [35] copulating, for their union lasts a long time, and it is plain in these cases that the one is male and the other has a uterus. Finally, it would be strange if this distinction did [756<sup>a</sup>1] not exist in the whole class, just as male and female in all the vivipara. The cause of the ignorance of those who make this statement is that the differences in the copulation and generation of various animals are of all kinds and not obvious, and so, basing their study on a few cases, they think the same must hold good in all cases. [5]

So also those who assert that conception in female fishes is caused by their swallowing the semen have not observed certain points when they say this. For the males have their milt and the females their eggs at about the same time of year, and the nearer the female is to laying the more abundant and the more liquid is the milt [10] formed in the male. And just as the increase of the milt in the male and of the egg in the female takes place at the same time, so is it also with their emission, for neither do the females lay all their eggs together, but gradually, nor do the males emit all the milt at once. All these facts are in accordance with reason. For just as the class [15] of birds in some cases has eggs without impregnation, but few and seldom, impregnation being generally required, so we find the same thing, though to a less degree, in fish. But in both classes these spontaneous eggs are infertile unless the male, in those kinds where the male exists, shed his fluid upon them. Now in birds [20] this must take place while the eggs are still within the mother, because they are perfect when discharged, but in fish, because the eggs are imperfect and complete their growth outside the mother in all cases, those outside are preserved by the sprinkling of the milt over them, even if nothing fertile comes into being inside by way of impregnation, and here it is that the milt of the males is used up. Therefore it [25] comes down the ducts and diminishes in quantity at the same time as this happens to the eggs of the females, for the males always attend them, shedding their milt upon the eggs as they are laid. Thus then they are

male and female, and all of them copulate (unless in any kind the distinction of sex does not exist), and without the semen of the male no such animal comes into being. [30]

What contributes to their error is also the fact that the union of such fishes is brief, so that it is not observed even by many of the fishermen, for none of them ever watches anything of the sort for the sake of knowledge. Nevertheless their copulation has been seen, for fish (when the tail part does not prevent it)<sup>6</sup> copulate like the dolphins by throwing themselves alongside of one another. But the dolphins [756<sup>b</sup>1] take longer to get free again, whereas such fishes do so quickly. Hence, not seeing this, but seeing the swallowing of the milt and the eggs, even the fishermen repeat [5] the same simple tale, so much noised abroad, as does Herodotus the story-teller,<sup>7</sup> as if fish were conceived by the mother's swallowing the milt—not considering that this is impossible. For the passage which enters by way of the mouth runs to the intestines, not to the uterus, and what goes into the intestines must be turned into [10] nutriment, for it is concocted; the uterus, however, is plainly full of eggs, and from whence did they enter it?

6 · A similar story is told also of the generation of birds. For there are some who say that the raven and the ibis unite at the mouth, and among quadrupeds that [15] the weasel brings forth its young by the mouth; so say Anaxagoras and some of the other natural scientists, speaking too superficially and without consideration. Concerning the birds, they are deceived by a false reasoning, because the copulation [20] of ravens is seldom seen, but they are often seen uniting with one another with their beaks, as do all the birds of the raven family; this is plain with domesticated jackdaws. Birds of the pigeon kind do the same, but, because they also plainly copulate, therefore they have not had the same legend told of them. But the raven [25] family is not amorous, for they are birds that produce few young, though this bird also has been seen copulating before now. It is a strange thing, however, that these theorists do not ask themselves how the semen enters the uterus through the intestine, which always concocts whatever comes into it, as the nutriment; and these [30] birds have a uterus like others, and eggs are found in them near the hypozoma. And the weasel has a uterus in like manner to the other quadrupeds; by what passage is the embryo to get from it to the mouth? But this opinion has arisen because the young of the weasel are very small like those of the other fissipeds, of which we

shall [757<sup>a</sup>1] speak later, and because they often carry the young about in their mouths.

Much deceived also are those who make a foolish statement about the trochus and the hyena. Many say that the hyena, and Herodorus of Heraclea says that the [5] trochus, has two pudenda, those of the male and of the female, and that the trochus impregnates itself but the hyena mounts and is mounted in alternate years. This is untrue, for the hyena has been seen to have only one pudendum, there being no lack of opportunity for observation in some districts, but hyenas have under the tail a line [10] like the pudendum of the female. Both male and female have such a mark, but the males are taken more frequently; this casual observation has given rise to this opinion. But enough has been said of this.

7 · Touching the generation of fish, the question may be raised, why it is that [15] in the selachia neither the females are seen discharging their eggs nor the males their milt, whereas in the non-viviparous fishes this is seen in both sexes. The reason is that the whole selachian class do not produce much semen, and further the females have their uterus near the hypozoma. For the males and females of the one [20] class of fish differ from the males and females of the other class in like manner, for the selachia are less productive of semen. But in the oviparous fish, as the females lay their eggs on account of their number, so do the males shed their milt on account of its abundance. For they have more milt than just what is required for copulation, [25] as nature prefers to expend the milt in helping to perfect the eggs, when the female has deposited them, rather than in forming them at first. For as has been said both further back and in our recent discussions, the eggs of birds are perfected internally but those of fish externally. The latter, indeed, resemble in a way those animals [30] which produce a grub; for the product discharged by them is still more imperfect. It is the male that brings about the perfection of the egg both of birds and of fishes, only in the former internally, as they are perfected internally, and in the latter externally, because the egg is imperfect when deposited; but the result is the same in both cases.

[757<sup>b</sup>1] In birds the wind-eggs become fertile, and those previously impregnated by one kind of male change their nature to that of the later impregnator. And if the eggs be behindhand in growth, then, if the same cock treads the hen again after leaving off treading for a time,<sup>8</sup> he causes

them to increase quickly, not, however, at [5] any period whatever, but if the treading take place before the egg changes so far that the white begins to separate from the yolk. But in the eggs of fishes no such limit of time has been laid down, but the males shed their milt quickly upon them to preserve them. The reason is that these eggs are not two-coloured, and hence there is no such limit of time fixed with them as with those of birds. This fact is what we [10] should expect, for by the time that the white and yolk are separated off from one another, the bird's egg already contains the principle that comes from the male parent (for the male contributes this).

Wind-eggs, then, participate in generation so far as is possible for them. That they should be perfected into an animal is impossible, for an animal requires [15] sense-perception; but the nutritive faculty of the soul is possessed by females as well as males, and indeed by all living things, as has been often said; and that is why the egg itself is perfect only as the embryo of a plant, but imperfect as that of an animal. If, then, there had been no male sex in the class of birds, the egg would have been [20] produced as it is in some fishes, if indeed there is any kind of fish of such a nature as to generate without a male; but it has been said of them before that this has not yet been satisfactorily observed. But as it is both sexes exist in all birds, so that, considered as a plant, the egg is perfect (and that is why it does not change again after impregnation); but in so far as it is not a plant it is not perfect, nor does [25] anything else result from it; for neither has it come into being simply like a real plant nor from copulation like an animal. Eggs, however, produced from copulation but already separated into white and yolk take after the first impregnator; for they already contain both principles. [30]

8 · The young are produced in the same way also by the cephalopoda, e.g. cuttlefish and the like, and by the crustacea, e.g. crayfish and their kindred, for these also lay eggs in consequence of copulation, and the male has often been seen uniting with the female. Therefore those who say that all fish are female and lay [758<sup>a</sup>1] eggs without copulation are plainly speaking unscientifically from this point of view also. For it is a wonderful thing to suppose that the former animals lay eggs in consequence of copulation and that fish do not; if again they were unaware of this, it is a sign of ignorance. The union of all these creatures lasts a considerable time, as in insects, and naturally so, for they are bloodless and therefore of a cold nature. [5]

In the cuttlefish and calamaries the eggs appear to be two, because the uterus is divided and appears double, but that of the octopus appears to be single. The reason is that the shape of the uterus in the octopus is round in form and spherical, the cleavage being obscure when it is filled with eggs. The uterus of the crayfish is [10] also bifid. All these animals also lay an imperfect egg for the same reason as fishes. In the crayfish and their like the females produce their eggs so as to keep them attached to themselves, which is why the side-flaps of the females are larger than [15] those of the males, to protect the eggs; the cephalopoda lay them away from themselves. The males of the cephalopoda sprinkle their milt over the females, as the male fish do over the eggs, and it becomes a continuous and glutinous mass, but in the crayfish and their like nothing of the sort has been seen or can be naturally expected, for the egg is under the female and is hard-shelled. Both these eggs and [20] those of the cephalopoda grow after deposition like those of fishes.

The cuttlefish while developing is attached to the egg by its front part, for here alone is it possible, because this animal alone has its front and back part pointing in the same direction. For the position and attitude of the young while developing you [25] must look at the *Histories*.<sup>9</sup>

9 · We have now spoken of the generation of other animals, those that walk, fly, and swim; it remains to speak of insects and testacea according to the plan laid down. Let us begin with the insects. It was observed previously that some of these [30] are generated by copulation, others spontaneously, and besides this that they produce a grub, and why this is so. For pretty much all creatures seem in a certain way to produce a grub first, since the most imperfect embryo is of such a nature; and in all animals, even the viviparous and those that lay a perfect egg, the first [35] embryo grows in size while still undifferentiated into parts; now such is the nature of the grub. After this stage some of the ovipara produce the egg in a perfect [758<sup>b</sup>1] condition, others in an imperfect, but it is perfected outside as has been often stated of fish. With animals internally viviparous the embryo becomes egg-like in a certain sense after its original formation, for the liquid is contained in a fine membrane, just [5] as if we should take away the shell of the egg, and that is why they call the abortion of an embryo at that stage an 'efflux'.

Those insects which generate at all generate a grub, and those which come into being spontaneously and not from copulation do so at first

from a formation of this nature. For we must put down caterpillars also and the product of spiders as a sort [10] of grub. And yet some even of these and many of the others may be thought to resemble eggs because of their round shape, but we must not judge by shapes nor yet by softness and hardness (for what is produced by some is hard), but by the fact that the whole of them is changed into the body of the creature and the animal is not [15] developed from a part of them. All these products that are of the nature of a grub, after progressing and acquiring their full size, become a sort of egg, for the husk about them hardens and they are motionless during this period. This is plain in the grub of bees and wasps and in caterpillars. The reason of this is that their nature, [20] because of its imperfection, oviposits as it were before the right time, as if the grub, while still growing in size, were a soft egg. Similar to this is also what happens with all other insects which come into being without copulation in wool and other such materials and in water. For all of them after the grub-stage become immovable and [25] their integument dries round them, and after this the latter bursts and there comes forth as from an egg an animal perfected in its third stage, and of these the winged sort are more numerous than those which walk.

Another point is quite natural, which may be wondered at by many. Caterpillars at first take nourishment, but after this stage do so no longer, but what is called [30] by some the chrysalis is motionless. The same applies to the grub of wasps and bees ...<sup>10</sup> after this comes into being the so-called pupa, which has nothing of the kind. For an egg is also of such a nature that when it has reached perfection it grows no more in size, but at first it grows and receives nourishment until it is differentiated [35] and becomes a perfect egg. Sometimes the grub contains in itself the material from which, as it feeds, a residue is produced<sup>11</sup>—e.g. the grubs of bees and wasps; [759<sup>a</sup>1] sometimes it gets its nourishment from outside itself, as caterpillars and some others.

It has thus been stated why such animals go through a threefold development and for what reason they become immovable again after moving. And some of them come into being by copulation, like birds and vivipara and most fishes, others [5] spontaneously, like some plants.

10 · There is much difficulty about the generation of bees. If it is really true that in the case of some fishes there is such a method of generation that they produce eggs without copulation, this may well happen also with bees, to judge from [10] appearances. For they must



either bring the young brood from elsewhere, as some say, and if so the young must either be spontaneously generated or produced by some other animal, or they must generate them themselves, or they must bring some and generate others, for this also is maintained by some, who say that they bring the [15] young of the drones only. Again, if they generate them it must be either with or without copulation; if the former, then either each kind must generate its own kind, or some one kind must generate the others, or one kind must unite with another for the purpose (I mean for instance that bees may be generated from the union of bees, drones from that of drones, and kings from that of kings, or that all the others may [20] be generated from one, as from what are called kings and leaders, or from the union of drones and bees, for some say that the former are male, the latter female, while others say that the bees are male and the drones female). But all these views are impossible if we reason first upon the facts peculiar to bees and secondly upon those [25] which apply more generally to other animals also.

For if they do not generate the young but bring them from elsewhere, then bees ought to come into being also, if the bees did not carry them off, in the places from which the old bees carry the seeds. For why, if new bees come into existence when the seeds are transported, should they not do so if the seeds are left there? They [30] ought to do so just as much, whether the seeds are spontaneously generated in the flowers or whether some animal generates them. And if the seeds were of some other animal, then that animal ought to be produced from them instead of bees. Again, that they should collect honey is reasonable, for it is their food, but it is strange that they should collect the young if they are neither their own offspring nor [35] food. With what object should they do so? for all animals that trouble themselves about the young labour for what appears to be their own offspring.

[759<sup>b</sup>1] But, again, it is also unreasonable to suppose that the bees are female and the drones male, for nature does not give weapons for fighting to any female, and while the drones are stingless all the bees have a sting. Nor is the opposite view [5] reasonable, that the bees are male and the drones female, for no males are in the habit of working for their offspring, but as it is the bees do this. And generally, since the brood of the drones is found coming into being among them even if there is no mature drone present, but that of the bees is not so found without the presence of [10] the kings (which is why some say that the young of the drones alone is brought in from outside), it is plain that they are not produced from copulation, either of bee with bee or drone with drone or

of bees with drones. (That they should import the brood of the drones alone is impossible for the reasons already given, and besides it is unreasonable that a similar state of things should not prevail with all the three [15] kinds alike.) Then, again, it is also impossible that the bees themselves should be some of them male and some female, for in all kinds of animals the two sexes differ. Besides they would in that case generate their own kind, but as it is their brood is not found to come into being if the leaders are not among them, as men say. And an [20] argument against both theories, that the young are generated by union of the bees with one another or with the drones, separately or with one another, is this: none of them has ever yet been seen copulating, whereas this would have often happened if the sexes had existed in them. It remains then, if they are generated by copulation at [25] all, that the kings shall unite to generate them. But the drones are found to come into being even if no leaders are present, and it is not possible that the bees should either import their brood or themselves generate them by copulation. It remains then, as appears to be the case in certain fishes, that the bees should generate the drones without copulation, being indeed female in respect of generative power, but [30] containing in themselves both sexes as plants do. Hence also they have the instrument for fighting, for we ought not to call that female in which the male sex is not separated. But if this is found to be the case with drones, if they come into being [35] without copulation, then it is necessary that the same account should be given of the bees and the kings and that they also should be generated without copulation. Now if the brood of the bees had been found to come into being among them without the [760<sup>a</sup>1] presence of the kings, it would necessarily follow that the bees also are produced from bees themselves without copulation, but as it is, since those occupied with the tendance of these creatures deny this, it remains that the kings must generate both their own kind and the bees.

As bees are a peculiar and extraordinary kind of animal so also their [5] generation appears to be peculiar. That bees should generate without copulation is a thing which may be paralleled in other animals, but that what they generate should not be of the same kind is peculiar to them, for the erythrinus generates an [10] erythrinus and the channa a channa. The reason is that bees themselves are not generated like flies and similar creatures, but from a kind different indeed but akin to them, for they are produced from the leaders. Hence in a sort of way their generation is analogous. For the leaders resemble the drones in size and the bees in possessing a sting; so the bees are like them in this respect, and the

drones are like [15] them in size. For there must needs be some overlapping unless the same kind is always to be produced from each; but this is impossible, for at that rate the whole class would consist of leaders. The bees, then, are assimilated to them in their power of generation, the drones in size; [if the latter had had a sting also, they would have [20] been leaders, but as it is this much of the difficulty remains, for the leaders are like both kinds at once, like the bees in possessing a sting, like the drones in size].<sup>12</sup>

But the leaders also must be generated from something. Since it is neither from the bees nor from the drones, it must be from their own kind. The cells of the kings [25] are produced last and are not many in number.

Thus what happens is this: the leaders generate their own kind but also another kind, that of the bees; the bees again generate another kind, the drones, but do not [30] also generate their own kind—this has been denied them. And since what is according to nature is always in due order, therefore it is necessary that it should be denied to the drones even to generate another kind than themselves. This is just what we find happening, for though the drones are themselves generated, they generate nothing else, but the process reaches its limit in the third stage. And so beautifully is this arranged by nature that the three kinds always continue in [760<sup>b</sup>1] existence and none of them fails, though they do not all generate.

Another fact is also natural, that in fine seasons much honey is collected and many drones are produced, but in rainy seasons a large brood of ordinary bees. For the wet causes more residual matter to be formed in the bodies of the leaders, the [5] fine weather in that of the bees, for being smaller in size they need the fine weather more than the kings do. It is right also that the kings, being as it were made with a view to producing young, should remain within, freed from the labour of procuring necessities, and also that they should be of a considerable size, their bodies being, as it were, constituted with a view to bearing young, and that the drones should be [10] idle as having no weapon to fight for their food and because of the slowness of their bodies. But the bees are intermediate between the two other kinds, for this is useful for their work, and they are workers as having to support not only their young but also their fathers. And it agrees with our views that the bees attend upon their kings [15] because they are their offspring (for if nothing of the sort had been the case the facts about their leadership would be unreasonable), and that, while they suffer the kings to do no work as

being their parents, they punish the drones as their children, for it is nobler to punish one's children and those who have no work to perform. The fact [20] that the leaders being few generate the bees in large numbers seems to be similar to what obtains in the generation of lions, which at first produce five, afterwards a smaller number each time, at last one and thereafter none. So the leaders at first produce a number of workers, afterwards a few of their own kind; thus the brood of [25] the latter is smaller in number than that of the former, but where nature has taken away from them in number she has made it up again in size.

Such appears to be the truth about the generation of bees, judging from theory [30] and from what are believed to be the facts about them; the facts, however, have not yet been sufficiently grasped; if ever they are, then credit must be given rather to observation than to theories, and to theories only if what they affirm agrees with the observed facts.

A further indication that bees are produced without copulation is the fact that the brood appears small in the cells of the comb, whereas, whenever insects are [761<sup>a</sup>1] generated by copulation, the parents remain united for a long time but produce quickly something of the nature of a grub and of a considerable size.<sup>13</sup>

Concerning the generation of animals akin to them, as hornets and wasps, the facts in all cases are similar to a certain extent, but are devoid of the extraordinary [5] features which characterize bees; this we should expect, for they have nothing divine about them as the bees have. For the so-called 'mothers' generate the young and mould the first part of the combs, but they generate by copulation with one another, for their union has often been observed. As for all the differences of each of [10] these kinds from one another and from bees, they must be investigated with the aid of the illustrations to the *Histories*.

11 · Having spoken of the generation of all insects, we must now speak of the testacea. Here also the facts of generation are partly like and partly unlike those in [15] the other classes. And this is what might be expected. For compared with animals they resemble plants, compared with plants they resemble animals, so that in a sense they appear to come into being from semen, but in another sense not so, and in one way they are spontaneously generated but in another from their own kind, or some of them in the latter way, others in the former. Because their nature answers [20] to that of plants, therefore few or no kinds of testacea come into being on land, e.g. the snails and any others, few as they are, that

resemble them; but in the sea and similar waters there are many of all kinds of forms. But the class of plants has but [25] few and one may say practically no representatives in the sea and such places, all such growing on the land. For plants and testacea are analogous; and in proportion as liquid has more life-supporting power than solid, water than earth, so much does the nature of testacea differ from that of plants, since the object of testacea is to be [30] in such a relation to water as plants are to earth, as if plants were, so to say, land-shell fish, shell-fish water-plants.

For such a reason also the testacea in the water vary more in form than those on the land. For the nature of liquid is more plastic than that of earth and yet not much less material, and this is especially true of the inhabitants of the sea, for fresh [761<sup>b</sup>1] water, though sweet and nutritious, is cold and less material. That is why animals having no blood and not of a hot nature are not produced in lakes nor in the fresher among brackish waters, but only exceptionally; but it is in estuaries and at the [5] mouths of rivers that they come into being, as testacea and cephalopoda and crustacea, all these being bloodless and of a cold nature. For they seek at the same time the warmth of the sun and food; now the sea is not only water but much more material than fresh water and hot in its nature; it has a share in all the parts of the [10] universe, water and air and earth, so that it also has a share in all living things which are produced in connexion with each of these elements.<sup>14</sup> Plants may be assigned to land, the aquatic animals to water, the land animals to air, but variations of quantity and distance make a great and wonderful difference. The fourth class must [15] not be sought in these regions, though there certainly ought to be some animal corresponding to the element of fire, for this is counted in as the fourth of the elementary bodies. But the form which fire assumes never appears to be peculiar to it, but it always exists in some other of the elements, for that which is ignited appears to be either air or smoke or earth. Such a kind of animal must be sought in [20] the moon, for this appears to participate in the element removed in the third degree from earth. The discussion of these things, however, belongs to another subject.

To return to testacea, some of them are formed spontaneously, some emit a sort of generative substance from themselves, but these also often come into being [25] from a spontaneous formation. To understand this we must grasp the different methods of generation in plants; some of these are produced from seed, some from slips, planted out, some by budding off alongside, as the class of onions. In the last way are produced mussels, for smaller ones are always growing off alongside the [30]

original, but the trumpet-shells, the purple-fish, and those which are said to 'honeycomb' emit masses of a liquid slime as if originated by something of a seminal nature. We must not, however, consider that anything of the sort is real semen, but that these creatures participate in the resemblance to plants in the manner stated above. Hence when once one such creature has been produced, then is produced a number of them. For all these creatures are liable to be even spontaneously [762<sup>a</sup>1] generated, and so to be formed still more plentifully in proportion if some are already existing. For it is natural that each should have some superfluous residue attached to it from the original, and from this buds off each of the creatures growing alongside of it. Again, since the nutriment and its residue possess a like power, it is [5] likely that the product of those testacea which 'honeycomb' should resemble the original formation, and so it is natural that a new animal of the same kind should come into being from this also.

All those which do not bud off or 'honeycomb' are spontaneously generated. Now all things formed in this way, whether in earth or water, manifestly come into [10] being in connexion with putrefaction and an admixture of rain-water. For as the sweet is separated off into the matter which is forming, the residue of the mixture takes such a form. Nothing comes into being by putrefying, but by concocting; putrefaction and the thing putrefied is only a residue of that which is concocted. For [15] nothing comes into being out of the whole of anything, any more than in the products of art; if it did art would have nothing to do, but as it is in the one case art removes the useless material, in the other nature does so. Animals and plants come into being in earth and in liquid because there is water in earth, and air in water, [20] and in all air is vital heat, so that in a sense all things are full of soul. Therefore living things form quickly whenever this air and vital heat are enclosed in anything. When they are so enclosed, the corporeal liquids being heated, there arises as it [25] were a frothy bubble. Whether what is forming is to be more or less honourable in kind depends on the embracing of the vital principle; this again depends on the medium in which the generation takes place and the material which is included. Now in the sea the earthy matter is present in large quantities, and consequently the testaceous animals are formed from a concretion of this kind, the earthy matter [30] hardening round them and solidifying in the same manner as bones and horns (for these cannot be melted by fire), and the body which contains the life being included within it.

The class of snails is the only class of such creatures that has been

seen uniting, but it has never yet been sufficiently observed whether their generation is the result of the union or not.

It may be asked, if we wish to follow the right line of investigation, what it is in [762<sup>b</sup>1] such animals the formation of which corresponds to the material principle. For in the females this is a residual secretion of the animal, potentially such as that from which it came, by imparting motion to which the principle derived from the male perfects the animal. But here what must be said to correspond to this, and whence [5] comes or what is the moving principle which corresponds to the male? We must understand that even in animals which generate it is from the incoming nourishment that the heat in the animal makes the residue, the beginning of the conception, by secretion and concoction. The like is the case also in plants, except that in these [10] (and also in some animals) there is no further need of the male principle, because they have it mingled with the female principle within themselves, whereas the residual secretion in most animals does need it. The nourishment again of some is earth and water, of others a combination of these, so that what the heat in animals produces from their nutriment, the heat of the warm season in the environment puts [15] together and combines by concoction out of the sea-water and the earth. And the portion of the vital principle which is either included along with it or separated off in the air makes an embryo and puts motion into it. Now in plants which are spontaneously generated the method of formation is uniform; they arise from a part [20] of something, and while some of it is the starting-point of the plant, some is the first nourishment of the young shoots. Other animals are produced in the form of a grub, not only those bloodless animals which are not generated from parents but even some sanguinea, as a kind of mullet and some other river fishes and also the eel kind. [25] For all of these, though they have but little blood by nature, are nevertheless sanguinea, and have a heart with blood in it as the origin of the parts; and the so-called 'entrails of earth', in which comes into being the body of the eel, have the nature of a grub.

Hence one might suppose, in connexion with the origin of men and quadrupeds, [30] that, if ever they were really 'earth-born' as some say, they came into being in one of two ways; that either it was by the formation of a grub at first or else it was out of eggs. For either they must have had in themselves the nutriment for growth (and such a conception is a grub) or they must have got it from elsewhere, and that either from the mother or from part of the conception. If then the former is impossible (I mean that nourishment should flow to them from the earth

as it does in animals from the mother), then they must have got it from some part of the conception, and [763<sup>a</sup>1] such generation we say is from an egg.

It is plain then that, if there really was any such beginning of the generation of all animals, it is reasonable to suppose it to have been one of these two. But it is less reasonable to suppose that it was from eggs, for we do not see such generation [5] occurring with any animal, but we do see the other both in the sanguinea above mentioned and in the bloodless animals. Such are some of the insects and such are the testacea which we are discussing; for they do not develop out of a part of something (as do animals from eggs), and they grow like a grub. For the grub grows [10] towards the upper part and the first principle, since in the lower part is the nourishment for the upper. And this resembles the development of animals from eggs, except that these latter consume the whole egg, whereas in the grub, when the upper part has grown by taking up into itself part of the substance in the lower part, the lower part is then differentiated out of the rest. The reason is that in later life [15] also the nourishment is absorbed by all animals in the part below the hypozoma.

That the grub grows in this way is plain in the case of bees and the like, for at first the lower part is large in them and the upper is smaller. The details of growth in the testacea are similar. This is plain in the whorls of the spiral-shelled creatures, [20] for always as the animal grows the whorls become larger towards the front and what is called the head of the creature.

We have now pretty well described the manner of the development of these and the other spontaneously generated animals. That all the testacea are formed [25] spontaneously is clear from such facts as these. They come into being on the side of boats when the frothy mud putrefies. In many places where previously nothing of the kind existed, the so-called lagoon-oysters, a kind of testacea, have come into [30] being when the spot turned muddy through want of water; thus when a naval armament cast anchor at Rhodes a number of clay vessels were thrown out into the sea, and after some time, when mud had collected round them, oysters used to be found in them. Here is another proof that such animals do not emit any generative substance from themselves; when certain Chians carried some live oysters over from [763<sup>b</sup>1] Pyrrha in Lesbos and placed them in narrow straits of the sea where tides clash, they became no more numerous as time passed, but increased greatly in size. The so-called eggs contribute nothing to generation but are only a sign of good [5] condition, like fat in the sanguinea, and therefore the oysters are savoury



eating at these periods. A proof that this substance is not really eggs is the fact that such 'eggs' are always found in some testacea, as in pinnae, trumpet-shells, and purple-fish; only they are sometimes larger and sometimes smaller; in others, as scallops, mussels, and the so-called lagoon-oysters, they are not always present but [10] only in the spring; as the season advances they dwindle and at last disappear altogether; the reason being that the spring is favourable to their being in good condition. In others again, as the ascidians, nothing of the sort is visible. (The details concerning these last, and the places in which they come into being, must be [15] learnt from the *History*.)

## BOOK IV

[20] 1 · We have thus spoken of the generation of animals both generally and separately in all the different classes. But, since male and female are distinct in the most perfect of them, and since we say that the sexes are first principles of all living things whether animals or plants, only in some of them the sexes are separated and [25] in others not, therefore we must speak first of the origin of the sexes in the latter. For while the animal is still imperfect in its kind the distinction is already made between male and female.

It is disputed, however, whether the embryo is male or female, as the case may be, even before the distinction is plain to our senses, and further whether it is thus [30] differentiated within the mother or even earlier. It is said by some, as by Anaxagoras and other of the physicists, that this antithesis exists from the beginning in the seeds; for the seed, they say, comes from the male while the female [764<sup>a</sup>1] only provides the place, and the male is from the right, the female from the left, and so also that the male embryo is in the right of the uterus, the female in the left. Others, as Empedocles, say that the differentiation takes place in the uterus; for he says that if the uterus is hot what enters it becomes male, if cold, female, the cause [5] of the heat or cold being the flow of the menstrual fluids, according as it is colder or hotter, older or more recent. Democritus of Abdera also says that the differentiation of sex takes place within the mother; that however it is not because of heat and cold that one embryo becomes female and another male, but that it depends on the [10] question which parent it is whose semen prevails,—not the whole of the semen, but that which has come from the part by which male and female differ from one another. This is a better theory, for certainly Empedocles has made a rather lighthearted assumption in thinking that the difference between them is due only to cold and heat, when he saw that there was a great difference in the whole of the [15] sexual parts, the difference in fact between the male pudenda and the uterus. For suppose two animals already moulded in embryo, the one having all the parts of the female, the other those of the male; suppose them then to be put into the uterus as into an oven, the former when the oven is hot, the latter when it is cold; then on the view of Empedocles that which has no uterus will be female and that which has will [20] be male. But this is impossible. Thus the theory of Democritus would be the better of the two, at least as far as this goes, for he seeks for the difference in this

development and tries to set it forth; whether he does so well or not is another question.

Again, if heat and cold were the cause of the difference of the parts, this ought to have been stated by those who maintain the view of Empedocles; for to explain [25] the origin of male and female is practically the same thing as to explain this, which is the manifest difference between them. And it is no small matter, starting from temperature as a principle, to collect the cause of the origin of these parts, as if it were a necessary consequence for this part which they call the uterus to be formed [30] in the embryo under the influence of cold but not under that of heat. The same applies also to the parts which serve for intercourse, since these also differ in the way stated previously.

Moreover male and female twins are often found together in the same part of the uterus; this we have observed sufficiently by dissection in all the vivipara, both [35] land animals and fish. Now if Empedocles had not seen this it was only natural for him to fall into error in assigning this cause of his; but if he had seen it it is strange [764b1] that he should still think the heat or cold of the uterus to be the cause, since on his theory both these twins would have become either male or female, but as it is we do not see this to be the fact.

Again he says that the parts of the embryo are sundered, some being in the male and some in the female parent, which is why they desire intercourse with one [5] another. If so it is necessary that the substance of these parts too should be separated from one another and that a union should take place—but not on account of cooling or heating. But perhaps it would be superfluous to discuss thoroughly such a cause<sup>1</sup> as this for its whole character seems to be fanciful. If, however, the [10] facts about semen are such as we have actually stated, if it does not come from the whole of the body of the male parent and if the secretion of the male does not give any material at all to the embryo, then we must make a stand against both Empedocles and Democritus and any one else who argues on the same lines. For then it is not possible that the body of the seed should exist sundered, part in the [15] female parent and part in the male, as Empedocles says in the words: 'But the nature of the limbs hath been sundered, part in the man's . . .';<sup>2</sup> nor yet that the whole is drawn off from each parent and the combination of the two becomes male or female according as one part prevails over another. [20]

And, to take a more general view, though it is better to say that the one part makes it female by prevailing through some superiority than to assign nothing but heat as the cause without any reflection, yet, as the

form of the pudendum also differs, we need an explanation of the fact that both these parts go along with each other. If it is because they are near each other, then each of the other parts also [25] ought to go with them, for one of the prevailing parts is always near another; thus the offspring would be not only female or male but also like its mother or father respectively.

Besides, it is absurd to suppose that these parts should come into being as something isolated, without the body as a whole having changed along with them. Take first and foremost the blood-vessels, round which the whole mass of the flesh lies as round a frame-work. It is not reasonable that these should become of a [30] certain quality because of the uterus, but rather that the uterus should do so on account of them. For though it is true that each is a receptacle of blood of some kind, still the system of the vessels is prior to the other; the moving principle must always be prior to that which it moves, and it is because it is itself of a certain [35] quality that it is the cause of the development. The difference, then, of these parts as compared with each other in the two sexes is a result; not this but something else must be held to be the first principle and the cause, even if no semen is secreted by [765<sup>a</sup>1] either male or female, but the embryo is formed in any way you please.

The same argument as that with which we meet Empedocles and Democritus [5] will serve against those who say that the male comes from the right and the female from the left. If the male contributes no material, there can be nothing in this view. If, as they say, he does contribute something of the sort, we must confront them in the same way as we did the theory of Empedocles, which accounts for the difference [10] between male and female by the heat and cold of the uterus. They make the same mistake as he does, when they account for the difference by their 'right and left', though they see that the sexes differ actually by the whole of the sexual parts; for what reason then is the body of the uterus to exist in those embryos which come [15] from the left and not in those from the right? For if an embryo has come from the left but has not acquired this part, it will be a female without a uterus—or maybe a male with one. Besides, as has been said before, a female embryo has been observed in the right part of the uterus, a male in the left, or again both at once in the same [20] part, and this not only once but several times. [Or the male in the right part, the female in the left; and no less both are formed in the right part.]<sup>3</sup>

Some again, persuaded of the truth of a view resembling that of these philosophers, say that if a man copulates with the right or left testis tied

up the [25] result is male or female offspring respectively; so at least Leophanes asserted. And some say that the same happens in the case of those who have one or other testis excised, not speaking truth but vaticinating what will happen from probabilities and jumping at the conclusion that it is so before seeing that it proves to be so. Moreover, they know not that these parts of animals contribute nothing to the [30] production of one sex rather than the other; a proof of this is that many animals in which the distinction of sex exists, and which produce both male and female offspring, nevertheless have no testes, as the footless animals; I mean the classes of fish and of serpents.

[35] To suppose, then, either that heat and cold are the causes of male and female, or that the different sexes come from the right and left, is not altogether [765<sup>b</sup>1] unreasonable in itself; for the right of the body is hotter than the left, and the concocted semen is hotter than the unconcocted; again, the thickened is concocted, and the more thickened is more fertile. Yet to put it in this way is to seek for the [5] cause from too remote a starting-point; we must draw near the primary causes in so far as it is possible for us.

We have, then, previously spoken elsewhere of both the body as a whole and its parts, explaining what each part is and for what reason it exists. But the male and female are distinguished by a certain capacity and incapacity. (For the male is that [10] which can concoct and form and discharge a semen carrying with it the principle of form—by ‘principle’ I do not mean a material principle out of which comes into being an offspring resembling the parent, but I mean the first moving cause, whether it have power to act as such in the thing itself or in something else—but the [15] female is that which receives semen, but cannot form it or discharge it.) And all concoction works by means of heat. Therefore the males of animals must needs be hotter than the females. For it is by reason of cold and incapacity that the female is more abundant in blood in certain parts of her anatomy, and this abundance is an evidence of the exact opposite of what some suppose, thinking that the female is hotter than the male for this reason, i.e. the discharge of menstrual fluids. It is true [20] that blood is hot, and that which has more of it is hotter. But they assume that this discharge occurs through excess of blood and of heat, as if it were possible for everything to be equally blood if only it be liquid and sanguineous in colour, and as if it might not become less in quantity but purer in quality in those who assimilate [25] nourishment properly. In fact they look upon this residual discharge in the same light as that of the intestines, when they think that a greater

amount of it is a sign of a hotter nature, whereas the truth is just the opposite. For consider the production of fruit; the nutriment in its first stage is abundant, but the useful product derived from it is small, indeed the final result is nothing at all compared to the quantity in [30] the first stage. So is it with the body; the various parts receive and work up the nutriment, from the whole of which the final result is quite small. This is blood in some animals, in some its analogue. Now since the one sex is able and the other is [35] unable to reduce the residual secretion to a pure form, and every capacity has a certain corresponding organ, whether the faculty produces the desired results in a lower degree or in a higher degree, and since the two sexes correspond in this [766<sup>a</sup>1] manner (the terms 'able' and 'unable' being used in more senses than one)—therefore it is necessary that both female and male should have organs. Accordingly the one has the uterus, the other the male organs.

Again, nature gives both the faculty and the organ to each individual at the [5] same time, for it is better so. Hence each region comes into being along with the secretions and the faculties, as e.g. the faculty of sight is not perfected without the eye, nor the eye without the faculty of sight; and so too the intestine and bladder come into being along with the faculty of forming the residues. And since that from which an organ comes into being and that by which it is increased are the same (i.e. [10] the nutriment), each of the parts will be made out of such a material and such residual matter as it is able to receive. In the second place, again, it is formed, as we say, in a certain sense, out of its opposite. Thirdly, we must understand besides this that, if it is true that when a thing perishes it becomes the opposite of what it was, it is necessary also that what is not under the sway of that which made it must change [15] into its opposite. After these premisses it will perhaps be now clearer for what reason one embryo becomes female and another male. For when the first principle does not bear sway and cannot concoct the nourishment through lack of heat nor bring it into its proper form, but is defeated in this respect, then must the material [20] change into its opposite. Now the female is opposite to the male, and that in so far as the one is female and the other male. And since it differs in its faculty, its organ also is different, so that the embryo changes into this state. And as one part of first-rate importance changes, the whole system of the animal differs greatly in form along with it. This may be seen in the case of eunuchs, who, though mutilated in one part [25] alone, depart so much from their original appearance and approximate closely to the female form. The reason of this is that some of the parts are principles, and when a

principle is moved many of the parts that go along with it must change with it.

[30] If then the male is a principle and a cause, and the male is such in virtue of a certain capacity and the female is such in virtue of an incapacity, and if the definition of the capacity and of the incapacity is ability or inability to concoct the nourishment in its ultimate stage, this being called blood in the sanguinea and the analogue of blood in the other animals, and if the cause of this capacity is in the first principle and in the part which contains the principle of natural heat—therefore a [766<sup>b</sup>1] heart must be formed in the sanguinea (and the resulting animal will be either male or female), and in the other kinds which possess the sexes must be formed that which is analogous to the heart.

This, then, is the first principle and cause of male and female, and this is the part of the body in which it resides. But the animal becomes definitely female or [5] male by the time when it possesses also the parts by which the female differs from the male, for it is not in virtue of any part you please that it is male or female, any more than it is able to see or hear by possessing any part you please.

To recapitulate, we say that the semen has been laid down to be the ultimate residue of the nutriment. By ultimate I mean that which is carried to every part of [10] the body, and this is also the reason why the offspring is like the parent. For it makes no difference whether we say that the semen comes from all the parts or goes to all of them, but the latter is the better. But the semen of the male differs in that it contains a principle within itself of such a kind as to set up movements also in the embryo and to concoct thoroughly the ultimate nourishment, whereas the secretion [15] of the female contains material alone. If, then, the male element prevails it draws the female element into itself, but if it is prevailed over it changes into the opposite or is destroyed. But the female is opposite to the male, and is female because of its inability to concoct and of the coldness of the sanguineous nutriment. And nature assigns to each of the residues the part fitted to receive it. But the semen is a residue, [20] and this in the hotter animals with blood, i.e. the males, is moderate in quantity, which is why the recipient parts of this residue in males are only passages. But the females, owing to inability to concoct, have a great quantity of blood, for it cannot be worked up into semen. Therefore they must also have a part to receive this, and this part must be unlike the passages of the male and of a considerable size. This is [25] why the uterus is of such a nature, this being the part by which the female differs from the male.

2 · We have thus stated for what reason the one becomes female and the other male. Observed facts confirm what we have said. For more females are produced by the young and by those verging on old age than by those in the prime of [30] life; in the former the heat is not yet perfect, in the latter it is failing. And those of a moister and more feminine state of body are more wont to beget females, and a liquid semen causes this more than a thicker; now all these characteristics come of deficiency in natural heat.

Again, more males are born if copulation takes place when north than when south winds are blowing; for animals' bodies are more liquid when the wind is in the [35] south, so that they produce more residue—and more residue is harder to concoct; hence the semen of the males is more liquid, and so is the discharge of the menstrual fluids in women.

Also the fact that menstruation occurs in the course of nature rather when the [767<sup>a</sup>1] month is waning is due to the same causes. For this time of the month is colder and moister because of the waning and failure of the moon; as the sun makes winter and summer in the year as a whole, so does the moon in the month. This is not due to the [5] turning of the moon, but it grows warmer as the light increases and colder as it wanes.

The shepherds also say that it not only makes a difference in the production of males and females if copulation takes place during northern or southerly winds, but [10] even if the animals while copulating look towards the south or north; so small a thing will sometimes turn the scale and cause cold or heat, and these again influence generation.

The male and female, then, are distinguished generally, as compared with one another in connexion with the production of male and female offspring, for the causes stated. However, they also need a certain correspondence with one another; [15] for all things that come into being as products of art or of nature exist in virtue of a certain ratio. Now if the hot preponderates too much it dries up the liquid; if it is very deficient it does not solidify it; for the product we need the due mean between the extremes. Otherwise it will be as in cooking; too much fire burns the meat, too [20] little does not cook it, and in either case the process is a failure. So also there is need of due proportion in the mixture of the male and female elements. And for this cause it often happens to many of both sexes that they do not generate with one another, but if divorced and remarried to others do generate; and these oppositions [25] show themselves sometimes in youth, sometimes in advanced age, alike as concerns fertility or infertility, and as concerns generation of male or



female offspring.

One country also differs from another in these respects, and one water from another, for the same reasons. For the nourishment and the condition of the body [30] are of such or such a kind because of the tempering of the surrounding air and of the food entering the body, especially the water; for men consume more of this than of anything else, and this enters as nourishment into all food, even solids. Hence hard waters cause infertility, and cold waters the birth of females. [35]

3 · The same causes must be held responsible for the facts that some children resemble their parents, while others do not (some being like the father and others like the mother, both in the body as a whole and in each part); and that they [767<sup>b</sup>1] resemble their parents more than remoter ancestors, and resemble those ancestors more than any chance individual; and that males rather resemble their fathers, females their mothers; and that some, though resembling none of their relations, yet do at any rate resemble a human being, but others are not even like a human being [5] but a monstrosity. For even he who does not resemble his parents is already in a certain sense a monstrosity; for in these cases nature has in a way departed from the type. The first departure indeed is that the offspring should become female instead of male; this, however, is a natural necessity. (For the class of animals divided into [10] sexes must be preserved, and as it is possible for the male sometimes not to prevail over the female, either through youth or age or some other such cause, it is necessary that animals should produce female young.) And the monstrosity, though not necessary in regard of a final cause and an end, yet is necessary accidentally. As [15] for the origin of it, we must look at it in this way. If the generative residue in the menstrual fluids is properly concocted, the movement imparted by the male will make the form of the embryo in the likeness of itself. (Whether we say that it is the semen or this movement that makes each of the parts grow, makes no difference; nor again whether we say that it makes them grow or forms them from the [20] beginning, for the formula of the movement is the same in either case.) Thus if this movement prevail, it will make the embryo male and not female, like the father and not like the mother; if it prevail not, the embryo is deficient in that faculty in which it has not prevailed. By 'each faculty' I mean this. That which generates is not only [25] male but also a certain sort of male, e.g. Coriscus or Socrates, and it is not only Coriscus but also a man. In this way some of the characteristics of the father are

more near to him, others more remote from him considered simply as a parent and not in reference to his accidental qualities (as for instance if the parent is a scholar or the neighbour of some particular person). Now the peculiar and individual has [30] always more force in generation. Coriscus is both a man and an animal, but his manhood is nearer to what is peculiar to him than is his animal-hood. In generation both the individual and the class are operative, but the individual is the more so of [35] the two, for this is the substance. And the offspring is produced indeed of a certain quality, but also as a certain 'this', and this latter is the substance. Therefore it is from the forces of all such things that the movements come which exist in the semen; potentially from remoter ancestors but in a higher degree from whatever [768<sup>a</sup>1] individual is nearer (and by the individual I mean e.g. Coriscus or Socrates). Now since everything changes not into anything haphazard but into its opposite, therefore also that which is not prevailed over in generation must change and become the opposite, in respect of that particular force in which the generative and [5] moving element has not prevailed. If then it has not prevailed in so far as it is male, the offspring becomes female; if in so far as it is Coriscus or Socrates, the offspring does not resemble the father but the mother. For as father and mother are opposed in general, so also the individual father is opposed to the individual mother. The like applies also to the forces that come next in order, for the offspring always changes [10] rather into the likeness of the nearer ancestor, both in the paternal and in the maternal line.

Some of the movements exist actually, others potentially; actually, those of the father and the general type, as man and animal; potentially, those of the female and [15] the remoter ancestors. Now if it lose its own nature, it changes to its opposites, but the movements which form the embryo relapse into those nearly connected with them; for instance, if the movement of the male parent relapses, it changes by a very slight difference into that of his father, and in the next instance into that of his grandfather; and in this way in the female line too the movement of the female [20] parent changes into that of her mother, and, if not into this, then into that of her grandmother; and similarly also with the more remote ancestors.

Naturally then it is most likely that the characteristics of male and of the father will go together, whether they prevail or are prevailed over. For the difference between them is small so that there is no difficulty in both concurring, for Socrates is an individual man with certain characteristics. Hence for the most part the male offspring resemble the

father, and the female the mother. For the loss of [25] both characters takes place at once, and the change is into the two opposites; now female is opposed to male, and mother to father.

But if the movement coming from the male principle prevails while that coming from Socrates does not, or vice versa, then the result is that male children [30] are produced resembling the mother and female children resembling the father.

If again the movements relapse, then if the male character remains but the movement coming from the individual Socrates relapses into that of the father of Socrates, the result will be a male child resembling its grandfather or some other of its more remote ancestors in the male line on the same principle. If the male principle be prevailed over, the child will be female and resembling most probably its mother, but, if the movement coming from the mother also relapses, it will [35] resemble its mother's mother or the resemblance will be to some other of its more remote ancestors in the female line on the same principle.

The same applies also to the separate parts, for often some of these take after [768<sup>b</sup>1] the father, and others after the mother, and yet others after some of the remoter ancestors. For, as has been often said already, some of the movements which form the parts exist actually and others potentially. We must grasp certain general principles, not only that just mentioned (that some of the movements exist [5] potentially and others actually), but also two others, that if a character be prevailed over it changes into its opposite, and, if it relapse it is resolved into the movement next allied to it—if less, into that which is near, if more, into that which is further removed. Finally, the movements are so confused together that there is no [10] resemblance to any of the family or kindred, but the only character that remains is that common to all, i.e. being a man. The reason for this is that this accompanies all the individual characteristics; man is universal, while Socrates, the father, and the mother, whoever she may be, are individuals.

The reason why the movements relapse is this. The agent is itself acted upon by [15] that on which it acts; thus that which cuts is blunted by that which is cut by it, that which heats is cooled by that which is heated by it, and in general the moving cause (except in the case of the first cause of all) does itself receive some motion in return; e.g. what pushes is itself in a way pushed again and what crushes is itself crushed [20] again. Sometimes it is altogether more acted upon than acting, so that what is heating or cooling something else is itself cooled or heated, sometimes having produced no effect, sometimes less than it has itself

received. (This question has been treated in the special discussion of action and reaction, where it is laid down in what classes of things action and reaction exist.) Now that which is acted on escapes [25] and is not mastered, either through deficiency of power in the concocting and moving agent or because what should be concocted and formed into distinct parts is too cold and in too great quantity. Thus the moving agent, mastering it in one part but not in another, makes the embryo in formation to be multiform, as happens with [30] athletes because they eat so much. For owing to the quantity of their food their nature is not able to master it in such a way that their form grows proportionately and remains symmetrical; therefore their limbs develop irregularly, sometimes indeed almost so much that no one of them resembles what it was before. Similar to this is also the disease known as satyriasis, in which the face appears like that of [35] some other creature—a satyr—owing to a quantity of unconcocted humour being diverted into parts of the face.

[769<sup>a</sup>1] We have thus discussed the cause of all these phenomena, why female and male offspring are produced, why some are similar to their parents, female to female and male to male, and others the other way about, females being similar to the father and males to the mother, and in general why some are like their ancestors [5] while others are like none of them, and all this as concerns both the body as a whole and each of the parts separately. Different accounts,<sup>4</sup> however, have been given by some of the natural scientists as to why children are like or unlike their parents. They give two versions of the reason. Some say that the child is more like that parent of the two from whom comes more semen, this applying equally both to the [10] body as a whole and to the separate parts, on the assumption that semen comes from every part; if an equal part comes from each, then, they say, the child is like neither. But if this is false, if semen does not come off from the whole body, it is clear that [15] the reason assigned cannot be the cause of likeness and unlikeness. Moreover, they are hard put to it to explain how it is that a female child can be like the father and a male like the mother. For those who assign the same cause of sex as Empedocles or Democritus say what is on other grounds impossible, and those who say that it is determined by the greater or smaller amount of semen coming from the male or [20] female parent, and that this is why one child is male and another female, cannot show how the female is to resemble the father and the male the mother, for it is impossible that more should come from both at once. Again, for what reason is a child generally like its ancestors, even the more remote? None of the semen has [25] come from *them* at any rate.

But those who account for the similarity in the manner which remains to be discussed, explain this point better, as well as the others. For there are some who say that the semen, though one, is as it were a seed-aggregate of many elements; just as, [30] if one should mix many juices in one liquid and then take some from it, it would be possible to take, not an equal quantity always from each juice, but sometimes more of one and sometimes more of another, sometimes some of one and none at all of another, so they say it is with the generative fluid, which is a mixture of many [35] elements, for the offspring resembles that parent from which it has derived most. Though this theory is obscure and in many ways fictitious, it aims at what is better expressed by saying that what is called the seed-aggregate exists potentially, not [769<sup>b</sup>1] actually; it cannot exist actually, but it can do so potentially. But if we assign only one sort of cause, it is not easy to explain all the phenomena—the distinction of sex, [5] why the female is often like the father and the male like the mother, and again the resemblance to remoter ancestors, and further the reason why the offspring is sometimes unlike any of these but still a human being, but sometimes, proceeding further on these lines, appears finally to be not even a human being but only some kind of animal, what is called a monstrosity. [10]

For, following what has been said, it remains to give the reason for such monsters. If the movements relapse and the material is not controlled, at last there remains what is most universal, that is to say the animal. Then people say that the child has the head of a ram or a bull, and so on with other animals, as that a calf has [15] the head of a child or a sheep that of an ox. All these monsters result from the causes stated above, but they are none of the things they are said to be; there is only some similarity, such as may arise even where there is no defect of growth. Hence often jesters compare someone who is not beautiful to a goat breathing fire, or again to a ram butting, and a certain physiognomist reduced all faces to those of two or three [20] animals, and his arguments often prevailed on people.

That, however, it is impossible for such a monstrosity to come into existence— I mean one animal in another—is shown by the great difference in the period of gestation between man, sheep, dog, and ox, it being impossible for each to be developed except in its proper time. [25]

This is the description of some of the monsters talked about; others are such because certain parts of their form are multiplied so that they are born with many feet or many heads.

The account of the cause of monstrosities is very close and similar in

a way to that of the deformed; for monstrosity is actually a kind of deformity. [30]

4 · Democritus said that monstrosities arose because two emissions of seminal fluid fall into the uterus: the earlier one is operative and is not ejected, and the later also enters the uterus, so that the parts of the embryo grow together and get confused with one another. But in birds, he says, since copulation always takes place quickly, both the eggs and their colour cross one another. But if it is the fact, as it manifestly is, that several young are produced from one emission of semen and [770<sup>a</sup>1] a single act of intercourse, it is better not to desert the short road to go a long way about, for in such cases it is absolutely necessary that this should occur when the semen is not separated but all enters the female at once.

If, then, we must attribute the cause to the semen of the male, this will be the [5] way we shall have to state it, but in general we must rather suppose that the cause lies in the material and in the embryo as it is forming. Hence also such monstrosities appear very rarely in animals producing only one young one, more frequently in those producing many, most of all in birds and among birds in the common fowl. For [10] this bird produces many young, not only because it lays often like the pigeon family, but also because it has many embryos at once and copulates all the year round. Therefore it produces many double eggs, for the embryos grow together because they are near one another, as often happens with many fruits. In such double eggs, [15] when the yolks are separated by the membrane, two separate chickens are produced with nothing abnormal about them; when the yolks are continuous, with no division between them, the chickens produced are monstrous, having one body and head but [20] four legs and four wings; this is because the upper parts are formed earlier from the white, their nourishment being drawn from the yolk, whereas the lower part comes into being later and its nourishment is one and indivisible.

A snake has also been observed with two heads for the same reason, this class [25] also being oviparous and producing many young. Monstrosities, however, are rarer among them owing to the shape of the uterus, for by reason of its length the numerous eggs are set in a line.

Nothing of the kind occurs with bees and wasps, because their brood is in separate cells.

[30] But in the fowl the opposite is the case, whereby it is plain that

we must hold the cause of such phenomena to lie in the material. So, too, monstrosities are commoner in other animals if they produce many young. Hence they are less common in man, for he produces for the most part only one young one and that perfect; even in man monstrosities occur more often in regions where the women [35] give birth to more than one at a time, as in Egypt. And they are commoner in sheep and goats, since they produce more young. Still more does this apply to the fissipeds, [770b1] for such animals produce many young and imperfect, as the dog, the young of these creatures being generally blind. Why this happens and why they produce many young must be stated later, but in them nature has made an advance towards the production of monstrosities in that what they generate, being imperfect, is so far unlike the parent; now monstrosities also belong to the class of things unlike the [5] parent. Therefore this accident also often invades animals of such a nature. So, too, it is in these that the so-called 'metachœra' are most frequent, and the condition of these also is in a way monstrous, since both deficiency and excess are monstrous. For the monstrosity belongs to the class of things contrary to nature, not any and [10] every kind of nature, but nature taken as what holds for the most part; nothing can happen contrary to nature considered as eternal and necessary, but only in those cases where things generally happen in a certain way but may also happen in another way. In fact, even in the case of monstrosities, whenever things occur contrary indeed to the established order but still always in a certain way and not at [15] random, the result seems to be less of a monstrosity because even that which is contrary to nature is in a certain sense according to nature, whenever, that is, the formal nature has not mastered the material nature. Therefore they do not call such things monstrosities any more than in the other cases where a phenomenon occurs [20] habitually, as in fruits; for instance, there is a vine which some call 'smoky'; if this bear black grapes they do not judge it a monstrosity because it is in the habit of doing this very often. The reason is that it is in its nature intermediate between white and black; thus the change is not a large one nor, so to say, contrary to nature; at least, it is not a change into another nature. But in animals producing many [25] young these things occur because the numerous embryos hinder one another from becoming perfect and interfere with the generative motions.

A difficulty may be raised concerning the production of many young and the multiplication of the parts and concerning the production of few young or only one [30] and the deficiency of the parts. Sometimes

animals are born with too many toes, sometimes with one alone, and so on with the other parts, for they may be multiplied or they may be mutilated. Again, they may have the generative parts doubled, the one being male, the other female; this is known in men and especially in goats. For what are called 'tragaenae' are such because they have both male and female [35] generative parts; there is a case also of a goat being born with a horn upon its leg. Changes and deficiencies and multiplications are found also in the internal parts, [771<sup>a</sup>1] animals either not possessing some at all, or possessing them in a mutilated condition, or too numerous or in the wrong place. No animal, indeed, has ever been born without a heart, but they are born without a spleen or with two spleens or with one kidney; there is no case again of total absence of the liver, but there are cases of [5] its being incomplete. And all these phenomena have been seen in animals perfect and alive. Animals also which naturally have a gall-bladder are found without one; others are found to have more than one. Cases are known, too, of the organs changing places, the liver being on the left, the spleen on the right. These phenomena have been observed, as stated above, in animals whose growth is [10] perfected; at the time of birth great confusion of every kind has been found. Those which only depart a little from nature commonly live; not so those which depart further, when the unnatural condition is in the parts which are sovereign over life.

The question then about all these cases is this. Are we to suppose that a single cause is responsible for the production of a single young one and for the deficiency [15] of the parts, and also for the production of many young and the multiplication of parts, or not?

In the first place it seems only reasonable to wonder why some animals produce many young, others only one. For it is the largest animals that produce one, e.g. the elephant, camel, horse, and the other solid-hoofed ungulates; of these some are larger than all other animals, while the others are of a remarkable size. But the [20] dog, the wolf, and practically all the fissipeds produce many, even the small members of the class, as the mouse family. The cloven-footed animals again produce few, except the pig, which belongs to those that produce many. Now we should expect the large animals to be able to generate more young and to produce [25] more semen. But precisely what we wonder at is the reason for not wondering; it is just because of their size that they do not produce many young, for the nutriment is expended in such animals upon increasing the body. But in the smaller animals nature takes away from the size and adds the excess to the seminal secretion. [30] Moreover,



more semen must be used in generation by the larger animal, and little by the smaller. Therefore many small ones may be produced together, but it is hard for many large ones to be so, and to those intermediate in size nature has assigned the intermediate number. We have formerly given the reason why some animals are large, some smaller, and some between the two. Some produce one young, some few, [771<sup>b</sup>1] some many: for the most part, the solid-hoofed produce one, the cloven-footed few, the fissipeds many. (The reason of this is that, generally speaking, their sizes correspond to this difference.) It is not so, however, in all cases; for it is the largeness [5] and smallness of the body that is cause of few or many young being born, not the fact that the kind of animal has one, two, or many toes. A proof of this is that the elephant is the largest of animals and yet is many-toed, and the camel, the next [10] largest, is cloven-footed. And not only in animals that walk but also in those that fly or swim the large ones produce few, the small many, for the same reason. In like manner also it is not the largest plants that bear most fruit.

We have explained then why some animals naturally produce many young, [15] some but few, and some only one; in the difficulty now stated we may rather be surprised with reason at those which produce many, since such animals are often seen to conceive from a single copulation. Whether the semen of the male contributes to the material of the embryo by itself becoming a part of it and mixing [20] with the semen of the female, or whether, as we say, it does not act in this way but brings together and fashions the material within the female and the generative secretion as the fig-juice does the liquid substance of milk, what is the reason why it does not form a single animal of considerable size? For certainly in the parallel case [25] the fig-juice is not separated if it has to curdle a large quantity of milk, but the more the milk and the more the fig-juice put into it, so much the greater is the curdled mass. Now it is no use to say that the several regions of the uterus attract the semen and therefore more young than one are formed, because the regions are many and [30] the cotyledons are more than one. For two embryos are often formed in the same region of the uterus, and they may be seen lying in a row in animals that produce many, when the uterus is filled with the embryos. (This is plain from the dissections.) Rather the truth is this. As animals complete their growth there are certain limits to their size, both upwards and downwards, beyond which they cannot [35] go, but it is in the space between these limits that they exceed or fall short of one another in size, and it is within these limits that one man (or any other animal) is [772<sup>a</sup>1] larger or smaller than another. So also the

generative material from which each animal is formed is not without a quantitative limit in both directions, nor can it be formed from any quantity you please. Whenever, then, an animal, for the cause [5] assigned, discharges more of the secretion than is needed for beginning a single animal, it is not possible that only one should be formed out of all this, but a number limited by the appropriate size in each case; nor will the semen of the male, or the power residing in the semen, form anything either more or less than what is [10] according to nature. In like manner, if the male emits more semen than is necessary, or more powers in different parts of the semen as it is divided, however much it is it will not make anything greater; on the contrary it will dry up the material and destroy it. So fire also does not continue to make water hotter in proportion as it is itself increased, but there is a fixed limit to the heat of which water is capable; if [15] that is once reached and the fire is then increased, the water no longer gets hotter but rather evaporates and at last disappears and is dried up. Now since it appears that the secretion of the female and that from the male need to stand in some proportionate relation to one another (I mean in animals of which the male emits semen), what happens in those that produce many young is this: from the very first [20] the semen emitted by the male has power, being divided, to form several embryos, and the material contributed by the female is so much that several can be formed out of it. (The parallel of curdling milk, which we spoke of before, is no longer in point here, for what is formed by the heat of the semen is not only of a certain quantity but also of a certain quality, whereas with fig-juice and rennet quantity alone is concerned.) This then is just the reason why in such animals the embryos [25] formed are numerous and do not all unite into one whole; it is because an embryo is not formed out of any quantity you please, but whether there is too much or too little, in either case there will be no result, for there is a limit set alike to the power of the heat which acts and to the material so acted upon.

On the same principle many embryos are not formed, though the secretion is [30] much, in the large animals which produce only one young one, for in them also both the material and that which works upon it are of a certain quantity. So they do not secrete such material in too great quantity for the reason previously stated, and what they do secrete is naturally just enough for one embryo alone to be formed from it. If ever too much is secreted, then twins are born. Hence such cases seem [35] rather to be monstrous because they are contrary to the general and customary rule.

Man belongs to all three classes, for he produces one only and sometimes many [772<sup>b</sup>1] or few, though naturally he almost always produces one. Because of the moisture and heat of his body he may produce many (for semen is naturally fluid and hot), but because of his size he produces few or one. On account of this it results that in [5] man alone among animals the period of gestation is irregular; whereas the period is fixed in the rest, there are several periods in man, for children are born at seven months and at ten months and at the times between, for even those of eight months do live though less often than the rest. The reason may be gathered from what has [10] just been said, and the question has been discussed in the *Problems*. Let this explanation suffice for these points.

The reason why the parts may be multiplied contrary to nature is the same as the cause of the birth of twins. For the reason exists already in the embryo, whenever more material gathers than is required by the nature of the part. The [15] result is then that either one of its parts is larger than the others, as a finger or hand or foot or any of the other extremities or limbs; or again if the embryo is cleft there may come into being more than one, as eddies do in rivers; as the water in these is carried along with a certain motion, if it dash against anything two systems come [20] into being out of one, each retaining the same motion; the same thing happens also with the embryos. They generally are attached near one another, but sometimes at a distance because of the movement taking place in the embryo, and especially because of the excess of material returning to that place whence it was taken away while retaining the form of that part whence it arose as a superfluity. [25]

In certain cases we find a double set of generative organs [one male and the other female].<sup>5</sup> When such duplication occurs the one is always functional but not the other, because it is always insufficiently supplied with nourishment as being contrary to nature; it is attached like a tumour (for such growths also receive nourishment though they are a later development than the body proper and [30] contrary to nature). If the formative power prevails, both are similar; if it is altogether vanquished, both are similar; but if it prevail here and be vanquished there, then the one is female and the other male. (For whether we consider the reason why the whole animal is male or female, or why the parts are so, makes no difference.)

[35] When we meet with deficiency in such parts, e.g. an extremity or one of the other limbs, we must assume the same cause as when the embryo is altogether aborted (abortion of embryos happens frequently).

[773<sup>a</sup>1] Outgrowths differ from the production of many young in the manner stated before; monsters differ from these in that most of them are due to embryos growing together. Some however are also of the following kind, when the monstrosity affects [5] greater and more sovereign parts, as for instance some monsters have two spleens or more than two kidneys. Further, the parts may migrate, the movements being diverted and the material changing its place. We must decide whether the monstrous animal is one or is composed of several grown together by considering the vital principle; thus, if the heart is a part of such a kind then that which has one [10] heart will be one animal, the multiplied parts being mere outgrowths, but those which have more than one heart will be two animals grown together through their embryos having been confused.

It also often happens even in many animals that do not seem to be defective and whose growth is now complete, that some of their passages may have grown [15] together or others may have been diverted from the normal course. Thus in some women before now the os uteri has remained closed, so that when the time for menstruation has arrived pain has attacked them, till either the passage has burst open of its own accord or the physicians have removed the impediment; some such cases have ended in death if the rupture has been made too violently or if it has been [20] impossible to make it at all. In some boys, on the other hand, the end of the penis has not coincided with the end of the passage where the urine is voided, but the passage has ended below, so that they crouch sitting to void it, and if the testes are drawn up they appear from a distance to have both male and female generative organs. The [25] passage of the solid food also has been closed before now in sheep and some other animals; there was a cow in Perinthus which passed fine matter, as if it were sifted, through the bladder, and when the anus was cut open it quickly closed up again nor could they succeed in keeping it open.

[30] We have now spoken of the production of few and many young, and of the outgrowth of superfluous parts and also of monstrosities.

5 · Superfoetation does not occur at all in some animals but does in others; of the former some are able to bring the later formed embryo to birth, while others can only do so sometimes. The reason why it does not occur in some is that they produce [773<sup>b</sup>1] only one young one, for it is not found in solid-hoofed animals and those larger than these, as owing

to their size the secretion is all used up for the one embryo. For all these have large bodies, and when an animal is large its foetus is large in proportion, [5] e.g. the foetus of the elephant is as big as a calf. But superfoetation occurs in those which produce many young because the production of more than one at a birth is itself a sort of superfoetation, one being added to another. Of these all that are large, as man, bring to birth the later embryo, if the second impregnation takes [10] place soon after the first, for such an event has been observed before now. The reason is that given above, for even in a single act of intercourse the semen discharged is more than enough for one embryo, and this being divided causes more than one child to be born, the one of which is later than the other. But when the embryo has already grown to some size and it so happens that copulation occurs again, superfoetation sometimes takes place, but rarely, since the uterus generally closes in women during the period of gestation. If this ever happens (for this also has [15] occurred) the mother cannot bring the second embryo to perfection, but it is cast out in a state like what are called abortions. For just as, in those animals that bear only one, all the secretion of the female is converted to the first formed embryo because of its size, so it is here also; the only difference is that in the former case this happens [20] at once, in the latter when the foetus has attained to some size, for then they are in the same state as those that bear only one. In like manner—since man naturally would produce many young, and since the size of the uterus and the quantity of the female secretion are both greater than is necessary for one embryo, only not so much so as to bring to birth a second—therefore women and mares are the only [25] animals which admit the male during gestation, the former for the reason stated, and mares both because of the barrenness of their nature and because their uterus is of superfluous size, too large for one but too small to allow a second embryo to be brought to perfection by superfoetation. And the mare is naturally inclined to sexual intercourse because she is in the same case as the barren among women; these latter are barren because they have no monthly discharge (which corresponds [30] to the act of intercourse in males) and mares have exceedingly little. And in all the vivipara the barren females are so inclined, because they resemble the males when the semen has collected in the testes but is not being got rid of. For the discharge of the menstrual fluids is in females an emission of semen, they being unconcocted [774<sup>a</sup>1] semen as has been said before. Hence it is that those women also who are incontinent in regard to such intercourse cease from their passion for it when they have borne many children, for, the seminal secretion being

then drained off, they no [5] longer desire this intercourse. And among birds the hens are less disposed that way than the cocks, because the uterus of the hen-bird is up near the hypozoma; but with the cock-birds it is the other way, for their testes are drawn up within them so that, if any kind of such birds has much semen naturally, it is always in need of this [10] intercourse. In females then it encourages copulation to have the uterus low down, but in males to have the testes drawn up.

It has been now stated why superfoetation is not found in some animals at all, why it is found in others which sometimes bring the later embryos to birth and sometimes not, and why some such animals are inclined to sexual intercourse while [15] others are not.

Some of those animals in which superfoetation occurs can bring the embryos to birth even if a long time elapses between the two impregnations, if their kind is abundant in semen, if their body is not of a large size, and if they bear many young. For because they bear many their uterus is spacious, because they are abundant in [20] semen the generative discharge is copious, and because the body is not large but the discharge is in greater measure than is required for the nourishment wanted for the embryo, therefore they can not only form animals but also bring them to birth later [25] on. Further, the uterus in such animals does not close up because there is a quantity of the residual discharge left over. This has happened before now even in women, for in some of them the discharge continues during all the time of pregnancy. In women, however, this is contrary to nature, so that the embryo suffers, but in such [30] animals it is according to nature, for their body is so formed from the beginning, as with hares. For superfoetation occurs in these animals, since they are not large and they bear many young (for they have many toes and the many-toed animals bear many), and they abound in semen. This is shown by their hairiness, for the quantity [35] of their hair is excessive, these animals alone having hair under the feet and within the jaws. Now hairiness is a sign of abundance of residual matter, wherefore among [774<sup>b</sup>1] men also the hairy are given to sexual intercourse and have much semen rather than the smooth. In the hare it often happens that some of the embryos are imperfect while others of its young are produced perfect.

[5] **6** · Some of the vivipara produce their young imperfect, others perfect; the one-hoofed and cloven-footed perfect, most of the many-toed imperfect. The reason for this is that the one-hoofed produce one young

one, and the cloven-footed either one or two generally speaking; now it is easy to bring the few to perfection. All the [10] many-toed animals that bear their young imperfect give birth to many. Hence, though they are able to nourish the embryos while newly formed, their bodies are unable to complete the process when the embryos have grown and acquired some size. So they produce them imperfect, like those animals which generate a grub; for some of them when born are scarcely brought into form at all, as the fox, bear, and [15] lion, and some of the rest in like manner; and nearly all of them are blind, as not only the animals mentioned but also the dog, wolf, and jackal. The pig alone produces both many and perfect young, and thus here alone we find any overlapping; it produces many as do the many-toed animals, but is cloven-footed or solid-hoofed (for there certainly are solid-hoofed swine). They bear, then, many [20] young because the nutriment which would otherwise go to increase their size is diverted to the generative secretion (for considered as a solid-hoofed animal the pig is not a large one), and also it is more often cloven-hoofed, striving as it were with the nature of the solid-hoofed animals. For this reason it produces sometimes only one, sometimes two, but generally many, and brings them to perfection before birth [25] because of the good condition of its body, being like a rich soil which has sufficient and abundant nutriment for plants.

The young of some birds also are hatched imperfect and blind; this applies to all small birds which lay many eggs, as crows, jays, sparrows, swallows, and to all those which lay few eggs without producing abundant nourishment along with the [30] young, as ring-doves, turtle-doves, and pigeons. Hence if the eyes of swallows while still young be put out they recover their sight again, for the birds are still developing, not yet developed, when the injury is inflicted, so that the eyes grow and sprout afresh. And in general the production of young before they are perfect is [35] owing to inability to continue nourishing them, and they are born imperfect because they are born too soon. This is plain also with seven-months children, for since they [775<sup>a</sup>1] are not perfected it often happens that even the passages, e.g. of the ears and nostrils, are not yet opened in some of them at birth, but only open later as they are growing, and many such infants survive.

In man males are more often born defective than females, but in the other animals this is not the case. The reason is that in man the male is much superior to [5] the female in natural heat, and so the male foetus moves about more than the female, and on account of moving is more liable to injury, for what is young is easily injured since it is weak. For

this same reason also the female foetus is not perfected equally with the male in women (but they are so in the other animals, for in them [10] the female is not later in developing than the male). For while within the mother the female takes longer in developing, but after birth everything is perfected more quickly in females than in males; I mean, for instance, puberty, the prime of life, and old age. For females are weaker and colder in nature, and we must look upon the female character as being a sort of natural deficiency. Accordingly while it is [15] within the mother it develops slowly because of its coldness (for development is concoction, and it is heat that concocts, and what is hotter is easily concocted); but after birth it quickly arrives at maturity and old age on account of its weakness, for all inferior things come sooner to their perfection, and as this is true of works of art [20] so it is of what is formed by nature. For the reason just given also twins are less likely to survive in man if one be male and one female, but this is not at all so in the other animals; for in man it is contrary to nature that they should run an equal course, as their development does not take place in equal periods; but the male must [25] needs be too late or the female too early; in the other animals, however, it is not contrary to nature. A difference is also found between man and the other animals in respect of gestation, for animals are in better bodily condition most of the time, whereas in most women gestation is attended with discomfort. Their way of life is [30] partly responsible for this, for being sedentary they are full of more residual matter; among nations where the women live a laborious life gestation is not equally conspicuous and those who are accustomed to work bear children easily both there and elsewhere; for work consumes the residual matter, but those who are sedentary [35] have a great deal of it in them because not only is there no monthly discharge during pregnancy but also they do not work; therefore their travail is painful. But work exercises them so that they can hold their breath, upon which depends the ease or [775<sup>b</sup>1] difficulty of child-birth. These circumstances then, as we have said, contribute to cause the difference between women and the other animals in this state, but the most important thing is this: in some animals the discharge is small, and in some not [5] visible at all, but in women it is greater than in any other animal, so that when this discharge ceases owing to pregnancy they are troubled (for if they are not pregnant they are afflicted with ailments whenever the discharges do not occur); and they are more troubled as a rule at the beginning of pregnancy, for the embryo is able indeed [10] to stop the discharges but is too small at first to consume any quantity of the secretion: later on it takes up some of it



and so alleviates the mother. In the other animals, on the contrary, the residual matter is but small and so corresponds with the growth of the foetus, and as the secretions which hinder nourishment are being [15] consumed by the foetus the mother is in better bodily condition than usual. The same holds good also with aquatic animals and birds. If it ever happens that the body of the mother is no longer in good condition when the foetus is now becoming [20] large, the reason is that its growth needs more nourishment than the residual matter supplies. (In some few women it happens that the body is in a better state during pregnancy; these are women in whose body the residual matter is small so that it is all used up along with the nourishment that goes to the foetus.)

[25] 7 · We must also speak of what is known as a ‘mole’, which occurs rarely in women but still is found sometimes during pregnancy. For they produce what is called a mole; it has happened before now to a woman, after she had had intercourse with her husband and supposed she had conceived, that at first the size of her belly [30] increased and everything else happened accordingly, but yet when the time for birth came on, she neither bore a child nor was her size reduced, but she continued thus for three or four years until dysentery came on, endangering her life, and she produced a lump of flesh which is called a mole. Moreover this condition may continue till old age and death. Such masses when expelled from the body become [35] so hard that they can hardly be cut through even by iron. Concerning the cause of this phenomenon we have spoken in the *Problems*; the same thing happens to the [776<sup>a</sup>1] embryo in the womb as to meats half cooked in roasting, and it is not due to heat, as some say, but rather to the weakness of the heat. (For their nature seems to be weak and unable to perfect or to put the last touches to the process of generation. Hence it [5] is that the mole remains in them till old age or at any rate for a long time, for in its nature it is neither perfect nor altogether a foreign body.) It is want of concoction that is the reason of its hardness, for half-cooking is also a sort of want of concoction.

A difficulty is raised as to why this does not occur in other animals, unless indeed it has entirely escaped observation. We must suppose the reason to be that [10] woman alone among animals is subject to troubles of the uterus, and alone has a superfluous amount of menstrual fluids and is unable to concoct them; when, then, the embryo has been formed of a liquid hard to concoct, then comes the so-called mole into being, and this

happens naturally in women alone or at any rate more than in other animals.

[15] 8 · Milk is formed in the females of all internally viviparous animals, becoming useful for the time of birth. For nature has made it for the sake of the nourishment of animals after birth, so that it neither fails at this time at all nor yet is at all superfluous; this is just what we find happening, unless anything chance [20] contrary to nature. In the other animals the period of gestation does not vary, and so the milk is concocted in time to suit the moment, but in man, since there are several times of birth, it must be ready at the first of these; hence in women the milk is useless before the seventh month and only then becomes useful. That it is only [25] concocted at the last stages is what we should expect to happen also as being due to a necessary cause. For at first such residual matter when secreted is used up for the development of the embryo; now the nutritious part in all things is the sweetest and the most concocted, and thus when all such elements are removed what remains must become of necessity bitter and ill-flavoured. As the embryo is perfecting, the [30] residual matter left over increases in quantity because the part consumed by the embryo is less; it is also sweeter since the easily concocted part is less drawn away from it. For it is no longer expended on moulding the embryo but only on slightly increasing its growth, the embryo being now as it were stationary because it has reached perfection (for in a sense there is a perfection even of an embryo). [776<sup>b</sup>1] Therefore it comes forth from the mother and changes its mode of development, as now possessing what belongs to it; and no longer takes that which does not belong to it; and it is at this season that the milk becomes useful.

The milk collects in the upper part of the body and the breasts because of the original plan of the organism. For the part above the hypozoma is the part that [5] controls life, while that below is concerned with nourishment and residual matter, in order that all animals which move about may contain within themselves nourishment enough to make them independent when they move from one place to another. From this upper part also is produced the generative secretion for the reason mentioned in the opening of our discussion. But both the secretion of the male and [10] the menses of the female are of a sanguineous nature, and the first principle of this blood and of the blood-vessels is the heart, and the heart is in this part of the body. Therefore it is here that the change of such a secretion must first become plain. This is why the voice changes in

both sexes when they begin to bear seed (for the first [15] principle of the voice resides there, and is itself changed when its moving cause changes). At the same time the parts about the breasts are raised visibly even in males but still more in females, for the region of the breasts becomes empty and spongy in them because so much material is drained away below. This is so also in [20] those animals which have the breasts low down.

This change in the voice and the parts about the breasts is plain even in other creatures to those who have experience of each kind of animal, but is most remarkable in man. The reason is that in man the production of secretion is greatest [25] in both sexes in proportion to their size as compared with other animals. [I mean menstruation in women and the emission of semen in men.]<sup>6</sup> When, therefore, the embryo no longer takes up the secretion in question but yet prevents its being discharged from the mother, it is necessary that all the residual matter should [30] collect in all those empty parts which are set upon the same passages. And such is the position of the breasts in each kind of animals for both causes; it is so both for the sake of what is best and of necessity.

It is here, then, that the nourishment in animals is now formed and becomes concocted. As for the cause of concoction, we may take that already given, or we may take the opposite, for it is a reasonable view also that the embryo being larger [777<sup>a</sup>1] takes more nourishment, so that less is left over about this time, and the less is concocted more quickly.

That milk has the same nature as the secretion from which each animal is formed is plain, and has been stated previously. For the material which nourishes is [5] the same as that from which nature forms the animal in generation. Now this is the sanguineous liquid in the sanguinea, and milk is blood concocted (not corrupted; Empedocles either mistook the fact or made a bad metaphor when he wrote that [10] milk 'on the tenth day of the eighth month comes into being, a white pus',<sup>7</sup> for putrefaction and concoction are opposite things, and pus is a kind of putrefaction but milk is concocted). While women are suckling children menstruation does not occur according to nature, nor do they conceive; if they do conceive, the milk dries [15] up. This is because the nature of the milk and of the menses is the same, and nature cannot be so productive as to supply both at once; if the secretion is diverted in the one direction it must needs cease in the other, unless some violence is done contrary to the general rule. But this is as much as to say that it is contrary to nature, for in [20] all cases where it is not impossible for things to be otherwise

than they generally are but where they may so happen, still what is the general rule is what is according to nature.

The time also at which the young animal is born has been well arranged. For when the nourishment coming through the umbilical cord is no longer sufficient for the foetus because of its size, then at the same time the milk becomes useful for the coming nourishment and the blood-vessels round which the so-called umbilical cord [25] lies as a coat collapse as the nourishment is no longer passing through it; for these reasons it is at that time also that the young animal enters into the world.

9 · The natural birth of all animals is head-foremost, because the parts above the umbilical cord are larger than those below. The body then, being suspended [30] from the cord as in a balance, inclines towards the heavy end, and the larger parts are the heavier.

10 · The period of gestation is, as a matter of fact, determined generally in each animal in proportion to the length of its life. For it is reasonable that the development of the long-lived animals should take a longer time. Yet this is not the cause of it, but the correspondence holds for the most part; for though the larger and [777<sup>b</sup>1] more perfect sanguinea do live a long time, yet the larger are not all longer-lived. Man lives a longer time than any animal of which we have any credible experience except the elephant, and yet the human kind is smaller than that of the bushy-tailed [5] animals and many others. The real cause of long life in any animal is its being tempered in a manner resembling the environing air, along with certain other circumstances of its nature, of which we will speak later; but the cause of the time of gestation is the size of the offspring. For it is not easy for large masses to arrive at [10] their perfection in a small time, whether they be animals or, one may say, anything else whatever. That is why horses and animals akin to them, though living a shorter time than man, yet carry their young longer; for the time in the former is a year, but in the latter ten months at the outside. For the same reason also the time is long in [15] elephants; they carry their young two years on account of their excessive size.

We find, as we might expect, that in all animals the time of gestation and development and the length of life aim naturally at being measured periods. By a period I mean, e.g., a day and night, a month, a year, and the times measured by these, and also the periods of the moon, that is to say, the full moon and her [20] disappearance and the halves of the times

between these, for it is by these that the moon's orbit fits in with that of the sun, the month being a period common to both.

The moon is a first principle because of its connexion with the sun and its participation in its light, being as it were a second smaller sun, and therefore she [25] contributes to all generation and development. For heat and cold varying within certain limits make things to come into being and after this to perish, and it is the motions of the sun and moon that fix the limit both of the beginning and of the end [30] of these processes. Just as we see the sea and all bodies of water settling and changing according to the movement or rest of the winds, and the air and winds again according to the course of the sun and moon, so also the things which grow out of these or are in these must follow suit. For it is reasonable that the periods of the [778<sup>a</sup>1] less important should follow those of the more important. For in a sense a wind, too, has a life and birth and death.

As for the revolutions of the sun and moon, they may perhaps depend on other principles.

It is the aim, then, of nature to count the coming into being and the end of [5] animals by the numbers of these higher periods, but nature does not bring this to pass accurately because matter cannot be easily brought under rule and because there are many principles which hinder generation and decay from being according to nature, and often cause things to fall out contrary to nature.

We have now spoken of the nourishment of animals within the mother and of [10] their birth into the world, both of each kind separately and of all in common.

## BOOK V

1 · We must now investigate the qualities by which the parts of animals differ. I mean such qualities of the parts as blueness and blackness of the eyes, height and depth of pitch in the voice, and differences in colour and in hair or [20] feathers. Some such qualities are found to characterize the whole of a kind of animals sometimes, while in other kinds they occur at random, as is especially the case in man. Further, in connexion with the changes in the time of life, all animals are alike in some points, but are opposed in others as in the case of the voice and the colour of the hair, for some do not grow grey visibly in old age, while man is subject [25] to this more than any other animal. And some of these affections appear immediately after birth, while others become plain as age advances or in old age.

Now we must no longer suppose that the cause of these and all such phenomena is the same. For whenever things are not the product of nature in [30] general nor yet characteristic of each separate kind, then none of these things is such as it is or is so developed for the sake of anything. The eye for instance exists for a final cause, but it is not blue for a final cause unless this condition be characteristic of the kind of animal. In fact in some cases this condition has no connexion with the account of the animal's essence, but we must refer the causes to [778<sup>b1</sup>] the material and the motive principle on the view that these things come into being by necessity. For, as was said originally in the outset of our discussion, when we are dealing with definite and ordered products of nature, we must not say that each *is* of a certain quality because it *becomes* so, rather that they *become* so and so because [5] they *are* so and so, for the process of becoming attends upon being and is for the sake of being, not *vice versa*.

Past students of nature, however, took the opposite view. The reason for this is that they did not see that the causes were numerous, but only saw the material and efficient and did not distinguish even these, while they made no inquiry at all into [10] the formal and final causes.

Everything then exists for a final cause, and all those things which are included in the definition of each animal, or which either are for the sake of some end or are ends in themselves, come into being both through this cause and the rest. But when we come to those things which come into

being without falling under the heads just [15] mentioned, their cause must be sought in the movement or process of coming into being, on the view that the differences which mark them arise in the actual formation of the animal. An eye, for instance, the animal must have of necessity (for an animal is supposed to be of such a sort), but it will have an eye of a particular kind of necessity in another sense, not the sense mentioned just above, because it is its nature to act or be acted on in this or that way.

[20] These distinctions being drawn let us speak of what comes next in order. As soon then as the offspring of all animals are born, especially those born imperfect, they are in the habit of sleeping, because they continue sleeping also within the mother when they first acquire sensation. But there is a difficulty about the earliest period of development, whether the state of wakefulness exists in animals first, or [25] that of sleep. Since they plainly wake up more as they grow older, it is reasonable to suppose that the opposite state, that of sleep, exists in the first stages of development. Moreover the change from not being to being must pass through the intermediate condition, and sleep seems to be in its nature such a condition, being as [30] it were a boundary between living and not living, and the sleeper being neither altogether non-existent nor yet existent. For life most of all appertains to wakefulness, on account of sensation. But on the other hand, if it is necessary that the animal should have sensation and if it is then first an animal when it has acquired sensation, we ought to consider the original condition to be not sleep but only something resembling sleep, such a condition as we find also in plants, for indeed at [779<sup>a1</sup>] this time animals do actually live the life of a plant. But it is impossible that plants should sleep, for there is no sleep which cannot be broken, and the condition in plants which is analogous to sleep cannot be broken.

It is necessary then for the animal to sleep most of the time because the growth [5] and the weight lie on the upper part of the body (and we have stated elsewhere that such is the cause of sleep). But nevertheless they are found to wake even in the womb (this is clear in dissections and in the ovipara), and then they immediately fall into a sleep again. This is why after birth also they spend most of their time in [10] sleep.

When awake infants do not laugh, but while asleep they both laugh and cry. For animals have sensations even while asleep, not only what are called dreams but also others besides dreams, as those persons who arise while sleeping and do many [15] things without dreaming. For there are some who get up while sleeping and walk about seeing just like those who are awake; these have perception of what is happening, and though

they are not awake, yet this perception is not like a dream. So infants presumably have sense-perception and live in their sleep owing to [20] previous habit, being as it were without knowledge of the waking state. As time goes on and their growth is transferred to the lower part of the body, they now wake up more and spend most of their time in that condition. Children continue asleep at first more than other animals, for they are born in a more imperfect condition than other animals that are produced in a perfect state, and their growth has taken place [25] more in the upper part of the body.

The eyes of all children are bluish immediately after birth; later on they change to the colour which is to be theirs permanently. But in the case of other animals this is not visible. The reason for this is that the eyes of other animals are more apt to have only one colour; e.g. cattle are dark-eyed, the eye of all sheep is [30] pale, of others again the whole kind is blue or grey-eyed, and some are yellow as the majority of goats themselves, whereas the eyes of men happen to be of many colours, for they are blue or grey or dark in some cases and yellow in others. Hence, [779<sup>b</sup>1] as the individuals in other kinds of animals do not differ from one another in the colour, so neither do they differ from themselves, for they are not of a nature to have more than one colour. Of the other animals the horse has the greatest variety of colour in the eye, for some of them actually have eyes of different colour; this [5] phenomenon is not to be seen in any of the other animals, except in some men.

Why then is it that there is no visible change in the other animals if we compare their condition when newly born with their condition at a more advanced age, but that there is such a change in children? We must consider just this to be a sufficient cause, that the part concerned has only one colour in the former but several colours in the latter. And the reason why the eyes of infants are bluish and [10] have no other colour is that the parts are weaker in the newly born and blueness is a sort of weakness.

We must also gain a general notion about the difference in eyes, for what reason some are blue, some grey, some yellow and some dark. To suppose that the [15] blue are fiery, as Empedocles says, while the dark have more water than fire in them, and that this is why the former, the blue, have not keen sight by day, viz. owing to deficiency of water in their composition, and the latter are in like condition by night, viz. owing to deficiency of fire—this is not well said if indeed we are to assume sight to be connected with water, not fire, in all cases. Moreover it is [20] possible to render another account of the cause of the colours, but if indeed the fact is as was stated before in the treatise on the senses, and



still earlier than that in the investigations concerning soul<sup>1</sup>—if this sense organ is composed of water and if we were right in saying for what reason it is composed of water and not of air or [25] fire—then we must assume the water to be the cause of the colours mentioned. For some eyes have too much liquid to be adapted to the movement, others have too little, others the due amount. Those eyes therefore in which there is much liquid are [30] dark because much liquid is not transparent, those which have little are blue; (so we find in the sea that the transparent part of it appears light blue, the less transparent watery, and the unfathomable water is dark or deep-blue on account of its depth). When we come to the eyes between these, they differ only in degree.

We must suppose the same cause also to be responsible for the fact that blue [780<sup>a</sup>1] eyes are not keen-sighted by day nor dark eyes by night. Blue eyes, because there is little liquid in them, are too much moved by the light and by visible objects in respect of their liquidity as well as their transparency, but sight is the movement of this part in so far as it is transparent, not in so far as it is liquid. Dark eyes are less [5] moved because of the quantity of liquid in them. For the nocturnal light is weak; at the same time also liquid is in general hard to move in the night. But if the eye is to see, it must neither not be moved at all nor yet more than in so far as it is transparent, for the stronger movement drives out the weaker. Hence it is that on [10] changing from strong colours, or on going out of the sun into the dark, men cannot see, for the motion already existing in the eye, being strong, stops that from outside, and in general neither a strong nor a weak sight can see bright things because the liquid is acted upon and moved too much.

The same thing is shown also by the morbid affections of each kind of sight. [15] Cataract attacks the blue-eyed more, but what is called night-blindness the dark-eyed. Now cataract is a sort of dryness of the eyes and therefore it is found more in the aged, for this part also like the rest of the body gets dry towards old age; [20] but night-blindness is an excess of liquidity and so is found more in the younger, for their brain is more liquid.

The sight of the eye which is intermediate between too much and too little liquid is the best, for it has neither too little so as to be disturbed and hinder the movement of the colours, nor too much so as to cause difficulty of movement.

[25] Not only the above-mentioned facts are causes of seeing keenly or the reverse, but also the nature of the skin upon what is called the pupil. This ought to be transparent, and it is necessary that the

transparent should be thin and white and even, thin that the movement coming from without may pass straight through it, [30] even that it may not cast a shadow by wrinkling (for this also is a reason why old men have not keen sight, the skin of the eye like the rest of the skin wrinkling and becoming thicker in old age), and white because black is not transparent, for that is just what is meant by 'black', what is not shone through, and that is why lanterns [780<sup>b</sup>1] cannot give light if they be made of black skin. It is for these reasons then that the sight is not keen in old age nor in the diseases in question, but it is because of the small amount of liquid that the eyes of children appear blue at first.

And the reason why men especially and horses occasionally have eyes of different colours is the same as the reason why man alone grows grey and the horse is the only other animal whose hairs whiten visibly in old age. For greyness is a [5] weakness of the fluid in the brain and a lack of concoction, and so is blueness of the eyes; excess of thinness or of thickness produces the same effect, according as this liquidity is too little or too much. Whenever then nature cannot make the eyes correspond exactly, either by concocting or by not concocting the liquid in both, but [10] concocts the one and not the other, then the result is differently coloured eyes.

The cause of some animals being keen-sighted and others not so is not simple but double. For things are called keen in two ways (and this is the case in like manner with hearing and smelling). In one sense keen sight means the power of [15] seeing at a distance, in another it means the power of distinguishing as accurately as possible the objects seen. These two faculties do not occur together in the same individual. For the same person, if he shade his eyes with his hand or look through a tube, does not distinguish the differences of colour either more or less in any way, [20] but he will see further; in fact, men in pits or wells sometimes see the stars. Therefore if any animal's brows project far over the eye, but if the liquid in the pupil is not pure nor suited to the movement coming from external objects and if the skin over the surface is not thin, this animal will not distinguish accurately the [25] differences of the colours but it will be able to see from a long distance (just as it can from a short one)<sup>2</sup> better than those in which the liquid and the covering membrane are pure but which have no brows projecting over the eyes. For the cause of seeing keenly in the sense of distinguishing the differences is in the eye itself; as on a clean [30] garment even small stains are visible, so also in a pure sight even small movements are plain and cause sensation. But it is the position of the eyes that is the cause of seeing things far off and of the

movements coming to the eyes from distant objects. [35] For animals with prominent eyes do not see well at a distance, whereas those which have their eyes lying deep in the head can see things at a distance because the [781<sup>a</sup>1] movement is not dispersed in space but comes straight to the eye. For it makes no difference whether we say, as some do, that seeing is caused by the sight going forth from the eye—on that view, if there is nothing projecting over the eyes, the sight must be scattered and so less of it will fall on the objects of vision and things at a [5] distance will not be seen so well—or whether we say that seeing is due to the movement coming from the objects; for the sight also must see, in a manner resembling the movement. Things at a distance, then, would be seen best if there were, so to say, a continuous tube straight from the sight to its object, for the movement from the object would not then be dissipated; but, if that is impossible, [10] still the further the tube extends the more accurately must distant objects be seen.

Let these, then, be given as the causes of the difference in eyes.

2 · It is the same also with hearing and smell; to hear and smell accurately mean in one sense to perceive as precisely as possible all the distinctions of the [15] objects of perception, in another sense to hear and smell far off. As with sight, so here the sense-organ is the cause of distinguishing well the distinctions, if both that [20] organ itself and the membrane round it be pure. For the passages of all the sense-organs, as has been said in the treatise on sensation, run to the heart, or to its analogue in creatures that have no heart. The passage of the hearing, then, since this sense-organ is of air, ends at the place where the innate breath causes in some [25] animals the pulsation and in others respiration;<sup>3</sup> and that is why we are able to understand what is said and repeat what we have heard, for as<sup>4</sup> was the movement which entered through the sense-organ, such again is the movement which is caused by means of the voice, being as it were of one and the same stamp, so that a man can [30] say what he has heard. And we hear less well during a yawn or expiration than during inspiration, because the starting-point of the sense-organ of hearing is set upon the part concerned with breathing and is shaken and moved as the organ moves the breath, for while setting the breath in motion it is moved itself. The same thing happens in wet weather or a damp climate.<sup>5</sup> ... And the ears seemed to be [781<sup>b</sup>1] filled with air because their starting-point is near the region of breathing.<sup>6</sup>

Accuracy then in judging the differences of sounds and smells

depends on the purity of the sense-organ and of the membrane lying upon its surface, for then all [5] the movements become clear in such cases, as in the case of sight.<sup>7</sup> Perception and non-perception at a distance also depend on the same things as with sight. For those animals can perceive at a distance which have channels, so to say, running through the parts concerned and projecting far in front of the sense-organs. Therefore all [10] animals whose nostrils are long, as the Laconian hounds, are keen-scented, for the sense-organ being above them, the movements from a distance are not dissipated but go straight to the mark, just as with those who shadow the eyes with the hand.

Similar is the case of animals whose ears are long and project far like the eaves [15] of a house, as in some quadrupeds, with the internal spiral passage long; these also catch the movement from afar and pass it on to the sense-organ.

In respect of sense-perception at a distance, man is, one may say, the worst of all animals in proportion to his size, but in respect of judging the differences he is [20] the best of all. The reason is that the sense-organ is pure and least earthy and material, and he is by nature the thinnest-skinned of all animals for his size.

The workmanship of nature is admirable also in the seal, for though a viviparous quadruped it has no ears but only passages for hearing. This is because [25] its life is passed in the water; now the ear is a part added to the passages to preserve the movement of the air at a distance; therefore an ear is no use to it but would even bring about the contrary result by receiving a mass of water into itself.

We have thus spoken of sight, hearing, and smell.

[30] **3** · As for hair, men differ in this themselves at different ages, and also from all other kinds of animals that have hair. These are almost all which are internally viviparous, for even when the covering of such animals is spiny it must be considered as a kind of hair, as in the hedgehog and any other such animal among the vivipara. Hairs differ in respect of hardness and softness, length and shortness, straightness [782<sup>a</sup>1] and curliness, quantity and scantiness, and in addition to these qualities, in their colours, whiteness and blackness and the intermediate shades. They differ also in [5] some of these respects according to age, as they are young or growing old. This is especially plain in man; the hair gets thicker as time goes on, and some go bald on the front of the head; children indeed do not go bald, nor do women, but men do so [10] by the

time their age is advancing. Human beings also go grey on the head as they grow old, but this is not visible in practically any other animal, though more so in the horse than others. Men go bald on the front of the head, but turn grey first [15] on the temples; no one goes bald on these or on the back of the head. Some such affections occur in a corresponding manner also in animals which have not hair but something analogous to it, as the feathers of birds and scales in the class of fish.

For what purpose nature has made hair for animals has been previously stated [20] in the work dealing with the causes of the parts of animals; it is the business of the present inquiry to show under what circumstances and for what necessary causes each particular kind of hair occurs. The principal cause then of thickness and thinness is the skin, for this is thick in some animals and thin in others, rare in some [25] and dense in others. The different quality of the included moisture is also a helping cause, for in some animals this is greasy and in others watery. For generally speaking the skin is of an earthy nature; being on the surface of the body it becomes [30] solid and earthy as the moisture evaporates. Now the hairs on their analogue are not formed out of the flesh but out of the skin, the moisture evaporating and exhaling in them, and therefore thick hairs arise from a thick skin and thin from a thin. If then the skin is rarer and thicker, the hairs are thick because of the quantity of earthy matter and the size of the pores, but if it is denser they are thin because of the [782<sup>b</sup>1] narrowness of the pores. Further, if the moisture be watery it dries up quickly and the hairs do not gain in size, but if it be greasy the opposite happens, for the greasy is not easily dried up. Therefore the thicker-skinned animals are as a general rule [5] thicker-haired; however, the thickest-skinned are not more so than other thick-skinned ones, for the causes mentioned, as is shown by the class of swine compared to that of oxen and to the elephant and many others. And for the same reason also the hairs of the head in man are thickest, for this part of his skin is thickest and lies [10] over most moisture and besides is very rare.

The cause of the hairs being long depends on the evaporating moisture not being easily dried. Of this there are two causes, quantity and quality; if the liquid is much it does not dry up easily nor if it is greasy. And for this reason the hairs of the [15] head are longest in man, for the brain, being fluid and cold, supplies great abundance of moisture.

The hairs become straight or curly on account of the vapour arising in them. If it be smoke-like, it is hot and dry and so makes the hair curly, for it is twisted as [20] being carried with a double motion, the earthy part tending downwards and the hot upwards. Thus, being easily bent, it is

twisted owing to its weakness, and this is what is meant by curliness in hair. It is possible then that this is the cause, but it is also possible that, owing to its having but little moisture and much earthy matter in it, it [25] is dried by the surrounding air and so coiled up together. For what is straight becomes bent, if the moisture in it is evaporated, and runs together as a hair does when burning upon the fire; curliness will then be a contraction owing to deficiency of moisture caused by the heat of the environment. A sign of this is the fact that [30] curly hair is harder than straight, for the dry is hard. And animals with much moisture are straight-haired; for in these hairs the moisture advances as a stream, not in drops. For this reason the Scythians on the Black Sea and the Thracians are straight-haired, for both they themselves and the environing air are moist, whereas [783<sup>a</sup>1] the Aethiopians and men in hot countries are curly-haired, for their brains and the surrounding air are dry.

Some, however, of the thick-skinned animals are fine-haired for the cause previously stated, for the finer the pores are the finer must the hairs be. Hence the [5] class of sheep have such hairs (for wool is a multitude of hairs).

There are some animals whose hair is soft and yet less fine, as is the case with the class of hares compared with that of sheep; in such animals the hair is on the surface of the skin, and so is not long but in much the same state as the scrapings [10] from linen, for these also are not long but are soft and do not admit of weaving.

The condition of sheep in cold climates is opposite to that of man; the hair of the Scythians is soft but that of Sarmatian sheep is hard. The reason for this is the [15] same as it is also in all wild animals. The cold hardens and solidifies them by drying them, for as the heat is pressed out the moisture evaporates, and both hair and skin become earthy and hard. In wild animals then their open-air life is the cause, in the others the nature of their location. A proof of this is also what happens in the [20] sea-urchins which are used as a remedy in stranguries. For these, too, though small themselves, have large and hard spines because the sea in which they live is cold on account of its depth (for they are found in sixty fathoms and even more). The spines [25] are large because the growth of the body is diverted to them, since having little heat in them they do not concoct their nutriment and so have much residual matter and it is from this that spines, hairs, and such things are formed; they are hard and petrified through the congealing effect of the cold. In the same way also plants are [30] found to be harder, more earthy, and stony, if the region in which they grow looks to the north than if it looks to the south, and

those in windy places than those in sheltered, for they are all more chilled and their moisture evaporates.

Hardening, then, comes of both heat and cold, for both cause the moisture to [35] evaporate, heat *per se* and cold *per accidens* (since the moisture goes out of things along with the heat, there being no moisture without heat), but whereas cold not [783<sup>b</sup>1] only hardens but also condenses, heat makes a substance rarer.

For the same reason, as animals grow older, the hairs become harder in those which have hairs, and the feathers and scales in the feathered and scaly kinds. For [5] their skins become harder and thicker as they get older, for they are dried up, and old age, as the word implies,<sup>8</sup> is earthy because the heat fails and the moisture along with it.

Men go bald visibly more than any other animal, but still such a state is something general, for among plants also some are evergreens while others are [10] deciduous, and birds which hibernate shed their feathers. Similar to this is the condition of baldness in those human beings to whom it is incident. For leaves are shed by all plants, from one part of the plant at a time, and so are feathers and hairs [15] by those animals that have them; it is when they are all shed together that the condition is described by the terms mentioned, for it is called 'going bald' and 'the fall of the leaf' and 'moulting'. The cause of the condition is deficiency of hot moisture, such moisture being especially the greasy and hence greasy plants are more evergreen. (However, we must elsewhere state the cause of this—for other [20] causes also contribute to it.) It is in winter that this happens to plants (for the change from summer to winter is more important to them than the time of life), and to those animals which hibernate (for these, too, are by nature less hot and moist than man); in men it is the seasons of life that correspond to summer and winter. [25] Hence no one goes bald before the time of sexual intercourse, and at that time it is in those naturally inclined to such intercourse that baldness appears, for the brain is naturally the coldest part of the body and sexual intercourse makes men cold, being a loss of pure natural heat. Thus we should expect the brain to feel the effect of it [30] first, for a little cause turns the scale where the thing concerned is weak and in poor condition. Thus if we reckon up these points, that the brain itself has but little heat, and further that the skin round it must needs have still less, and again that the hair must have still less than the skin inasmuch as it is the furthest removed from the brain, we should reasonably expect baldness to come about this age upon those who [35] have much semen. And it is for the same reason that the front part of the head alone goes bald in man

and that he is the only animal to do so; the front part goes bald [784<sup>a</sup>1] because the brain is there, and man is the only animal to go bald because his brain is much the largest and the moistest. Women do not go bald because their nature is like that of children, both alike being incapable of producing seminal secretion. [5] Eunuchs do not become bald, because they change into the female condition. And as to the hair that comes later in life, eunuchs either do not grow it at all, or lose it if they happen to have it, with the exception of the pubic hair; for women also grow that though they have not the other, and this mutilation is a change from the male to [10] the female condition.

The reason why the hair does not grow again in cases of baldness, although both hibernating animals recover their feathers or hair and trees that have shed their leaves grow leaves again, is this. The seasons of the year are the turning-points of their lives so that when these seasons change they change with them by growing [15] and losing feathers, hairs, or leaves respectively. But the winter and summer, spring and autumn of man are defined by his age, so that, since his ages do not return, neither do the conditions caused by them return, although the cause is similar. [20]

We have now spoken pretty much of all the other conditions of hair.

4 · But as to their colour, it is the nature of the skin that is the cause of this in other animals (and also of their being unicoloured or varicoloured); but in man it is not the cause, except of the hair going grey through disease (not through old age), [25] for in what is called leprosy the hairs become white; on the contrary, if the hairs are white because of old age, the whiteness does not derive from the skin. The reason is that the hairs grow out of skin; if, then, the skin is diseased and white the hair [30] becomes diseased with it, and the disease of hair is greyness. But the greyness of hair which is due to age results from weakness and deficiency of heat. For as the body declines in vigour we tend to be cold at every time of life, and especially in old age,<sup>9</sup> this age being cold and dry. We must remember that the nutriment coming to each part of the body is concocted by the heat appropriate to the part; if the heat is [784<sup>b</sup>1] inadequate the part perishes, and deformity or disease results. (We shall speak more in detail of causes in the treatise on growth and nutrition.) Whenever, then, the hair in man has naturally little heat and too much moisture enters it, its own [5] proper heat is unable to concoct the moisture and so it is decayed by the heat in the environing air. All decay



is caused by heat—not the innate heat, as has been stated elsewhere. And as there is a decay of water, of earth, and all such material bodies, so [10] there is also of the earthy vapour, for instance what is called mould (for mould is a decay of earthy vapour). Thus also the liquid nutriment in the hair decays because it is not concocted, and what is called greyness results. It is white because mould also, practically alone among decayed things, is white. The reason for this is that it has [15] much air in it, all earthy vapour being equivalent to thick air. For mould is, as it were, the antithesis of hoar-frost; if the ascending vapour be frozen it becomes hoar-frost, if it be decayed, mould. Hence both are on the surface of things, for vapour is superficial. And so the comic poets make a good metaphor in jest when [20] they call grey hairs ‘mould of old age’ and ‘hoar-frost’. For the one is generically the same as greyness, the other specifically; hoar-frost generically (for both are a vapour), mould specifically (for both are a form of decay). A proof that this is so is this: grey hairs have often grown on men in consequence of disease, and later on [25] dark hairs instead of them after restoration to health. The reason is that in sickness the whole body is deficient in natural heat and so the parts besides, even the very small ones, participate in this weakness; and again, much residual matter is formed in the body and all its parts, so that the incapacity in the flesh to concoct the [30] nutriment causes the grey hairs. But when men have recovered health and strength again they change, becoming as it were young again instead of old; in consequence the states change also. Indeed, we may rightly call disease an acquired old age, old age a natural disease; at any rate, some diseases produce the same effects as old age.

Men go grey on the temples first, because the back of the head is empty of [785<sup>a</sup>1] moisture owing to its containing no brain, and the fontanelle has a great deal of moisture, a large quantity not being liable to decay; the hair on the temples, however, has neither so little that it can concoct it nor so much that it cannot decay, [5] for this region of the head being between the two extremes is exempt from both states. The cause of greyness in man has now been stated.

5 · The reason why this change does not take place visibly on account of age in other animals is the same as that already given in the case of baldness; their brain is small and less fluid than in man, so that the heat required for concoction does not [10] altogether fail. Among them it is most clear in horses of all animals that we know, because the

bone about the brain is thinner in them than in others in proportion to their size. A sign of this is that a blow on this spot is fatal to them—thus Homer also [15] has said: ‘where the first hairs grow on the skull of horses, and a wound is most fatal’.<sup>10</sup> As then the moisture easily flows to these hairs because of the thinness of the bone, whilst the heat fails on account of age, they go grey. The reddish hairs go grey sooner than the black, redness also being a sort of weakness of hair and all [20] weak things ageing sooner.

It is said that cranes become darker as they grow old. The reason for this would be that their feathers are naturally finer than others and as they grow old the moisture in the feathers is too much to decay easily.

Greyiness comes about by some sort of decay, and is not, as some think, a [25] withering. A sign is the fact that hair protected by hats or other coverings goes grey sooner (for the winds prevent decay and the protection keeps off the winds), and the fact that it is aided by anointing with a mixture of oil and water. For, though water [30] cools things, the oil mingled with it prevents the hair from drying quickly, water being easily dried up. That the process is not a withering, that the hair does not whiten as grass does by withering, is shown by the fact that some hairs grow grey from the first, whereas nothing springs up in a withered state. Many hairs also whiten at the tip, for there is least heat in the extremities and thinnest parts.

When the hairs of other animals are white, this is caused by nature, not by any [785<sup>b</sup>1] affection. The cause of the colours in other animals is the skin; if they are white, the skin is white, if they are dark it is dark, if they are piebald in consequence of a mixture of the hairs, it is found to be white in the one part and dark in the other. But [5] in man the skin is in no way the cause, for even white-skinned men have very dark hair. The reason is that man has the thinnest skin of all animals in proportion to his size and therefore it has not strength to change the hairs; on the contrary the skin itself changes its colour through its weakness and is darkened by sun and wind, [10] while the hairs do not change along with it at all. But in the other animals the skin, owing to its thickness, has the influence belonging to the soil in which a thing grows: that is why the hairs change according to the skin but the skin does not change at all in consequence of the winds and the sun. [15]

6 · Of animals some are uni-coloured (I mean by this term those of which the kind as a whole has one colour, as all lions are tawny; and this

condition exists also in birds, fish, and the other classes of animals alike); others though many-coloured are yet whole-coloured (I mean those whose body as a whole has the same colour, as [20] a bull is white as a whole or dark as a whole); others are vari-coloured. This last term is used in two ways; sometimes the whole kind is vari-coloured, as leopards and peacocks, and some fish, e.g. the so-called 'thrattai'; sometimes the kind as a whole is not so, but such individuals are found in it, as with cattle and goats and, among [25] birds, pigeons; the same applies also to other kinds of birds. The whole-coloured change much more than the uniformly coloured, both into the simple colour of another individual of the same kind (as dark changing into white and *vice versa*) and into both colours mingled. This is because it is a natural characteristic of the [30] kind as a whole not to have one colour only, the kind being easily moved in both directions so that the colours both change more into one another and are more varied. The opposite holds with the uniformly coloured; they do not change except by an affection, and that rarely; but still they do so change, for before now white [35] individuals have been observed among partridges, ravens, sparrows, and bears. This happens when the course of development is perverted, for what is small is easily [786<sup>a</sup>1] spoilt and easily moved, and what is developing is small, the beginning of all such things being on a small scale.

Change is especially found in those animals of which by nature the individual is whole-coloured but the kind many-coloured. This is owing to the water which [5] they drink, for hot waters make the hair white, cold makes it dark, an effect found also in plants. The reason is that the hot have more air than water in them, and the air shining through causes whiteness, as also in froth. As, then, skins which are white by reason of some affection differ from those white by nature, so also in the [10] hair the whiteness due to disease or age differs from that due to nature in that the cause is different; the latter are whitened by the natural heat, the former by the external heat. Whiteness is caused in all things by the vaporous air imprisoned in them. Hence also in all animals not uniformly coloured all the part under the belly is [15] whiter. For practically all white animals are both hotter and better flavoured for the same reason; the concoction of their nutriment makes them well-flavoured, and heat causes the concoction. The same cause holds for those animals which are uniformly-coloured, but either dark or white; heat and cold are the causes of the [20] nature of the skin and hair, each of the parts having its own special heat.

The tongue also varies in the simply coloured as compared with the

varicoloured animals, and again in the simply coloured which differ from one another, as white and dark. The reason is that assigned before, that the skins of the vari-coloured are vari-coloured, and the skins of the white-haired and dark-haired [25] are white and dark in each case. Now we must conceive of the tongue as one of the external parts, not taking into account the fact that it is covered by the mouth but looking on it as we do on the hand or foot; thus since the skin of the vari-coloured animals is not uniformly coloured, this is the cause of the skin on the tongue being also vari-coloured.

[30] Some birds and some wild quadrupeds change their colour according to the seasons of the year. The reason is that, as men change according to their age, so the same thing happens to them according to the season; for this makes a greater difference to them than the change of age.

The more omnivorous animals are more vari-coloured to speak generally, and [786<sup>b</sup>1] this is what might be expected; thus bees are more uniformly coloured than hornets and wasps. For if the food is responsible for the change, we should expect varied food to increase the variety in the movements and in the residual matter of the food, from which come into being hairs and feathers and skins.

[5] So much for colours and hairs.

7 · As to the voice, it is deep in some animals, high in others, in others again well-pitched and in due proportion between both extremes. Again, in some it is loud, in others small, and it differs in smoothness and roughness, flexibility and [10] inflexibility. We must inquire then into the causes of each of these distinctions.

We must suppose then that the same cause is responsible for high and deep voices as for the change which they undergo in passing from youth to age. The voice is higher in all other animals when younger, but in cattle that of calves is deeper. We [15] find the same thing also in the male and female sexes; in the other kinds of animals the voice of the female is higher than that of the male (this being especially plain in man, for nature has given this faculty to him in the highest degree because he alone [20] of animals makes use of speech and the voice is the material of speech), but in cattle the opposite obtains, for the voice of cows is deeper than that of bulls.

Now the purpose for which animals have a voice, and what is voice and sound generally, has been stated partly in the treatise on sensation,

partly in that on the [25] soul. But since lowness of voice depends on the movement being slow and its highness on its being quick, there is a difficulty in knowing whether it is that which moves or that which is moved that is the cause of the slowness or quickness. For some say that what is much is moved slowly, what is little quickly, and that this is the cause of some animals having a deep and others a high voice. Up to a certain [30] point this is well said (for it seems to be rightly said in a general way that the depth depends on a certain amount of the air put in motion), but not altogether, for if this were true it would not be easy to speak both soft and deep at once, nor again both loud and high. Again, the depth seems to belong to the nobler nature, and in songs the deep note is better than the high-pitched ones, the better lying in superiority, [787<sup>a</sup>1] and depth of tone being a sort of superiority. But then depth and height in the voice are different from loudness and softness, and some high-voiced animals are loud-voiced, and in like manner some soft-voiced ones are deep-voiced, and the same applies to the tones lying between these extremes. And by what else can we [5] define these (I mean loudness and softness of voice) except by the large and small amount of the air put in motion? If then height and depth are to be decided in accordance with the distinction postulated, the result will be that the same animals will be deep- and loud-voiced, and the same will be high- and soft-voiced; but this is [10] false.

The reason of the difficulty is that the words 'great' and 'small', 'much' and 'little' are used sometimes absolutely, sometimes relatively to one another. Whether an animal has a great voice depends on the air which is moved being much *absolutely*, whether it has a small voice depends on its being little *absolutely*; but whether they have a deep or high voice depends on their being thus differentiated in [15] relation to one another. For if that which is moved surpasses the strength of that which moves it, what is moved must go slowly; if the opposite, quickly. The strong, then, on account of their strength, sometimes move much air and make the movement slow, sometimes, having complete command over it, make the movement swift. On the same principle the weak either move too much air for their strength [20] and so make the movement slow, or if they make it swift move but little because of their weakness.

These, then, are the reasons of these contrarieties, that neither are all young animals high-voiced nor all deep-voiced, nor are all the older, nor yet are the two [25] sexes thus opposed, and again that not only the sick speak in a high voice but also those in good bodily condition, and, further, that as men verge on old age they become higher-voiced, though

this age is opposite to that of youth.

Most young animals, then, and most females set but little air in motion because of their want of power, and are consequently high-voiced, for a little air is [30] carried along quickly, and in the voice what is quick is high. But in calves and cows, in the one case because of their age, in the other because of their female nature, the part by which they set the air in motion is not strong; at the same time they set a [787<sup>b</sup>1] great quantity in motion and so are deep-voiced; for that which is borne along slowly is heavy, and much air is borne along slowly. And these animals set much in movement whereas the others set but little, because the vessel through which the breath is first borne has in them a large opening and necessarily sets much air in [5] motion, whereas in the rest the air is better dispensed. As their age advances this part which moves the air gains more strength in each animal, so that they change into the opposite condition, the high-voiced becoming deeper-voiced than they were, and the deep-voiced higher-voiced, which is why bulls have a higher voice than [10] calves and cows. Now the strength of all animals is in their sinews, and so those in the prime of life are stronger, the young being weaker in the joints and sinews; moreover, in the young they are not yet tense, and in those now growing old the tension relaxes; hence both these ages are weak and powerless for movement. And [15] bulls are particularly sinewy, even their hearts, and therefore that part by which they set the air in motion is in a tense state, like a sinewy string stretched tight. (That the heart of bulls is of such a nature is shown by the fact that a bone is actually found in some of them, and bones seek the nature of sinew.)

[20] All animals when castrated change to the female character, and utter a voice like that of the females because the sinewy strength in the principle of the voice is relaxed. This relaxation is just as if one should stretch a string and make it taut by hanging some weight on to it, as women do who weave at the loom, for they stretch [25] the warp by attaching stone weights to it. For in this way are the testes attached to the seminal passages, and these again to the blood-vessel which takes its origin in the heart near the organ which sets the voice in motion. Hence as the seminal [30] passages change towards the age at which they are now able to secrete the semen, this part also changes along with them. As this changes, the voice too changes, more indeed in males, but the same thing happens in females too, only not so plainly, the [788<sup>a</sup>1] result being what some call 'bleating' when the voice is uneven. After this it settles into a deep or high voice of the succeeding time of life. If the testes are

removed the tension of the passages relaxes, as when the weight is taken off the string or the [5] warp; as this relaxes, the principle which moves the voice is loosened in the same proportion. This, then, is the reason why the voice and the form generally change to the female character in castrated animals; it is because the principle is relaxed upon [10] which depends the tension of the body; not that, as some suppose, the testes are themselves a knot of many principles, but small changes are the causes of great ones, not *per se* but when it happens that a principle changes with them. For the principles, though small in size, are great in potency; this, indeed, is what is meant by a principle, that it is itself the cause of many things without anything else being [15] higher than it.

The heat or cold also of their habitat contributes to make some animals of such a character as to be deep-voiced, and others high-voiced. For hot breath being thick causes depth, cold breath being thin the opposite. This is clear also in pipe-playing, [20] for if the breath of the performer is hotter, that is to say if it is expelled as by a groan, the note is deeper.

The cause of roughness and smoothness in the voice, and of all similar inequality, is that the part or organ through which the voice is conveyed is rough or [25] smooth or generally even or uneven. This is plain when there is any moisture about the trachea or when it is roughened by any affection, for then the voice also becomes uneven.

Flexibility and inflexibility depend on the softness or hardness of the organ, for what is soft can be regulated and assume any form, while what is hard cannot; thus [30] the soft organ can utter a loud or a small note, and accordingly a high or a deep one, since it easily regulates the breath, becoming itself easily great or small. But hardness cannot be regulated.

Let this be enough on all those points concerning the voice which have not been previously discussed in the treatise on sensation and in that on the soul. [788<sup>b</sup>1]

8 · With regard to the teeth it has been stated previously that they do not exist for a single purpose nor for the same purpose in all animals, but in some for nutrition, in others also for fighting and for vocal speech. We must, however, [5] consider it not alien to the discussion of generation to inquire into the reason why the front teeth are formed first and the grinders later, and why the latter are not shed but the former are shed and grow again.

Democritus has spoken of these questions but not well, for he assigns

the cause [10] too generally without investigating the facts in all cases. He says that the early teeth are shed because they are formed in animals too early, for it is when animals are practically in their prime that they grow according to nature, and suckling is the cause he assigns for their being found too early. Yet the pig also suckles but does not [15] shed his teeth, and, further, all the saw-toothed animals suckle, but some of them do not shed any teeth except the canines, e.g. lions. This mistake, then, was due to his speaking generally without examining what happens in all cases; but this is what we ought to do, for any one who makes any general statement must speak of all the particular cases.

Now we assume, basing our assumption upon what we see, that nature never [20] fails nor does anything in vain so far as is possible in each case. And it is necessary, if an animal is to obtain food after the time of taking milk is over, that it should have instruments for the treatment of the food. If, then, as Democritus says, this [25] happened about the time of reaching maturity, nature would fail in something possible for her to do. And, besides, the operation of nature would be contrary to nature, for what is done by violence is contrary to nature, and it is by violence that he says the formation of the first teeth is brought about. That this view then is not true is plain from these and other similar considerations.

[30] Now these teeth are developed before the flat teeth, in the first place because their function is earlier (for dividing comes before crushing, and the flat teeth are for crushing, the others for dividing), in the second place because the smaller is naturally developed quicker than the larger, even if both start together, and these [789a1] teeth are smaller in size than the grinders, because the bone of the jaw is flat in that part but narrow towards the mouth. From the greater part, therefore, must flow more nutriment to form the teeth, and from the narrower part less.

The act of sucking in itself contributes nothing to the formation of the teeth, but the heat of the milk makes them appear more quickly. A proof of this is that [5] even in suckling animals those young which enjoy hotter milk grow their teeth quicker, heat being conducive to growth.

They are shed, after they have been formed, partly because it is better so (for what is sharp is soon blunted, so that a fresh relay is needed for the work, whereas [10] the flat teeth cannot be blunted but are only smoothed in time by wearing down), partly from necessity because, while the roots of the grinders are fixed where the jaw is flat and the bone strong, those of the front teeth are in a thin part, so that they are weak and easily moved. They grow again because they are shed while the bone is [15] still growing and the animal is still young enough to grow teeth. A



proof of this is that even the flat teeth grow for a long time, the last of them cutting the gum at about twenty years of age; indeed in some cases the last teeth have been grown in quite old age. This is because there is much nutriment in the broad part of the [789<sup>b</sup>1] bones, whereas the front part being thin soon reaches perfection and no residual matter is found in it, the nutriment being consumed in its own growth.

Democritus, however, neglecting the final cause, reduces to necessity all the operations of nature. Now they are necessary, it is true, but yet they are for a final [5] cause and for the sake of what is best in each case. Thus nothing prevents the teeth from being formed and being shed in this way; but it is not on account of these causes but on account of the end; these are causes in the sense of being the moving and efficient instruments and the material. So it is reasonable that nature should perform most of her operations using breath as an instrument, for as some [10] instruments serve many uses in the arts, e.g. the hammer and anvil in the smith's art, so does breath in things formed by nature. But to say that necessity is the cause is much as if we should think that the water has been drawn off from a dropsical patient on account of the lancet alone, not on account of health, for the sake of [15] which the lancet made the incision.

We have thus spoken of teeth, saying why some are shed and grow again, and others not, and generally for what cause they are formed. And we have spoken of the other affections of the parts which are found to occur not for any final end but of [20] necessity and on account of the motive cause.

**\*\*TEXT:** H. J. Drossaart Lulofs, OCT, Oxford, 1965

<sup>1</sup>Reading ἄντί for ὅ ντα.

<sup>2</sup>*History of Animals* III 1.

<sup>3</sup>*History of Animals* 510<sup>a</sup>20ff.

<sup>4</sup>*History of Animals* III 1.

<sup>5</sup>Drossaart Lulofs excises ‘like a true skin’.

<sup>6</sup>Drossaart Lulofs excises ‘Those ovipara . . . develops externally’.

<sup>7</sup>Reading π ποῖοῦσα.

<sup>8</sup>*Parts of Animals*, IV 9—Drossaart Lulofs excises the reference.

<sup>9</sup>The text of the obelized passage is uncertain.

<sup>10</sup>Drossaart Lulofs excises the parenthetical sentence.

<sup>11</sup>Drossaart Lulofs excises ‘that the semen . . . the body’.

<sup>12</sup>Drossaart Lulofs excises ‘to a certain . . . otherwise’.

<sup>13</sup>Frag. 63 Diels-Kranz.

<sup>14</sup>Frag. 57 Diels-Kranz.

<sup>15</sup>Frag. 65 Diels-Kranz.

<sup>16</sup>The obelized passage is textually corrupt.

<sup>17</sup>Reading ἢ ἀρχή.

<sup>18</sup>Drossaart Lulofs marks lines 12 (‘Now that which comes . . .’) to 22 (‘ . . . semen is’) as an interpolation.

<sup>19</sup>Reading τοῦτω.

<sup>20</sup>Reading ἐκάτεροι for καὶ ἑτεροι.

<sup>21</sup>Drossaart Lulofs regards the bracketed passage as an interpolation.

<sup>22</sup>Drossaart Lulofs excises this paragraph.

<sup>23</sup>Drossaart Lulofs excises the parenthetical sentence.

<sup>24</sup>See *History of Animals* VI 18.

<sup>25</sup>Frag. 79 Diels-Kranz.

<sup>26</sup>Excised by Drossaart Lulofs.

<sup>27</sup>See III 11.

<sup>1</sup>Omitting καὶ σπέρμασι ... ἀποκρίσεσιν.

<sup>2</sup>‘Aphrodite’ from ἀφρός.

<sup>3</sup>Drossaart Lulofs marks a lacuna in the text here.

<sup>4</sup>Omitting τὸ σπέρμα.

<sup>5</sup>Drossaart Lulofs regards this paragraph as misplaced.

<sup>6</sup>See III 3.

<sup>7</sup>Reading τῆς τε ξηρᾶς καὶ τῆς ὑγρῆς.

<sup>8</sup>See *History of Animals* III 3.

<sup>9</sup>Omitting αἰὲ καί.

<sup>1</sup>*History of Animals* 567<sup>a</sup>30.

<sup>2</sup>Excised by Wimmer.

<sup>3</sup>Omitting τήν.

<sup>4</sup>The phrase between daggers is corrupt.

<sup>5</sup>See *History of Animals* VI 3.

<sup>6</sup>Reading ὅσοις μή.

<sup>7</sup>See Herodotus II 93.

<sup>8</sup>The text here is uncertain.

<sup>9</sup>*History of Animals* 550<sup>a</sup>17ff.

<sup>10</sup>Drossaart Lulofs marks a lacuna here.

<sup>11</sup>Reading ἐπιγίγνεται περίττωμα (Peck).

<sup>12</sup>Excised by Drossaart Lulofs.

<sup>13</sup>This paragraph appears to be misplaced.

<sup>14</sup>Omitting ἐν τοῖς τόποις ζῶων.

<sup>1</sup>Omitting τοῦ σπέρματος.

<sup>2</sup>Frag. 63 Diels-Kranz.

<sup>3</sup>Excised by Drossaart Lulofs.

<sup>4</sup>Reading ξ τερα.

<sup>5</sup>Excised by Platt.

<sup>6</sup>Excised by Drossaart Lulofs.

<sup>7</sup>Frag. 68 Diels-Kranz.

<sup>1</sup>*Sense and Sensibilia 2; On the Soul* III 1.

<sup>2</sup>Drossaart Lulofs excises the sentence in parentheses.

<sup>3</sup>Omitting καὶ εἰσπνοήν.

<sup>4</sup>Reading οἷα.

<sup>5</sup>There appears to be a lacuna in the text here.

<sup>6</sup>Reading τὴν ἀρχὴν τῷ πνευματικῷ τόπῳ.

<sup>7</sup>Drossaart Lulofs marks 781<sup>a</sup>20-<sup>b</sup>5 as a later addition.

<sup>8</sup>‘γῆρας’ (‘old age’) connected with ‘γῆ’ (‘earth’).

<sup>9</sup>Reading καὶ ἐν τῷ γήρῳ.

<sup>10</sup>*Iliad* VIII 83.

# ON COLOURS\*\*

*T. Loveday and E. S. Forster*

1 · Simple colours are those which belong to the elements, i.e. to fire, air, [791<sup>a</sup>1] water, and earth. Air and water in themselves are by nature white, fire (and the sun) yellow, and earth is naturally white. The variety of hues which earth assumes is due to dying, as is shown by the fact that ashes turn white when the moisture that [5] tinged them is burnt out. It is true they do not turn a pure white, but that is because they are tinged by the smoke, which is black. And this is the reason why lye-mixture turns yellow, the water being coloured by hues of flame and black.

Black is the proper colour of elements in process of transmutation. The [10] remaining colours, it may easily be seen, arise from blending by mixture of these.

Darkness is due to privation of light. For we see black under three different conditions. Either the object of vision<sup>1</sup> is naturally black (for black light is always reflected from black objects); or no light at all passes to the eyes from the object (for [15] an invisible object surrounded by a visible patch looks black); and objects always appear black to us when the light reflected from them is rare and scanty. This last condition is the reason why shadows appear black. It also explains the blackness of ruffled water, e.g. of the sea when a ripple passes over it: owing to the roughness of [20] the surface few rays of light fall on the water and the light is dissipated, and so the part which is in shadow appears black. The same principle applies to very dense cloud, and to masses of water and of air which light fails to penetrate; for water and [25] air look black when present in very deep masses, because of the extreme rarity of the rays reflected, the parts of the mass between the illuminated surfaces being in [791<sup>b</sup>1] darkness and therefore looking black. There are many arguments to prove that darkness is not a colour, but merely privation of light, the best being that darkness, unlike all other objects of vision, is never perceived as having any definite [5] magnitude or any definite shape.

Light is clearly the colour of fire; for it is never found with any other

hue than this, and it alone is visible in its own right whilst all other things are rendered visible by it. But there is this point to be considered, that some things, though they are not [10] in their nature fire nor any species of fire, yet seem to produce light. So we cannot say that the colour of fire is identical with light, and yet light is the colour of other things besides fire, but we can say that this colour is to be found in other things [15] besides fire, and yet light is the colour of fire. Anyhow, it is only by aid of light that fire is rendered visible, just as all other objects are made visible by the appearance of their colour.<sup>2</sup>

The colour black occurs when air and water are thoroughly burnt by fire, and [20] this is the reason why burning objects turn black, as e.g. wood and charcoal when the fire is put out, and smoke from clay as the moisture in the clay is all secreted and burnt. This is also why the blackest smoke is given off by fat and greasy substances like oil and pitch and resinous wood, because these objects burn most completely, and the process of combustion is most continuous in them.

[25] Again, things turn black through which water percolates if they first become coated with lichen and then the moisture dries off. The stucco on walls is an [792<sup>a</sup>1] example of this, and much the same applies to stones under water, which get covered with lichen and turn black when dried.

This then is the list of simple colours.

[5] **2** · From these the rest are derived in all their variety of chromatic effects by blending of them and by their presence in varying strengths. The different shades of crimson and violet depend on differences in the strength of their constituents, whilst blending is exemplified by mixture of white with black, which gives grey. So a dusky [10] black mixed with light gives crimson. For observation teaches us that black mixed with sunlight or firelight always turns crimson, and that black objects heated in the fire all change to a crimson colour, as e.g. smoky tongues of flame, or charcoal when [15] subjected to intense heat, are seen to have a crimson colour. But a vivid bright violet is obtained from a blend of feeble sunlight with a thin dusky white. That is why the air sometimes looks purple at sunrise and sunset, for then the air is especially dusky [20] and the impinging rays feeble. So, too, the sea takes a purple hue when the waves rise so that one side of them is in shadow: the rays of the sun strike without force on the slope and so produce a violet colour. The same thing may also be observed in [25] birds' wings,

which get a purple colour if extended in a certain way against the light, but if the amount of light falling on them is diminished the result is the dark colour called brown, whilst a great quantity of light blended with primary black gives crimson. Add vividness and lustre, and crimson changes to flame-colour.

For it is after this fashion that we ought to proceed in treating of the blending [30] of colours, starting from an observed colour as our basis and making mixtures with it. (But we must not assign to all colours a similar origin, for there are some colours which, though not simple, bear the same relation to their products that simple colours bear to them, inasmuch as a simple colour has to be mixed with one other [792<sup>b</sup>1] colour to produce them.) And when the constituents are obscure in the compound product, we must still try to establish our conclusions by reference to observation.<sup>3</sup> For, whether we are considering the blend which gives violet or crimson, or whether we are considering the mixtures of these colours which produce other tints, we must explain their origin on the same kind of principles, even though they look [5] dissimilar.<sup>4</sup> So we must start from a colour previously established, and observe what happens when it is blent. Thus we find that wine colour results from blending airy rays with pure lustrous black, as may be seen in grapes on the bunch, which grow wine-coloured as they ripen; for, as they blacken, their crimson turns to a violet. [10] After the manner indicated we must treat all differences of colours, getting comparisons by moving coloured objects,<sup>5</sup> keeping our eye on actual phenomena, assimilating different cases of mixture on the strength of the particular known instances in which a given origin and blending produce a certain chromatic effect, [15] and verifying our results. But we must not proceed in this inquiry by blending pigments as painters do, but rather by comparing the rays reflected from the aforesaid known colours, this being the best way of investigating the true nature of [20] colour-blends. Verification from experience and observation of similarities are necessary if we are to arrive at clear conclusions about the origin of different colours, and the chief ground of similarities is the common origin of nearly all colours in blends of different strengths of sunlight and firelight, and of air and water. At the same time we ought to draw comparisons from the blends of other [25] colours with rays of light. Thus charcoal and smoke, and rust, and brimstone, and birds' plumage blent, some with firelight and others with sunlight, produce a great variety of chromatic effects. And we must also observe the results of maturation in [30] plants and fruit, and in hair, feathers, and so on.

3 · We must not omit to consider the several conditions which give rise to the manifold tints and infinite variety of colours. It will be found that variations of tint occur either because colours are possessed by varying and irregular strengths of light and shade (for both light and shade may be present in very different strengths, [793<sup>a</sup>1] and so whether pure or already mixed with colours they alter the tints of the colours); or because the colours blent vary in fullness and in powers; or because they [5] are blent in different proportions. Thus violet and crimson and white and all colours vary very much both in strength and in intermixture and purity.

Difference of hue may also depend on the brightness and lustre or dimness and [10] dullness of the blend. Lustre is simply continuity and density of light; e.g. we have a glistening gold colour when the yellow colour of sunlight is highly concentrated and therefore lustrous. That explains why pigeons' necks and drops of falling water look [15] lustrous when light is reflected from them.

Again, some objects change their colour and assume a variety of hues when polished by rubbing or other means, like silver, gold, copper, and iron, when they are polished; and some kinds of stones give rise to different colours, like . . .<sup>6</sup> which are [20] black but make white marks. This is because the original composition of all such substances is of small dense and black particles, but in the course of their formation they have been tinged, and all the pores through which the tincture passed have taken its colour, so that finally the whole material appears to be of that colour. But [25] the dust that is rubbed off from them loses this golden or copper colour (or whatever the hue may be), and is quite black, because rubbing breaks up the pores through [30] which the tincture passed, and black is the original colour of the substance.<sup>7</sup> The other colour is no longer apparent because the dye is dissipated, and so we see the original natural colour of the material, and this is why these substances all appear black. But when rubbed against a smooth and even surface, as e.g. against a [793<sup>b</sup>1] touchstone, they lose their blackness and get back their other colour, which comes through where the lines of the tincture in the pores are unbroken and continuous.

In the case of objects burning, dissolving, or melting in the fire, we find that [5] those have the greatest variety which are dark in colour and give off a thin hazy smoke, such as the smoke of brimstone or rusty copper vessels, and those which, like silver, are dense and smooth.

Apart from these cases, variety of hue is characteristic of all dark



smooth [10] objects, such as water, clouds, and birds' plumage. For these last, owing to their smoothness and the variety of blends into which the impinging rays of light enter, show various colours, as also does darkness.

We never see a colour in absolute purity: it is always blent, if not with another [15] colour, then with rays of light or with shadows, and so it assumes a tint other than its own. That is why objects assume different tints when seen in shade and in light and sunshine, and according as the rays of light are strong or weak, and the objects themselves slope this way or that, and under other differential conditions. Again, [20] they vary when seen by firelight or moonlight or torchlight, because the colours of those lights differ somewhat. They vary also in consequence of mixture with other colours, for they are coloured by passing through one another. For if light falls on a given object and is coloured by it crimson or herb-green, and then the light reflected [25] from that object falls on another colour, it is again modified by this second colour, and so it gets a new chromatic blend. This happening to it continuously, though imperceptibly, light when it reaches the eye may be a blend of many colours, though the sensation produced is not of a blend but of some colour predominant in the [30] blend. This is why objects under water tend to have the colour of water, and why reflections in mirrors resemble the colour of the mirrors, and we must suppose that the same thing happens in the case of air. Thus all hues represent a threefold [794<sup>a</sup>1] mixture of light, a translucent medium (e.g. water or air), and underlying colours from which the light is reflected. A translucent white medium, when of a very rare [5] consistency, looks hazy in colour; but if it is dense, like water or glass, or air when thick, a sort of mist covers its surface, because the rays of light are inadequate at every point on it owing to its density, and so we cannot see the interior clearly. Air seen close at hand appears to have no colour, for it is so rare that it yields and gives [10] passage to the denser rays of light, which thus shine through it; but when seen in a deep mass it looks practically dark blue. This again is the result of its rarity, for where light fails the air lets darkness through and looks dark blue. When densified, [15] air is, like water, the whitest of things.

4 · All dyed things take their colour from the dye. Common sources of such coloration are the flowers of plants and their roots, bark, wood, leaves, or fruit, and again, earth, foam, and inks. Sometimes coloration is due to animal juices (e.g. the [20] juice of the purple-fish, with which

clothes are dyed violet), in other cases to wine, or smoke, or lye mixture, or to sea-water, as happens, for instance, to the hair of marine animals, which is always turned red by the sea. In short, anything that has a [25] colour of its own may transfer that colour to other things, and the process is always this, that colour leaving one object passes with moisture and heat into the pores of another, which on drying takes the hue of the object from which the colour came. This explains why colour so often washes out: the dye runs out of the pores again. Furthermore, steeping during the dyeing produces a great variety of hues and [30] mixtures, and these are also affected by the condition of the material itself, as has been said before in the case of blending. Even black fleeces are used for dyeing, but they do not take so bright a colour as white. The reason is that whilst the pores of the wool are tinged by the dye that enters them, the intervals of solid hair between the [794<sup>b</sup>1] pores do not take the colour, and if they are white, then in juxtaposition to the colour they make the dye look brighter, but if they are black, they make it look dark and dull. For the same reason a more vivid brown is obtained on black wool than on [5] white, the brown dye blending with the rays of black and so looking purer. For the intervals between the pores are too small to be separately seen, just as tin is invisible when blent with bronze; and there are other parallel cases. [10]

These then are the reasons for the changes in colour produced by dyeing.

5 · As for hair and feathers and flowers and fruit and all plants, it is abundantly clear that all the changes of colour which they undergo coincide with the process of maturation. But what the origins of colour in the various classes of [15] plants are, and what kinds of changes these colours undergo, and from what materials these changes are derived, and the reasons why they are thus affected, and any other difficulties connected with them—in considering all these questions we must start from the following premisses. In all plants the original colour is [20] herb-green; thus shoots and leaves and fruit begin by taking this colour. This can also be seen in the case of rain-water; when water stands for a considerable time and then dries up, it leaves a herb-green behind it. So it is intelligible why herb-green is the first colour to form in all plants. For all water in process of time first turns [25] yellow-green on blending with the rays of the sun; it then gradually turns black, and this further mixture of black and yellow-green produces herb-green. For, as has already been

remarked, moisture becoming stale and drying up of itself turns black. [30] This can be seen, for example, on the stucco of reservoirs; here all the part that is always under water turns black, because the moisture, as it cools, dries up of itself, but the part from which the water has been drawn off, and which is exposed to the sun, becomes herb-green, because yellow mingles with the black. Moreover, with [795<sup>a</sup>1] the increasing blackness of the moisture, the herb-green tends to become very deep and of a leek-green hue. This is why the old shoots of all plants are much blacker than the young shoots, which are yellower because the moisture in them has not yet [5] begun to turn black. For, the growth being slow and the moisture remaining in them a long time, owing to the fact that the liquid, as it cools, turns very black, a leek-green is produced by blending with pure black. But the colour of shoots in [10] which the moisture does not mix with the rays of the sun, remains white, unless it has lasted a long time and dried and turned black at an earlier stage. In all plants, therefore, the parts above the ground are at first of a yellow-green, while the parts under the ground, namely the stalks and the roots, are white. The shoots, too, are [15] white as long as they are underground, but if the earth be removed from round them, they turn herb-green; and all fruit, as has been already said, becomes herb-green at first, because the moisture, which passes through the shoots into it, has a natural tendency to assume this colour and is quickly absorbed to promote the [20] growth of the fruit. But when the fruit ceases to grow because the liquid nourishment which flows into it no longer predominates, but the moisture on the contrary is consumed by the heat—then it is that all fruit becomes ripe; and the [25] moisture already present in it being heated by the sun and the warmth of the atmosphere, each species of fruit takes its colour from its juice, just as dyed material takes the hue of the dye. This is why fruits colour gradually, those parts of them which face the sun and heat being most affected; it is also the reason why all fruits [30] change their colour with the changing seasons. This is evident; for all fruits, as soon as they begin to ripen, change from herb-green to their natural colour. They become white and black and grey and yellow and blackish and dusky and crimson and [795<sup>b</sup>1] wine-coloured and saffron—in fact, assume practically every variety of colour. Since most hues are the result of the blending of several colours, the hues of plants [5] must certainly also be due to the same blends; for the moisture percolating through the plants washes and carries along with it all the ingredients on which their colours depend. When this moisture is heated up by the sun and the warmth of the atmosphere at the time of the

ripening of the fruit, each of the colours forms [10] separately, some quickly and some slowly. The same thing happens in the process of dyeing with purple; when, after breaking up the shell and washing all the moisture from it, they pour it into earthenware vessels and boil it, at first no definite colour is noticeable in the dye, because, as the liquid boils more and more and the colours still [15] remaining in the vessels mix together, each of the hues gradually undergoes a great variety of alterations; for black and white and brown and hazy shades appear, and finally the dye all turns purple, when the colours are sufficiently boiled up together; [20] so as a result of the blending no other colour is separately noticeable. This is just what happens with fruit. In many instances, because the maturing of all the colours does not take place simultaneously, but some colours form earlier and others later, [25] changes from one to another take place, as in the case of grapes and dates. Some of these are crimson at first; but when black colour forms in them, they turn to a wine colour, and in the end they become a dark-bluish hue when the crimson is finally [30] mixed with a large quantity of pure black. For the colours which appear late, when they predominate, change the earlier colours. This is best seen in black fruits; for broadly speaking most of them, as has already been remarked, first change from [796<sup>a</sup>1] herb-green to a pinkish shade and become reddish, but quickly change again from the reddish hue and become dark blue because of the pure black present in them. [5] The presence of crimson is proved by the fact that the twigs and shoots and leaves of all such plants are crimson, because that colour is present in them in large quantities; while that black fruits partake of both colours is clear from the fact that their juice is always a wine colour. Now the crimson hues come into existence at an [10] earlier stage in growth than the black. This is clear from the fact that pavement upon which there is any dripping, and, generally speaking, any spot where is a slight flow of water in a shady place, always turns first from herb-green to a crimson colour, and the pavement looks as though blood had lately been shed over all the [15] portion of it on which the herb-green colour has matured; then finally this also becomes very black and of a dark-bluish colour. The same thing happens in the case of fruit. That change in the colour of fruit occurs by the formation of a fresh colour, [20] which ousts the earlier one, can easily be seen from the following examples. The fruit of the pomegranate and the petals of roses are white at first, but in the end, when the juices in them are beginning to be tinged as they mature, they alter their colours and change to violet and crimson hues. Other parts of plants have a number [25] of shades, for

example the juice of the poppy and the scum of olive oil; for this is white at first, as is the fruit of the pomegranate, but, after being white, it changes to crimson, and finally mingling with a large quantity of black it becomes a [30] dark-bluish hue. So, too, the petals of the poppy are crimson at their ends, because the process of maturation takes place quickly there, but at their base they are black, because this colour is already predominant at the end; just as it predominates in the [796<sup>b</sup>1] fruit, which also finally becomes black.

In the case of plants which have only one colour—white, for example, or black or crimson or violet—the fruit always keeps a single kind of colour, when once it has [5] changed from herb-green to another colour. Sometimes the blossoms are of the same colour as the fruit—as, for instance, in the pomegranate, the fruit and blossoms of which are both crimson; but sometimes they are of very dissimilar [10] hues—as, for example, in the bay-tree and the ivy, whose blossoms are always yellow, but their fruit respectively black and crimson. The same is true of the apple-tree; its blossom is white with a tinge of pink, while its fruit is yellow. In the poppy the flower is crimson, but the fruit may be black or white, according to the [15] different time at which the juices present in the plant ripen. The truth of the last statement can be seen from many examples; for, as has been said, some fruits come to differ greatly as they ripen. This is why the odours and flavours of flowers and [20] fruits differ so much. This is still more evident in the actual blossoms. For part of the same petal may be black and part crimson, or, in other cases, part white and part purplish. The best example of all is the iris; for its blossom shows a great [25] variety of hues according to the different states of maturation in its different parts, just as grapes do when they are already ripening. Therefore the extremities of blossoms always ripen most completely, whilst the parts near the base have much [30] less colour; for in some cases the moisture is, as it were, burnt out before the blossom undergoes its proper process of maturation. It is for this reason that the blossoms remain the same in colour, while the fruit changes as it grows riper; for the former, owing to the presence of only a small amount of nutriment, soon mature, while the [797<sup>a</sup>1] fruit, owing to the presence of a large quantity of moisture, changes as it ripens to all the various hues which are natural to it. This can also be seen, as has already been remarked, in the process of colour-dyeing. When in dyeing purple they put in [5] the colouring matter from the vein of the purple-fish, at first it turns brown and black and hazy; but when the dye has been boiled sufficiently, a vivid, bright violet appears. So it must be from similar reasons that the

blossoms of a plant frequently [10] differ in colour from its fruit, and that some pass to a stage beyond, whilst others never attain to their natural colour, according as they do or do not mature thoroughly. For these reasons, then, blossoms and fruit differ from one another in [15] their colouring. The leaves of most trees turn yellow in the end, because, owing to the failure of nutriment, they become dried up before they change to their natural colour; just as some of the fruits also which fall off are yellow in colour, because here too nutriment fails before they mature. Furthermore, corn and in fact all [20] plants turn yellow in the end. This change of colour is due to the fact that the moisture in them no longer turns black owing to the rapidity with which it dries up. As long as it turns black and blends with the yellow-green, it becomes herb-green, as has already been said; but, since the black is continually becoming weaker, the [25] colour gradually reverts to yellow-green and finally becomes yellow. The leaves of the pear-tree and the arbutus and some other trees become crimson when they mature; but the leaves even of these, if they dry up quickly, turn yellow, because the nutriment fails before maturity is reached. It seems very probable then that the [30] differences of colour in plants are due to the above causes.

6 · The hairs, feathers, and hides, whether of horses, cattle, sheep, human beings, or any other class of animals, grow white, grey, reddish, or black for the [797<sup>b</sup>1] same reason. They are white when the moisture which contains their proper colouring is dried up in the course of maturation. They are black, on the other hand—as was the case in the other form of life—when, during their growth, the [5] moisture present in the skin settles and becomes stale owing to its abundance, and so turns black; in all such cases skin and hide become black. They are grey, reddish, and yellow, and so on, when they have dried up before the moisture in them has [10] completely turned black. Where the process has been irregular, their colours are correspondingly variegated. So in all cases they correspond in colour to the hide and skin; for when men are reddish in colouring, their hair too is of a pale red; when they [15] are black, it is black; and if white leprosy has broken out over some part of the body, the hair on that portion is also always white, like the marking on dappled animals. Thus all hair and feathering follows the colour of the skin, both regional hair and hair which is spread over the whole body. So, too, with hoofs, claws, beaks, and [20] horns; in black animals they are black, in white animals they are white, and always because the nutriment percolates through the skin to the outer surface. A number of facts prove

that this is the true cause. For example, the heads of all young children [25] are at first reddish owing to scanty nutriment; that this is so is clear from the fact that the hair of infants is always weak and thin and short at first; but as they grow older, the hair turns black, when the nutriment which flows into them settles owing [30] to its abundance. So, too, with the pubes and beard; when the hair is just beginning to grow on the pubic region and chin, it also is reddish at first, because the moisture in it, being scanty, quickly dries up, but as the nutriment is carried more and more to those regions the hair turns black. But the hair on the rest of the body remains [798<sup>a</sup>1] reddish for a considerable time owing to lack of nutriment; for as long as it is growing, it keeps on turning black like the pubes and the hair of the head. This is clear from the fact that hairs which have any length are generally blacker near the body and yellower towards the ends, because the moisture which reaches these parts [5] of them is very scanty and soon dries up. The feathers, too, of black birds are in all cases darker near the body and lighter at the ends. The same is the case with the [10] parts about the neck and, generally speaking, any part which receives scanty nutriment. This can be illustrated by the fact that before turning grey all hair changes colour and becomes reddish, because the nutriment again fails and dries up [15] quickly; finally it becomes white, because the nutriment in it is completely matured before the moisture turns black. This is most evident in the case of beasts of burden; here the hair always turns white, for in those parts because, owing to the feebleness [20] of the heat, they cannot draw up as much nourishment as the rest of the body, the moisture quickly dries up and turns white. So men tend especially to turn grey in the region of the temples, and generally speaking in any part which is weak and ailing. So, too, white is the colour to which more than any other a change tends to take place in instances of deviation from natural colour. For example, a hare has been [25] known before now to be white—while black hares have also been seen—and similarly white deer and bears have sometimes occurred; similarly white quails, partridges, and swallows. For all these creatures, when weak in their growth, come to maturity too soon owing to lack of nutriment, and so turn white. Similarly some infants at birth have white hair and eyelashes and eyebrows, a circumstance which [30] normally occurs when old age is coming on and is then clearly due to weakness and lack of nutriment. Therefore in most classes of animals the white specimens are weaker than the black; for, owing to lack of nutriment, they mature before their [798<sup>b</sup>1] growth is complete, and so turn white, just as does fruit when it is unhealthy; for fruit is still more

apt to get mature through weakness. But when animals grow white [5] and at the same time are far superior to the rest of their species, as is the case with horses and dogs,<sup>8</sup> the change from their natural colour to white is due to generous nutriment. For in such animals the moisture, not settling long, but being absorbed in the process of growth, does not turn black. Such animals are soft and well covered [10] with flesh, because they are well nourished, and white hairs, therefore, never change colour. This is clear from the fact that black hairs, when the nutriment in them fails and matures too completely, turn reddish before they grow grey, but finally turn [15] white. Yet some people hold that hair always turns black because its nutriment is burnt up by heat, just like blood and all other substances; but they are in error, for some animals are black from birth—dogs, for example, and goats, and oxen, and, [20] generally speaking, those creatures whose skin and hair get nutriment from the very first—but they are less black as they get older. If their supposition were correct this ought not to be the case, but it would necessarily follow that the hair of all animals would turn black at their prime, when heat predominates in them, and that they would be more likely to be grey at first. For in the beginning the heat is always [25] much weaker than at the time when the hair begins to turn white. This is clear in the case of white animals also. Some of them are very white in colour at birth, those, [30] namely, which at first have an abundance of nutriment, the moisture in which has not been prematurely dried up; but as they grow older their hair turns yellow, because less nutriment afterwards flows into it. Others are yellow at first and are [799a1] whitest at their prime. Similarly birds change colour when the nutriment in them fails. That this is the case can be seen in the fact that in all these animals it is the parts round the neck, and, generally speaking, any parts which are stunted when the [5] nourishment is scanty, which turn yellow; for it is clear that, just as reddish colour turns black and *vice versa*, so white turns yellow and *vice versa*. This happens also in plants, some of which revert from a later stage in the process of maturation back again to an earlier stage. The best illustration of this is to be found in the [10] pomegranate. At first its seeds are crimson, as are also its leaves, owing to the small amount of nourishment which matures completely; afterwards they turn to a herb-green, because a quantity of nutriment flows into them and the process of maturation is less able to predominate than before; but in the end the nutriment [15] does mature and the colour reverts to crimson.

To sum the matter up, in hair and feathers of every kind, changes always occur either—as has already been remarked—when the nutriment



in them fails, or when, on the contrary, it is too abundant. Therefore the age at which the hair is at its [799<sup>b</sup>1] whitest or blackest varies in different cases; for even ravens' feathers turn yellow in the end, when the nutriment in them fails. But hair is never crimson or violet or [5] green or any other colour of that kind, because all such colours arise only by mixture with the rays of the sun, and further because in all hairs which contain moisture the changes take place beneath the skin, and so they admit of no admixture. This is [10] clear from the fact that no feathers have their distinctive colouring at first, but practically all gaily coloured birds start by being black—the peacock, for example, and the dove and the swallow; it is only later that they assume all their varied colours, the process of maturation taking place outside their bodies in their feathers [15] and wattles. Thus in birds, as in plants, the maturation of the colours takes place outside the body. So, too, the other forms of animal life—aquatic creatures, reptiles, and shell-fish—have all sorts and manners of colouring, because in them too the process of maturation is considerable.

[20] From what has been set forth in this treatise one may best understand the theory of colours.

**\*\*TEXT:** C. Prantl, Teubner, Leipzig, 1881

<sup>1</sup>Omitting μή.

<sup>2</sup>Prantl proposes moving this paragraph to follow 792<sup>a</sup>2.

<sup>3</sup>Reading καὶ τὸ μὴ εὖσημον ἐν τῷ παντι δεῖ πρὸς τὸ τεθεωρημένον.

<sup>4</sup>Reading εἰ καὶ μὴ ... ποιεῖ (and Omitting μή in line 2).

<sup>5</sup>Retaining κινήσεως.

<sup>6</sup>The name of a stone has dropped out of the text.

<sup>7</sup>Reading δὲ τοιοῦτον εἶναι.

<sup>8</sup>Putting a comma after κύνες.

# ON THINGS HEARD\*\*

*T. Loveday and E. S. Forster*

All sounds, whether articulate or inarticulate, are produced by the meeting of [800<sup>a</sup>1] bodies or of the air with bodies, not because the air assumes certain shapes, as some people think, but because it is set in motion in the way in which, in other cases, bodies are moved, whether by contraction or expansion or compression, or again [5] when it clashes together by an impact from the breath or from the strings of musical instruments. For, when the nearest portion of it is struck by the breath which comes into contact with it, the air is at once driven forcibly on, thrusting forward in like manner the adjoining air, so that the sound travels unaltered in quality as far as the disturbance of the air manages to reach. For, though the disturbance originates at a [10] particular point, yet its force is dispersed over an extending area, like breezes which blow from rivers or from the land. Sounds which happen for any reason to have been stifled where they arise, are dim and misty; but, if they are clear, they travel far and [15] fill all the space around them.

We all breathe in the same air, but the breath and the sounds which we emit differ owing to the differences among the vessels involved, through which the breath must travel in its passage from within—namely, the windpipe, the lungs, and the [20] mouth. Now the impact of the breath upon the air and the shapes assumed by the mouth make most difference to the voice. This is clearly the case; for indeed all the differences in the kinds of sounds which are produced proceed from this cause, and we find the same people imitating the noise of horses, of frogs, of the nightingale, of [25] cranes, and of practically every other living creature, by means of the same breath and windpipe, merely by expelling the air from the mouth in different ways. Many birds also imitate by these means the cries of other birds which they hear. [30]

As to the lungs, when they are small and thick and hard, they cannot admit the air nor expel it again in large quantities, nor is the impact of the breath strong and vigorous. For, because they are hard and thick and constricted, they do not admit of [35] dilatation to any great extent, nor

again can they force out the breath by contracting after wide distension; just as we ourselves cannot produce any effect with bellows, when they have become hard and cannot easily be dilated and closed. [800<sup>b</sup>1] For what gives strength to the impact of the breath is that the lungs after wide distension contract and violently force out the air. This can be illustrated from the [5] other parts of the body, none of which can strike a blow with any effect at a very close distance. It is impossible with either the leg or the hand to smite the object of [10] your blow with any force or to hurl it far, unless you allow the limb a considerable distance in which to strike the blow. If you fail to do so, the blow is hard owing to the energy exerted, but it cannot force its object far. Under similar circumstances stone-throwing engines cannot shoot far, nor a sling, nor a bow, if it is stiff and will [15] not bend, and the string cannot be drawn back far. But if the lung is large and soft and flexible, it can admit the air and expel it again in large quantities, regulating it at will, thanks to its softness and the ease with which it can contract.

[20] As for the windpipe, when it is long and narrow, it is only with difficulty that the voice is emitted, and considerable force is required owing to the distance that the breath has to travel. This is clear from the fact that creatures which have long necks force out their cries—geese, for example, and cranes and domestic fowls. A [25] better illustration may be taken from the pipe; every one, for instance, finds a difficulty in filling the ‘silkworm’ pipe, and considerable exertion is required owing to the amount of space to be filled. Furthermore, owing to narrowness of the passage, the breath is compressed within, and on escaping immediately expands and [30] disperses, like streams when they pass through narrow straits; so that the voice is not sustained and does not carry far. Moreover, in such cases the breath must necessarily be hard to regulate and not easily controlled. On the other hand, when [35] the windpipe is of considerable width, the breath can pass out easily, but, whilst travelling within, it becomes dispersed owing to the abundance of space, and the [801<sup>a</sup>1] voice becomes hollow and lacks solidity; furthermore, creatures which have wide windpipes cannot differentiate clearly with their breath because the windpipe does not hold firmly together. Creatures in whom the windpipe is irregular and has not the same width throughout must suffer from difficulties of every kind; for their [5] breath must be under irregular control, and must be compressed in one part and dispersed again in another part. If the windpipe is short, it necessitates a quick expulsion of the breath, and the impact on the air is more violent; in such cases the voice is higher owing to the quick passage of the breath.

[10] Not only differences among the vessels make a difference to the voice, but also their condition. When the lungs and the windpipe are full of moisture, the breath is dispersed and does not pass out continuously, because it sticks and becomes thick [15] and moist and difficult to move, as happens in the case of a catarrh and in drunkenness. If the breath be absolutely dry, the voice becomes rather hard and dispersed; for moisture, when it is slight, holds the air together and causes, as it were, a unity in the voice. Such, then, are the differences in the voice caused by [20] variations in the vessels and their conditions.

Now though we localize sounds where they severally originate, yet in every case we actually hear them only when they strike upon the ear; for the air struck by [25] the impact is borne along for a certain distance in a mass, and then gradually becomes dispersed, and we hereby distinguish all sounds as near or distant. This can be illustrated by the fact that if a man takes a pot<sup>1</sup> or a pipe or a trumpet and holds it [30] up to another man's ear and speaks through it, all the sounds seem quite close to the ear, because the air passing along the tube is not dispersed and the sound is kept uniform by the instrument which encloses it. Just as in a picture, if an artist represents two objects in colour, one as though it were at a distance and the other as though it were close at hand, the former object appears to us to be sunk into the [35] background of the picture and the latter to stand out in the foreground, though they are really in the same plane; so, too, in the case of sounds, whether articulate or inarticulate, if one sound is already dissolved before it strikes the ear, whilst another still retains its continuity, though both reach the same spot, the former seems distant from the ear and the latter quite near to it, because the one resembles a sound coming from afar, the other a sound<sup>2</sup> close at hand. [801b1]

Voices are distinct in proportion to the accuracy of the sounds uttered; for it is impossible for the voice to be distinct if the sounds are not perfectly articulated, just as the sealings of signet-rings cannot be distinct unless they are accurately impressed. For this reason children cannot speak distinctly, nor drunken persons, [5] nor old people, nor those who naturally lisp, nor, speaking generally, those whose tongues and mouths have any defect of movement. For as in instrumental music the sound produced by the combination of brass instruments and horns is less distinct, [10] so too, in the case of speech, great indistinctness is caused by the escape of breath from the mouth if the sounds are irregularly formed. They not only present themselves indistinctly, but they also impede the carefully articulated sounds, because the movement

to which they give rise, and which affects the ear, is [15] irregular. Therefore, when we hear one person speaking, we understand better than when we hear a number of persons saying the same thing at the same time. The same is the case with stringed instruments; and we hear still less well when the oboe and lyre are played at the same time, because the sounds confuse one another. This is particularly evident when they are played in harmony, the result being that the [20] two sounds produced drown one another. The conditions under which sounds become indistinct have now been stated.

Clearness in sound resembles clearness in colour. Those colours which most affect the eye are most clearly seen; in like manner we must suppose that those [25] sounds are most clearly heard which are most able to affect the hearing, when they strike upon it, in other words sounds which are distinct and solid and pure, and have most power of penetration; for indeed it is a general truth of sense-perceptions that the most distinct impressions are produced by the strongest, solidest, and purest [30] stimuli. This is borne out by the fact that all sounds finally become dim as the air which carries them becomes dispersed. The point can also be illustrated from the oboe; the sounds produced by oboes which have sloping reeds in their mouthpieces<sup>3</sup> are softer, but not so clear; for the breath being forced down passes immediately [35] into a wide space and is not continuously and consistently sustained, but becomes dispersed. But when the reeds are closely constructed, the sound produced is harder and clearer, the more one presses them against the lips, because the breath is thus emitted with more violence. Such, then, are the conditions of clearness in the voice. So voices which are called 'grey' are generally considered no worse than those which [802<sup>a</sup>1] are called 'white'. For voices which are rather harsh and slightly confused and have not any very marked clearness are the fitting accompaniment of outbreaks of [5] passion and of advancing years, and at the same time, owing to their intensity, they are less under control; for what is produced by violent exertion is not easily regulated, for it is difficult to increase or decrease the strength of the sound at will.

In the case of oboes and other instruments of the same class, the sounds produced are clear when the breath emitted from them is concentrated and intense. [10] For the impacts on the external air must be of this kind, and it is in this way that they will best travel to the ear in a solid mass. Similarly, in the case of odours and light and the various forms of heat, the weaker they are, the less definite is the impression which they convey to the sense-perception, just as juices are weaker [15]

when mixed with water or with other juices. For that which provides a perception of itself makes the powers in each case obscure.

In contrast to all other musical instruments the notes produced by horns, if they strike the air in a solid and continuous mass, are indistinct. Therefore the horn [20] ought to be one the nature of whose growth is regular and smooth, and which does not shoot up quickly. For such horns as shoot up quickly must necessarily be too soft and spongy, so that the notes are dispersed and do not pass out in a solid mass, nor do they produce a consistent sound owing to the softness and thinness of the pores. [25] On the other hand, the horn must not be of too slowly growing a kind, nor must it be of a thick, hard consistency and lacking in resonance; for, if the sound in its passage strikes against anything, it is arrested at the point and ceases to advance on its outward course, so that the notes which proceed from such horns are dull and [30] irregular. That the direction taken by sound follows a straight line is clear from the way in which carpenters test beams and large timber in general. For when they strike one end, the sound passes along continuously to the other end unless the wood [35] has some flaw in it; if it has a flaw, the sound travels along up to that point and there ceases and is dispersed. It passes round the knots in the wood and cannot continue in a straight course through them. The point can also be illustrated from what happens in bronze-working when they are filing down the loosely hanging folds of drapery or the wings of statues; the cracks close up, so that the metal gives out a rasping sound [40] and causes a considerable noise; but the sound immediately ceases if you tie a band round the folds; for the vibration continues till it strikes the soft material and is there checked.

[802<sup>b</sup>1] The baking of horns contributes greatly to the excellence of their tone; for, when they are well baked, they produce a sound very like that of pottery, owing to [5] the hardness and the baking; whilst, if they are not sufficiently baked, the sound which they make is too gentle owing to the softness of the horn, and they cannot produce such well-defined notes. Men, therefore, choose the ages of their horns; the horns of old animals are dry and callous and porous, while those of young animals [10] are quite soft and contain a considerable amount of moisture. As we have said, a horn should be dry, of uniform thickness, with straight pores and a smooth surface; for if it be so, the notes which pass through it will be full and smooth and even, and the impacts which they make upon the outer air will have the same qualities. For those strings too are best which are smoothest and most even all along, and show the [15] same workmanship throughout, and in which the joining of the gut is not

visible; for then the impacts which they make upon the air are most even.

The reeds of oboes, too, must be solid and smooth and even, so that the breath may pass through smoothly and evenly, without being dispersed. Therefore [20] mouthpieces which have been well steeped and soaked in grease give a pleasant sound, while those which are dry produce less agreeable notes. For the air passes softly and evenly through a moist and smooth instrument. This is clear from the fact that the breath itself, when it contains some moisture, is less likely to strike against [25] the mouthpiece and become dispersed; while dry breath is inclined to catch in the oboe, and the impact which it causes is too hard owing to the force necessary to expel it. Differences, then, in sound arise from the above causes.

Hard voices are those which strike forcibly upon the hearing; for which reason [30] they are particularly unpleasing—those, that is to say, which are difficult to start, but which when once started travel with added force—for any quickly yielding body which comes in the way fails to abide the impact and quickly springs aside. To take an illustration of this; heavy missiles travel along with force, as do streams when [35] they pass through narrow channels, for they acquire very considerable force in the actual straits, because they cannot yield to restraint all in a moment, but are driven violently along. The same thing happens in the case of articulate and inarticulate sounds. For clearly all forceful sounds are hard; as, for instance, those caused by the forcible opening of boxes and turning of hinges, and those made by bronze and iron. [40] For the sound made on the anvil is hard when the iron that is being forged is chilled and has become hard. So, too, is the noise from the file, when they are filing iron [803<sup>a</sup>1] implements and making teeth in saws. The most violent claps of thunder, too, produce very hard sounds, and those showers which from their violence we call ‘tearing’ showers.

It is quickness of breathing which makes the voice shrill, force which makes it [5] hard. So it happens that the same individuals have not only sometimes a shriller and at other times a deeper voice, but also at times a harder and at times a softer voice. Yet some people hold that it is owing to the hardness of the windpipe that the voice becomes hard. In this they are wrong; for, though this may be quite a slight [10] contributing cause, the real reason is the force of the impact caused by the breath from the lungs. For as some men’s bodies are moist and soft, while those of others are hard and closely knit, so do their lungs show variety. Therefore in some cases the [15] breath which comes forth is soft, in others it is hard and violent; for it is easy to see that the windpipe by itself exercises but



little influence. For no windpipe is of the hard consistency of an oboe; yet for all that, by passing the breath through the former and through the latter, some people produce soft and others hard tones on [20] the oboe. This is clear from the direct perception; for, if by using greater force one increases the strength of the breathing, the voice immediately becomes harder as a result of the force applied, even if it be a somewhat soft voice. So, too, in the case of the trumpet; when they are revelling, men relax the pressure of breath in the [25] trumpet in order to make the sound as soft as possible. The point can also be illustrated from musical instruments; as has been stated, the sounds produced by tightly stretched strings are hard, as are the notes of horns which have been well [30] baked. If one touches the strings violently instead of softly with the hand, they necessarily respond with more violent sounds. The notes produced by less tightly stretched strings and unbaked horns are softer, as are those produced by the longer [35] musical instruments; for the impacts upon the air are both slower and softer owing to the distance that the sound has to travel, whereas in the shorter instruments they are harder owing to the tension of the strings. That this is so is shown by the fact that the sounds which the instrument itself gives forth are harder when one does not strike the string in the middle, because there is more strain upon the parts of the [40] strings near the crossbar and near the pegs. The notes produced by instruments made of fennel are softer; for the sounds striking on a soft material do not rebound [803<sup>b</sup>1] with such violence.

Voices are rough when the impact of all the breath upon the air is not single but divided and dispersed. For each portion of the air striking separately upon the [5] hearing—as if each were moved by a different impact—the sense-impression is dispersed, so that one vocal utterance fails to produce any sound, while another strikes with great violence upon the ear, and the contact with the hearing is not [10] evenly sustained; just as when a rough object touches the skin. This can be best illustrated from the file; for the air is set in motion simultaneously at a number of separate minute points, and so the sounds passing from these points to strike the ear seem rough, and especially so when the file is scraped against a hard substance. One may compare the sense of touch; hard, rough objects produce perception more [15] forcefully. The matter can also be illustrated from the pouring of liquids, for the sound made by olive-oil is less noticeable than that made by any other liquid, owing to the continuity of its parts.

Voices are thin, when the breath that is emitted is small in quantity. Children's [20] voices, therefore, are thin, and those of women and

eunuchs, and in like manner those of persons who are enfeebled by disease or over-exertion or want of nourishment; for owing to their weakness they cannot expel the breath in large quantities. The same thing may be seen in the case of stringed instruments; the sounds produced from thin strings are thin and narrow and fine as hairs, because [25] the impacts upon the air have only a narrow surface of origin. For the sounds that are produced and strike on the ear are of the same quality as the source of movement which gives rise to the impacts; for example, they are rare or dense, soft [30] or hard, thin or full. For one portion of the air striking upon another portion of the air preserves the quality of the sound, as is the case also in respect of shrillness and depth; for the quick impulsions of the air caused by the impact, quickly succeeding one another, preserve the quality of the voice, as it was in its first origin. Now the [35] impacts upon the air from strings are many and are distinct from one another, but because, owing to the shortness of the intermittence, the ear cannot appreciate the intervals, the sound appears to us to be united and continuous. The same thing is the case with colours; for separate coloured objects appear to join, when they are moved [804<sup>a</sup>1] rapidly. The same thing happens, too, when notes form a concord; for owing to the fact that the notes overlap and include one another and cease at the same moment, the intermediate sounds escape our notice. For in all concords more frequent impacts upon the air are caused by the shriller note, owing to the quickness of its movement; and the last note strikes upon our hearing simultaneously with an earlier sound produced by the slower impact. Thus, because, as has been said, the ear [5] cannot perceive all the intermediate sounds, we seem to hear both notes together and continuously.

Thick sounds, on the contrary, are produced when the breath is emitted in great quantity and all together. Therefore the voices of men are inclined to be thick, [10] and the notes of the so-called 'perfect' oboes, especially when the latter are well filled with air. This is clear from the fact that if you compress the mouthpiece the sound tends to become shrill and thin, as also if one draws the 'speaker' downwards; but if one stops up the exits, the volume of the sound becomes far greater owing to [15] the amount of breath, like the notes produced from thicker strings. The sounds uttered by those whose voices are breaking and persons suffering from sore-throats, and after vomiting, are thick owing to the roughness of the windpipe and the fact that the voice does not escape, but striking upon it is pent up and acquires volume; [20] and above all, owing to the moist condition of the body.

Piping voices are those which are thin and concentrated, such as those of grasshoppers and locusts and the nightingale's song, and, generally speaking, cries which are thin, and are not followed by a second and different sound. For this piping quality does not depend on volume of sound nor on the tones being without tension [25] and deep, nor yet upon the close sequence of the sounds, but rather upon shrillness and thinness and accuracy. Therefore it is the instruments which are lightly constructed and tightly stretched, and those which have no horn-work about them, that produce piping notes. The sound of running water, and generally speaking, any [30] sound which, whatever its cause keeps up an unbroken continuity, preserve the accuracy of their tone.

Cracked voices which suddenly give way are those which travel along in a solid mass for a certain distance and then become dispersed. The best illustration may be taken from an earthenware vessel; every such vessel when broken as the result of a blow gives forth a cracked sound, for the course of the sound is broken at the point at [35] which the blow was struck, so that the sounds which it gives forth no longer form a solid mass. The same thing happens in the case of broken horns and badly strung strings; in all such cases the sound travels in a solid mass up to a certain point and is then dispersed, wherever the medium which supports it is not continuous, so that the [804<sup>b</sup>1] impact upon the air is not single but dispersed, and the sound produced seems cracked. Cracked voices closely resemble harsh voices, except that in the latter case the sounds are themselves dispersed into small portions, while cracked voices, for [5] the most part, form a solid mass at first and afterwards become split up into a number of parts.

Aspirated sounds are formed when we emit the breath from within immediately together with the sounds; smooth sounds, on the contrary, are those which are [10] formed without the emission of the breath.

Voices become broken when they have no longer strength enough to expel the air with an impact, but the region about the lungs collapses after distension. For just as the legs and shoulders eventually collapse when they are in a strained position, so [15] too the region about the lungs. The breath comes forth lightly, because the impact which it produces is not forcible enough; at the same time, owing to the fact that the windpipe has become exceedingly rough, the breath cannot pass out in a solid mass, [20] but is dispersed, and so the sounds which it produces are broken. Some people hold that it is owing to the adhesive condition of the lungs that the breath cannot pass out and abroad; but they are wrong, for what really happens is that they make a sound but cannot be heard,

because the impact upon the air does not take place with [25] sufficient energy, but they only make a sound such as the breath would make when forced merely from the throat.

When people stammer, it is due not to an affection of the veins or windpipe, but to the movement of the tongue; for they find a difficulty in changing the position of the tongue when they have to utter a second sound. They therefore keep on [30] repeating the same word, for they cannot utter the next word; but the movements of articulation continue and the lungs go on working with an impetus in the same direction as before, owing to the quantity and force of the breath. For just as when one is running fast it is difficult to divert the whole body from its impetus in one direction to some other movement, so likewise is it with the individual parts of the [35] body. So people who stammer are often unable to say the next word, but can easily say the next but one, when they make a fresh start to the movement. This is clear from the fact that people often stammer when angry, because then they force out their breath.

**\*\*TEXT:** C. Prantl, Teubner, Leipzig, 1881

<sup>1</sup>Retaining κέραμον.

<sup>2</sup>Reading τήν δὲ τῇ πλησίον.

<sup>3</sup>Reading ζευλῶν.

# PHYSIOGNOMONICS\*\*

*T. Loveday and E. S. Forster*

1 · Mental character is not independent of and unaffected by bodily [805<sup>a</sup>1] processes, but is conditioned by the state of the body; this is well exemplified by drunkenness and sickness, where altered bodily conditions produce obvious mental modifications. And contrariwise the body is evidently influenced by the affections [5] of the soul—by the emotions of love and fear, and by states of pleasure and pain. But still better instances of the fundamental connexion of body and soul and their very extensive interaction may be found in the normal products of nature. There [10] never was an animal with the form of one kind and the mental character of another: the soul and body appropriate to the same kind always go together, and this shows that a specific body involves a specific mental character. Moreover, experts on the [15] animals are always able to judge of character by bodily form: it is thus that a horseman chooses his horse or a sportsman his dogs. Now, supposing all this to be true, physiognomy must be practicable.

Three methods have been essayed in the past, each having had its special adherents.

The first method took as the basis for physiognomic inferences the various [20] genera of animals, positing for each genus a peculiar animal form, and a peculiar mental character appropriate to such a body, and then assuming that if a man resembles such and such a genus in body he will resemble it also in soul.<sup>1</sup>

Those who adopted the second method proceeded in the same way, except that they did not draw their inferences from all kinds of animals but confined themselves [25] to human beings: they distinguished various races of men (e.g. Egyptian, Thracian, Scythian) by differences of appearance and of character, and drew their signs of character from these races.

The third method took as its basis the characteristic facial expressions which are observed to accompany different conditions of mind, such as

anger, fear, erotic [30] excitement, and all the other passions.

All these methods are possible, and others as well: the selection of signs may be made in diverse ways. The last mentioned method by itself, however, is defective in [805<sup>b</sup>1] more than one respect. For one thing, the same facial expression may belong to different characters: the brave and the impudent, for example, look alike, though [5] their characters are far asunder. Besides, a man may at times wear an expression which is not normally his: for instance, a morose person will now and again spend an enjoyable day and assume a cheerful countenance, whilst a naturally cheerful man, if he be distressed, will change his expression accordingly. And, thirdly, the number of inferences that can be drawn from facial expression alone is small.

[10] As to arguments from beasts, the selection of signs is made on wrong principles. Suppose you have passed in review one by one the forms of all the different kinds of animals, you still have no right to assert that a man who resembles a given kind in body will resemble it in soul also. In the first place, speaking broadly, [15] you will never find this complete likeness, but only a resemblance. Moreover, very few signs are peculiar to individual genera; most of them are common to more than one kind, and of what use is resemblance in a common attribute? A man will resemble a lion, let us say, neither more nor less than a deer. (For we have a right to [20] suppose that common signs indicate common mental characters and peculiar signs peculiar characters.) Thus the physiognomist will not get any clear evidence from common signs. But is he any better off if he takes every genus by itself and selects signs that are peculiar to each? Surely not, for he cannot tell what they are signs of. They ought to be signs of peculiar characteristics, but we have no right to assume that there are any *mental* characteristics peculiar to the different kinds of animals [25] that we examine in physiognomy. Courage is not confined to the lion, but is found in many other creatures; nor timidity to the hare, but it shares this quality with numberless other creatures. Thus it is equally fruitless to select the common and the peculiar features, and we must abandon the attempt to proceed by an examination of every kind of animal singly. Rather, we ought to select our signs from all animals [30] that have some mental affection in common. For instance, when investigating the external marks of courage, we ought to collect all brave animals, and then to inquire what sort of affections are natural to all of them but absent in all other animals. For [806<sup>a</sup>1] if we were to select this or that as the signs of courage in the animals chosen in such a way as not to exclude the possibility of the presence in all these animals of some

other mental affection, we should not be able to tell whether our selected marks were really signs of courage or of this other character. The animals from which we [5] choose our signs must be as numerous as possible, and they must not have any mental affection in common except that one of which we are investigating the signs.

Permanent bodily signs will indicate permanent mental qualities, but what about those that come and go? How can they be true signs if the mental character [10] does not also come and go? No doubt if you took a transitory sign to be permanent, it might be true once in a way, but still it would be worthless because it would not be a constant concomitant of the affection.

Then again there are affections of soul whose occurrence produces no change in the bodily marks on which the physiognomist relies, and they will not provide his [15] art with recognizable signs. Thus as regards opinions or scientific knowledge, you cannot recognize a doctor or a musician, for the fact of having acquired a piece of knowledge will not have produced any alteration in the bodily signs on which physiognomy relies.

2 · We must now determine the special province of physiognomy (for the range of its application is limited), and the sources from which its various kinds of [20] signs are drawn, and then we may proceed to a detailed exposition of the more convincing among its conclusions.

Physiognomy has for its province, as the name implies, all natural affections of mental content, and also such acquired affections as on their occurrence modify the external signs which physiognomists interpret. I will explain later what kinds of [25] acquired characters are meant, but now I will give a list—a complete list—of the sources from which physiognomic signs are drawn. They are these: movements, gestures of the body, colour, characteristic facial expression, the growth of the hair, [30] the smoothness of the skin, the voice, condition of the flesh, the parts of the body, and the build of the body as a whole. Such is the list that physiognomists always give of the sources in which they find their signs. Were this list plain or not obscure, what [35] I have said would suffice; but, as things are, it may be worth while to give a more detailed description of the more convincing of the inferences that they draw from [806<sup>b</sup>1] their material, and to state what their various signs are and on what they are supposed to be founded, so far as I have not already done so.



A brilliant *complexion* indicates a hot sanguine temper, whilst a pale pink complexion signifies naturally good parts, when it occurs on a smooth skin. [5]

Soft *hair* indicates cowardice, and coarse hair courage. This inference is based on observation of the whole animal kingdom. The most timid of animals are deer, hares, and sheep, and they have the softest coats; whilst the lion and wild-boar are [10] bravest and have the coarsest coats. Precisely the same holds good of birds, for it is the rule that birds with coarse plumage are brave and those with soft plumage timid, particular instances being the cock and the quail. And again, among the different races of mankind the same combination of qualities may be observed, the [15] inhabitants of the north being brave and coarse-haired, whilst southern peoples are cowardly and have soft hair. A thick growth of hair about the belly signifies loquacity, on the evidence of the whole tribe of birds, for the one is a bodily and the other a mental property peculiar to birds. [20]

When the *flesh* is hard and constitutionally firm, it indicates dullness of sense; when smooth, it indicates naturally good parts combined with instability of character, except when smooth flesh goes with a strong frame and powerful extremities.

Lethargic *movements* are a sign of a soft character, rapid movements of a [25] fervid temper.

As to the *voice*,<sup>2</sup> when deep and full it is a sign of courage; when high-pitched and languid, of cowardice.

*Gesture* and the varieties of *facial expression* are interpreted by their affinity [30] to different emotions: if, for instance, when disagreeably affected, a man takes on the look which normally characterizes an angry person, irascibility is signified.<sup>3</sup>

Males are bigger and stronger than females of the same kind, and their extremities are stronger and sleeker and firmer and capable of more perfect performance of all functions. But inferences drawn from the parts of the body are less secure than those based on facial expression of character and movements and [807<sup>a</sup>1] gesture. In general it is silly to rely on a single sign: you will have more reason for confidence in your conclusions when you find several signs all pointing one way.

Here I may mention a possible method of physiognomy which has never yet [5] been tried. Suppose, e.g., that irascibility and morose sulkiness necessarily involve an envious disposition, and that the physiognomist could, without any bodily signs of the last character,

deduce its presence from the presence of the other characters, [10] we should then have a method peculiarly appropriate to masters of philosophy, since it is, we suppose, the peculiar mark of philosophy to be able to tell that, when certain premisses are given, something necessarily follows.<sup>4</sup> But this method which considers the interrelations of mental affections and that which proceeds by observation of animals sometimes arrive at contrary conclusions.<sup>5</sup> Take the voice, for example. By the former method you might feel bound to connect a shrill voice [15] with a fierce temper, because in vexation and anger one's voice tends to become loud and shrill, whilst placid people speak in tones at once languid and deep. But as against this, if you observe beasts, you find that a deep voice goes with courage and [20] a shrill voice with timidity, as witness on the one hand the roar of a lion and bull, the hound's bay, and the deep-noted crow of high-spirited cocks, and on the other, the high-pitched tones of deer and hares. Yet perhaps even in these cases it is better not to connect courage and cowardice with the pitch of the voice, but rather with its intensity, so that<sup>6</sup> it is strength of voice that marks the brave and a languid and [25] feeble voice the coward. It is safest, however, to refrain from all positive assertion when you find that your signs are inconsistent and contrary to one another in detail, unless they belong to classes, some of which you have determined to be more trustworthy than others. Above all it is best to base your arguments upon assertions about species and not about entire genera, for the species more nearly resembles what we are concerned with, for in physiognomy we try to infer from bodily signs [30] the character of this or that particular person, and not the characters of the whole human race.

3 · Signs of *Courage* are—coarse hair; an upright carriage of the body; size and strength of bones, sides and extremities; the belly broad and flat; shoulder-blades [35] broad and set well apart, neither too closely nor too loosely knit; a sturdy neck, not very fleshy; a chest well covered with flesh and broad; flat hips; the thickness of the calf low down the leg; gleaming eyes, neither wide and staring nor [807<sup>b</sup>1] yet mere slits, and not glistening; the body of a brilliant hue; a forehead straight and lean, not large, and neither quite smooth nor yet a mass of wrinkles. Signs of *Cowardice* are—a small growth of soft hair; the figure stooping and lacking in [5] quickness; the thickness of the calf high up the leg; a sallow complexion; weak blinking eyes; weak extremities; little legs,<sup>7</sup> and hands long and delicate; loins small and weak; a rigid gesture of the body; with undecided, deprecating, scared [10] movements, and a shifty downcast

look.

*Good natural parts* are indicated by rather moist and tender flesh, not exactly firm nor yet extremely fat; by leanness of the shoulders, neck, face, and neighbouring regions; by shoulder-blades closely knit and the parts below slack; by supple [15] sides; a somewhat gaunt back; a clear pinkish hue over the body; a thin skin; a small growth of hair, neither very coarse nor very black; and moist, gleaming eyes. *Dullness of sense* is indicated when the region of the neck and the legs are fleshy [20] and stiffly fitted and knitted; the hip-joint round; the shoulder-blades high-set; the forehead big, round, and fleshy; the eyes pale and vacant; the legs thick and fleshy and round at the ankles; the jaws big and fleshy; loins fleshy; legs long; neck [25] thick-set; the face fleshy and rather long. The manner of movement, gesture, and facial expression of the dull man, you may take it, are analogous to his character.

*Impudence* is signified by small, bright, wide-open eyes, with heavy blood-shot lids slightly bulging;<sup>8</sup> high shoulder-blades; a carriage of the body not erect, but [30] crouched slightly forwards; quickness of movement; a reddish hue over the body; with a sanguine complexion, a round face, and high chest. Signs of *Propriety* are—a slow gait; a slow way of speaking with a breath-like and weak voice; small eyes, [35] black but not lustrous, not open and staring, nor yet mere slits; with a slow, blinking movement of the lids—for rapid blinking signifies either cowardice or a hot [808<sup>a</sup>1] temperament.

*Good Spirits* are indicated by a good-sized forehead, fleshy and smooth; the region of the eyes rather low; a rather drowsy-looking countenance, neither keen nor reflective. The gait, we may suppose, will be slow and languid, the gesture and [5] facial expression those of a good but not a quick man. Signs of *Low Spirits* are—lean and wrinkled brows; drooping eyes (but you should notice that drooping eyes may signify softness and effeminacy as well as dejection and low spirits); a [10] meek bearing and weary gait.

The *Effeminate* is drooping-eyed and knock-kneed; his head hangs on his right shoulder; his hands are carried upturned and flabby; and as he walks he either wags his loins or else holds them rigid by an effort; and he casts a furtive gaze around, for [15] all the world like Dionysius the Sophist.

*Surliness* is indicated by a snarling grin; a black complexion and withered skin; a gaunt, wrinkled face and the neighbouring regions furrowed with lines; and by straight black hair.

Men of *Fierce Temper* bear themselves erect, are broad about the ribs and [20] move with an easy gait; their bodies are of a reddish hue, their shoulder-blades set well apart, large and broad; their extremities large and powerful; they are smooth about the chest and groin; they have great beards, and the hair of the head starts low down with a vigorous growth.

Those of a *Gentle* disposition are robust-looking, well covered with plenty of [25] moist flesh; well-sized men and well-proportioned; carrying themselves with head thrown back; and their hair starts rather higher up on the head than is usual.

The *Sly* man is fat about the face, with wrinkles round his eyes, and he wears a drowsy expression.

[30] The *Small-Minded* have small limbs and small, delicate, lean bodies, small eyes and small faces, just like a Corinthian or Leucadian.

Men addicted to *Gaming* have short arms, like weasels, and are dancers.

*Abusive* men have the upper lip updrawn; they tend to lean forwards, and their hue is reddish.

The *Compassionate* are delicate, pale, and lustrous-eyed: the top of their noses [35] is furrowed with lines, and they are always weeping. Such men are fond of women and beget female children, and in character they are erotic and mindful of the past, with good natural parts and a fervid temper. The signs of these qualities have [808<sup>b</sup>1] already been mentioned. Compassion goes with wisdom, with cowardice, and with propriety, hardness of heart with stupidity and effrontery.

*Gluttony* is indicated when the distance from navel to chest is greater than that from chest to neck.

*Lasciviousness* is indicated by a pale complexion, a heavy growth of straight, [5] thick, black hair over the body, a heavy growth of straight hair on the temples, and small, lustrous, lewd eyes.

In the *Somnolent* the upper parts are disproportionately large: such men are vulture-like<sup>9</sup> and hot, and their flesh is firm.

*Loquacity* is indicated by disproportionate size of the upper parts, with a round delicate build, and a thick growth of hair about the belly.

A *Good Memory* is signified when the upper parts are disproportionately [10] small, and are delicate and tolerably well covered with flesh.

one another: on the one hand, an alteration of the state of the soul produces an alteration in the form of the body, and contrariwise an alteration in bodily form produces an [15] alteration in the state of soul. Grief and joy, to take an instance, are states of the soul, and every one knows that grief involves a gloomy and joy a cheerful countenance. Now if it were the case that the external expression persisted after the soul had got rid of these emotions, we might still say that soul and body are in sympathy, but their sympathetic changes would not be entirely concomitant. As a [20] matter of fact, however, it is obvious that every modification of the one involves a modification of the other. The best instance of this is to be found in manic insanity. Mania, it is generally allowed, is a condition of the soul, yet doctors cure it partly by administering purgative drugs to the body, partly by prescribing, besides these, certain courses of diet. Thus the result of proper treatment of the body is that they succeed, and that too simultaneously, not only in altering the physical condition, but also in curing the soul of mania; and the fact that the changes are simultaneous proves that the sympathetic modifications of body and soul are thoroughly [25] concomitant.

It is equally indisputable that differences in the soul's capacities are represented by corresponding physical traits, so that all the resemblances in animals are indicative of some identity.

Again, if we consider the behaviour of animals, we find that some affections of [30] the soul are peculiar to particular genera, whilst others are common to several, and that the peculiar activities are accompanied by peculiar, the common by common, physical traits. Examples of common characters are insolence, which is found in all animals with bushy tails, and violent sexual excitability, which is found alike in [35] asses and in pigs: whilst on the other hand railing is a character peculiar to dogs, and insensibility to pain is peculiar to the ass. I have already explained how common and peculiar characters are to be distinguished. [809<sup>a</sup>1]

At the same time it is only by long and wide experience that one can hope for oneself to attain detailed and expert understanding of these matters. For not only are visible characteristics of the body to be referred for explanation, as we are told, to analogies drawn partly from animals, partly from modes of action, but there are [5] other external traits which depend on the varying proportions of bodily heat and cold; and to add to the difficulty, some of these traits are very much alike and have not got distinctive names, as is the case e.g. with the paleness that results from terror and the paleness due to fatigue—for these have the same name and

differ [10] only slightly from one another. Now when the difference is so slight, it can hardly be discerned except by those whom practice has taught to appreciate the congruity of different shades of expression with different conditions of mind, and so the argument from congruity leads to the quickest and soundest conclusions, and enables us to distinguish minute differences. It is a method generally useful, and [15] particularly in the selection of physiognomic signs, for the signs selected must be congruous with what they stand for.

Deduction also should be used in the selection of signs, whenever possible. In the deductive procedure we attach to our data known attributes of them. For [20] instance, if we have it given that a man is an impudent and niggling, we can add that he will be a thief and a miser, the one as a consequence of his effrontery, the other as a consequence of his niggardliness. In all such cases we ought to include the deductive method in our procedure. [25]

5 · I will now first attempt to make a division of animals by the marks in which they are bound to differ if they are respectively brave or timorous, upright or dishonest. We have to divide the whole animal kingdom for this purpose into two physical types, male and female, and to show what mental attributes are congruous with each of these types. In all beasts that we try to breed the female is tamer and [30] gentler in disposition than the male, less powerful, more easily reared and more manageable. One may conclude from this that the female has a less spirited temper, and I think we find a parallel to this in ourselves, for when we are mastered by a fit [35] of temper we become more obstinate and totally intractable; we grow headstrong and violent and do whatever our temper impels us to do. Further, the female is, in my opinion, more mischievous than the male, and (though feebler) more reckless. [809<sup>b</sup>1] Every one can see that this is so in women and in domesticated animals, and according to the unanimous evidence of herdsmen and hunters it is no less true of the beasts of the field. Moreover, it is beyond dispute that in every genus the head of [5] the female is smaller than that of the male, her visage narrower, her neck thinner, her chest weaker, her sides of smaller build, and that, whilst her hips and thighs are fuller, she inclines to be knock-kneed, the lower parts of her legs are less stout, and [10] her feet more delicately made: in short, the build of her body is more pleasing to the eye and softer rather than imposing, and she is in comparison feeble and tender, and of moister tissue. The male is the opposite of all

this:<sup>10</sup> his is the braver and more upright nature, whilst the female is the more timid and less upright.

[15] This being so, the lion manifestly exhibits the male type in its most perfect form. He has a good-sized mouth: his visage is square and not too bony, the upper jaw level with the lower and not protruding: his nose you would call, if anything, rather thick: his gleaming eyes are deep-set, and neither absolutely round nor [20] unduly long, and of moderate size:<sup>11</sup> his brow is of the right size, his forehead square and slightly hollowed from the centre, and over its lower part towards the eyebrows and nose, there hangs a sort of cloud, and from the top of his forehead down to his nose there runs a ridge of hairs sloping outwards: his head is of moderate size: his [25] neck of due length and broad in proportion with a tawny mane upon it, which is neither stiff and bristly nor yet too closely curled. About the clavicles he is supple and not too tightly articulated: his shoulders are stalwart, his chest powerful, his trunk broad, with sides and back to match: there is no superfluity of flesh on his [30] haunches or thighs: his legs are powerful and sinewy, his gait vigorous, his whole frame well-knit and sinewy and neither too stiff nor too soft: he moves slowly with a large stride, rolling his shoulders as he goes. Such is his bodily appearance, and in [35] soul he is generous and liberal, proud and ambitious, yet gentle and just and affectionate to his comrades.

The leopard, on the other hand, of all animals accounted brave, approximates more closely to the feminine type, save in its legs, which it uses to perform any feat [810<sup>a</sup>1] of strength. For its face is small, its mouth large, its eyes small and white, set in a hollow, but rather flat in themselves: its forehead is too long and tends to be curved rather than flat near the ears: its neck too long and thin: its chest narrow and its [5] back long: haunches and thighs fleshy: flanks and abdomen rather flat: its colour spotted: and its whole body ill-articulated and ill-proportioned. Such is its bodily aspect, and in soul it is mean and thievish, and in a word, a beast of low cunning.

I have now described the more notable examples of the male and the female types of body to be found among animals accounted brave, and the characterization of the remainder will present no difficulty. I will next proceed to explain in a chapter on selection of signs what marks derived from animals the student of physiognomics should take into consideration.

6 · The selection of signs with regard to men is as follows:

A large and shapely *foot*, well-articulated and sinewy, is held to signify a [15] strong character. For evidence we are referred to the male sex in general. A small, narrow, ill-articulated foot, pretty but weak, signifies a soft character, as in the female sex. Curved toes are a sign of impudence, and so are curved nails, on the [20] evidence of birds with curved claws, whilst toes that are not properly divided indicate timidity, as in web-footed water-birds.

*Ankles* sinewy and well-articulated mark a strong character, on the evidence [25] of the male sex; fleshy and ill-articulated ankles, a soft character, on the evidence of the female sex.

When the *lower leg* is at once well-articulated and sinewy and stalwart, it signifies a strong character, as in the male sex: when it is thin and sinewy it signifies [30] salaciousness, as in birds. When it is full and almost bursting, it signifies by congruity blatant effrontery.

*Knock-knees* are a sign of the effeminate, by congruity.

*Thighs* bony and sinewy indicate a strong character, as in the male sex: but [35] when bony and full, a soft character, as in females.

*Buttocks* pointed and bony are a mark of a strong character, fat fleshy [810<sup>b</sup>1] buttocks of a soft character, whilst lean buttocks which look as if they had been rubbed bare, are indicative of a mischievous disposition, as in apes.

A narrow *waist* marks the hunter, as in the lion and the dog; and you will find [5] that the best hunting dogs also are narrow in the waist.

A loose build round about the *belly* indicates strength of character, as in the male sex, whilst the opposite is by congruity indicative of a soft character. [10]

A well-sized and sturdy *back* marks strength, and a narrow feeble back softness of character, as in males and females respectively.

Strong *sides* indicate strength and weak sides softness, as in males and females respectively, whilst swollen inflated sides signify aimless loquacity, as in frogs. [15] When the distance from navel to the lower end of the breastbone exceeds that from the latter to the neck, it is a mark of gluttony and of dullness of sense, of gluttony because there is so large a receptacle of food, and of dull sense because the seat of [20] the senses is correspondingly confined and compressed by the receptacle of food, so that the senses have become stupefied by repletion of the stomach rather than, as is usual, by inanition.



A large well-articulated *chest* signifies strength of character, as in males.

When the *upper part of the back* is large and well covered with flesh and [25] well-knit, the character is strong, as in males: when it is feeble and gaunt and ill-knit, the character is soft, as in females. When it is very much bent and the shoulders fall in upon the chest, it is argued by congruity to signify a mischievous [30] disposition, since the front parts of the body, which ought to stand clear to view, become invisible. When it is curved backwards, it signifies vanity and lack of intelligence, as in the horse. So it must not be either convex or concave; and something intermediate between these extremes, therefore, should be looked for as marking a man of good natural parts.

[35] When the *shoulders* and the back of the neck are well-articulated, they signify a strong character, whilst weak and ill-articulated shoulders signify a soft character, the reference being to the sexes, as I explained when speaking of feet and thighs. [811<sup>a</sup>1] Supple shoulders signify liberality of soul, the argument being based on the external appearance, with which liberality seems to be congruous. On the other hand, stiff, clumsy shoulders indicate an illiberal disposition, also by congruity.

[5] Suppleness of the *clavicles* signifies quickness of perception, for when the collar-bone is supple, stimulation of the senses is rendered easy. Contrariwise, a stiff collar-bone indicates dullness of sense, because then it is difficult to apprehend sense-stimuli.

[10] A thick *neck* indicates a strong character, as in males: a thin neck, weakness, as in females: a neck thick and full, fierce temper, as in bulls: a well-sized neck, not [15] too thick, a proud soul, as in lions: a long, thin neck, cowardice, as in deer: an unduly short neck, a treacherous disposition, as in wolves.

*Lips* thin and pendulous at their points of junction, such that part of the upper [20] lip overhangs the lower at the corners, signify pride of soul. The reference generally given is to the lion, but you may see the same thing as well in large and powerful breeds of dogs. Lips thin and hard with a prominence about the eye-teeth<sup>12</sup> are a sign of base breeding, on the evidence of swine. Thick lips, with the upper [25] overhanging the lower, mean folly, as in the ass and the ape. Projecting upper lip and gums mark the abusive, on the evidence of dogs.

A *nose* thick at the tip means laziness, as witness cattle: but if thick from the [30] tip, it means dullness of sense, as in swine; if the tip is pointed, irascibility, as in dogs; whilst a round, blunt tip indicates pride,

as in lions. Men with a nose thin at the tip have the characteristics of birds. When such a nose curves slightly right [35] away from the forehead, it indicates impudence, as in ravens: but when it is strongly aquiline and demarcated from the forehead by a well-defined articulation, it indicates a proud soul, as in the eagle; and when it is hollow, with the part next the forehead rounded and the curve rising upwards, it signifies lasciviousness, as in [811<sup>b</sup>1] cocks. A snub nose means lasciviousness, as in deer. Open nostrils are a sign of fierce temper, for they enter into the facial expression of temper.

[5] The *face*, when fleshy, indicates laziness, as in cattle: if gaunt, assiduity, and if bony,<sup>13</sup> cowardice, on the analogy of asses and deer. A small face marks a small [10] soul, as in the cat and the ape: a large face means lethargy, as in asses and cattle. So the face must be neither large nor little: an intermediate size is therefore best. A mean-looking face signifies by congruity an illiberal spirit.

As to the *eyes*, when the lower lids are pendulous and baggy, you may know a [15] bibulous fellow, for heavy drinking produces bagginess below the eyes; but when the upper lids are baggy and hang over the eyes, that signifies somnolence, for on first waking from sleep our upper lids hang heavily. Small eyes mean a small soul, by congruity and on the evidence of the ape: large eyes, lethargy, as in cattle. In a man [20] of good natural parts, therefore, the eyes will be neither large nor small. Hollow eyes mean villainy, as in the ape: protruding eyes, imbecility, by congruity and as in the ass. The eyes, therefore, must neither recede nor protrude: an intermediate [25] position is best. When the eyes are slightly deep-set, they signify a proud soul, as in lions: and when a little deeper still, gentleness, as in cattle.

A small *forehead* means stupidity, as in swine: too large a forehead, lethargy, as in cattle. A round forehead means dullness of sense, as in the ass: a somewhat [30] long and flat forehead, quickness of sense, as in the dog. A square and well-proportioned forehead is a sign of a proud soul, as in the lion. A cloudy brow signifies self-will, as in the lion and the bull: a smooth brow is taken from [35] observation to mark the flatterer, and you may notice how a dog's brow smooths out when he fawns upon you. So, a cloudy brow indicating self-will and a smooth brow [812<sup>a</sup>1] obsequiousness, the proper condition must be intermediate between these extremes. A scowling brow means a morose disposition, for we observe that vexation is thus expressed: a downcast brow means querulousness, as may also be verified by [5] observation.

A large *head* means quickness and a small head dullness of sense, on

the evidence of the dog and the ass respectively. A peaked head means impudence, as in those birds which have curved claws.

Men with small *ears* have the disposition of monkeys, those with large ears the disposition of asses, and you may notice that the best breeds of dogs have ears of [10] moderate size.

Too black a *hue* marks the coward, as witness Egyptians and Ethiopians, and so does also too white a complexion, as you may see from women. So the hue that makes for courage must be intermediate between these extremes. A tawny colour [15] indicates a bold spirit, as in lions: but too ruddy a hue marks a rogue, as in the case of the fox. A pale mottled hue signifies cowardice, for that is the colour one turns in terror. The honey-pale are cold, and coldness means immobility, and an immobile [20] body means slowness. A red hue indicates hastiness, for all parts of the body on being heated by movement turn red. A flaming skin, however, indicates mania, for it results from an overheated body, and extreme bodily heat is likely to mean [25] mania.

A fiery colour on the chest signifies irascibility, for it is part of the expression of the onset of anger. Swollen veins on the neck and temples also signify irascibility, being part of the expression of anger. A face that reddens easily marks a bashful [30] man, for blushing is an expression of bashfulness. But when the jowl goes red, you have a drunkard, for a red jowl is an expression of heavy drinking: whilst eyes that flush red indicate uncontrollable temper, for in a wild outburst of temper the eyes flush red. If the eyes are too black, they signify cowardice, for we saw above that [812<sup>b</sup>1] this is the signification of too black a hue: if they are not too black, but inclining to chestnut, they indicate a bold spirit. Grey or white eyes indicate cowardice, for we saw above that this is the signification of a white hue: but if they are gleaming [5] rather than grey, they mean a bold spirit, as in lions and eagles. Goatish eyes mean lustfulness, as in goats: fiery eyes, impudence, as in dogs: eyes pale and mottled, [10] cowardice, for in terror the eyes go pale with splotches of colour: glistening eyes, lasciviousness, on the analogy of the cock and the raven.

*Hairy* legs mean lasciviousness, as in goats. Too much hair on breast and belly [15] mean lack of persistence, as argued from birds, in which this bodily characteristic is most developed; but breasts too devoid of hair indicate impudence, as in women. So both extremes are bad, and an intermediate condition must be best. Hairy shoulders [20] mean lack of persistence, on the analogy of birds: too much hair on the back, impudence, as in wild beasts. Hair on the nape of the neck indicates liberality, as in lions: hair on the point of the chin, a bold spirit, on the

evidence of dogs. Eyebrows [25] that meet signify moroseness, by congruity: eyebrows that droop on the nasal and rise on the temporal side, silliness, as is seen in swine. When the hair of the head stands up stiff, it signifies cowardice, by congruity, for fright makes the hair stand [30] on end: and very woolly hair also signifies cowardice, as may be seen in Ethiopians. Thus extremely bristly and extremely woolly hair alike signify cowardice, and so hair gently curling at the end will make for boldness of spirit, as is to be seen in lions. [35] A ridge of hair<sup>14</sup> on the upper part of the forehead indicates a liberal disposition, as in the lion: but a growth of hair on the forehead down by the nose indicates [813<sup>a1</sup>] illiberality, the argument being from congruity, because such a growth presents a servile appearance.

A long and slow *step* indicates a mind slow to begin, but persistent when started, for the length of the stride shows determination, but its slowness procrastination. [5] A short slow step means tardiness without persistence, for shortness and slowness indicate lack of determination. A long quick step means enterprise and persistence, for its speed indicates enterprise and its length determination. A short quick step signifies enterprise without persistence.

[10] Identical references are made about *gesture* of hand, elbow, and arm. To hold one's shoulders straight and stiff and roll them as one walks and to have weasel-arms. . .<sup>15</sup> on the analogy of the horse: but to roll the shoulders if one stoops a little forwards means a proud soul, as in the lion. To walk with feet and legs bent out [15] means femininity,<sup>16</sup> as being a characteristic of women. To keep turning and bending the body is a sign of obsequiousness, for that is the gesture of the flatterer. To walk with a stoop to the right is by congruity of appearance held to argue effeminacy.

[20] Mobile *eyes* signify keenness and rapacity, as in hawks: blinking eyes, cowardice, for flight begins with the eyes. Sidelong leering glances are held to be characteristic of a fop, and so are drooping movements of one lid half over a motionless eye, and an upward roll of the eyes under the upper lids with a tender [25] gaze and drooping eyelids, and in general all tender melting glances; we argue partly from congruity, partly from the fact that these looks are common in women. A slow movement of the eyes which allows a tinge of white to show all the time, so that they look stationary, indicates a reflective character; for when the mind is [30] absorbed in reflection, our eyes also are motionless.

A big, deep *voice* indicates insolence, as in the ass: a voice which, starting low, rises to a high pitch, indicates despondency and

querulousness, the argument being partly from cattle and partly from congruity. Shrill, soft, broken tones mark the speech of the effeminate; for such a voice is found in women and is congruous. A [813<sup>b</sup>1] deep, hollow, simple voice. . .<sup>17</sup>as in the stronger breeds of dogs, and also by the argument from congruity. A soft, languid voice means gentleness, as in sheep: a shrill, shrieking voice, lewdness, as in goats. [5]

Men of abnormally small *stature* are hasty, for the flow of their blood having but a small area to cover, its movements are too rapidly propagated to the organ of intelligence. Men of abnormally large stature, on the other hand, are slow, for the flow of the blood has to cover a large area, and its movements are therefore [10] propagated to the organ of intelligence slowly. Small men with dry flesh, or of the hue that heat produces in the body, have not persistence enough to effect their purposes; for their blood flowing in a confined space, and at the same time, in consequence of the fiery condition of the body, flowing rapidly, their thought never keeps to a single topic, but is always passing to something new before being done [15] with the old. Again, big men with moist flesh or of the hue that results from cold, also lack persistence; for their blood flowing over a large area, and slowly, on account of the cold condition of the body, its movement does not manage to reach the organ of intelligence entire. On the other hand, small men with moist flesh and [20] of the hue that results from cold, do effect their purposes; for their blood moving in a confined area, the less mobile constituent in its composition produces a proportion which conduces to effectiveness. And again, big men with dry flesh, and of the hue that results from heat, are also persistent, and are keen of sense; for the warmth of [25] flesh and complexion counteracts the excessive size, so that a proportion conducive to effectiveness is attained. Such, then, are the conditions under which opposite extremes of stature tend now to effective activity, and now to ineffectiveness. But a stature intermediate between these extremes confers upon its possessors the [30] greatest acuity of sense and the greatest general effectiveness, for on the one hand, movements of the blood, not having a long distance to travel, easily reach the reason, while on the other hand, not being confined in too small a space, they do not withdraw. Thus the greatest tenacity of purpose and the greatest acuity of sense will be found in persons of moderate stature.

An ill-proportioned body indicates a rogue, the argument being partly from [814<sup>a</sup>1] congruity and partly from the female sex. But<sup>18</sup> if bad proportions mean villainy, a well-proportioned frame must be characteristic of upright men and brave: only, the standard of the right

proportions must be sought in the good training and good breeding of the body, and not in the male type, as we said at the beginning. [5]

It is advisable, in elucidating all the signs I have mentioned, to take into consideration both their congruity with various characters and the distinction of the sexes; for this is the most complete distinction, and, as was shown, the male is more upright and courageous and, in short, altogether better than the female. It will be [814<sup>b1</sup>] found, moreover, in every selection of signs that some signs are better adapted than others to indicate the mental character behind them. The clearest indications are given by signs in certain particularly suitable parts of the body. The most suitable [5] part of all is the region of the eyes and forehead, head and face; next to it comes the region of the chest and shoulders, and next again, that of the legs and feet; whilst the belly and neighbouring parts are of least service. In a word, the clearest signs are derived from those parts in which intelligence is most manifest.

<sup>1</sup>Reading διάνοιαν οἷα ἔπεται τῷ τοιοῦτῳ σώματι, εἴτα τὸν ὅμοιον τούτῳ τὸ σῶμα ἔχοντα.

<sup>2</sup>Förster thinks that there is a lacuna in the text here.

<sup>3</sup>Reading ὅταν γὰρ πάσχη τι, εἰ τοιοῦτόν τι γίνεται οἷον ἔχει ὅταν τις ὀργίζεται, ὀργίλου τὸ σημείου. τοῦ δ' αὐτοῦ γένους.

<sup>4</sup>Reading τὸ γὰρ δύνασθαι ἰδεῖν τινων ὄντων ἀναγκαῖον τοῦτ' εἶναι.

<sup>5</sup>Reading ἔστι δ' ὅτε ἐναντιοῦται τῷ κατὰ τὰ πάθη φυσιογνωμονεῖν τὸ κατὰ τὰ ζῶα.

<sup>6</sup>Förster marks a lacuna here.

<sup>7</sup>Reading ἀσθενῆ, καὶ μικρὰ σκέλη.

<sup>8</sup>Reading μικρὸν ἔγκυρτα.

<sup>9</sup>Retaining γυπῶδεις.

<sup>10</sup>Förster marks a lacuna here.

<sup>11</sup>Reading μετρίους.

<sup>12</sup>Förster marks a lacuna here.

<sup>13</sup>Reading ὁστώδη.

<sup>14</sup>Reading ἀνάσιλλον.

<sup>15</sup>There is a lacuna here, or else the text is corrupt.

<sup>16</sup>Reading θήλεις.

<sup>17</sup>Förster marks a lacuna.

<sup>18</sup>Reading εἰ δέ.

# ON PLANTS\*\*

*E. S. Forster*

## BOOK I

1 · Life is found in animals and plants; but while in animals it is clearly [815<sup>a</sup>10] manifest, in plants it is hidden and not evident. For before we can assert the presence of life in plants, a long inquiry must be held<sup>1</sup> as to whether plants possess a soul and a distinguishing capacity for desire and pleasure and pain. Now Anaxagoras and Empedocles say that they are influenced by desire; they also assert that they [15] have sensation and sadness and pleasure. Anaxagoras declared that plants are animals and feel joy and sadness, deducing this from the fall of their leaves; while Empedocles held the opinion that sex has a place in their composition. Plato indeed [20] declares<sup>2</sup> that they feel desire only on account of their compelling need of nutriment. If this be granted, it will follow that they also feel joy and sadness and have sensation. I should also like to reach some conclusion as to whether they are refreshed by sleep and wake up again, and also whether they breathe, and whether [25] they have sex and the mingling of the sexes or not. But the great diversity of opinion on these subjects involves too long an inquiry, and the best course is to pass over these topics and not to waste time on the unprofitable investigation of details. Some [30] have asserted that plants have souls, because they have seen that they are generated and receive nutriment and grow, and have the bloom of youth and the dissolution of old age—characteristics which nothing inanimate shares with plants; if plants possess these characteristics, they believed them also to be affected by desire. [815<sup>b</sup>10]

Let us first examine their obvious characteristics, and afterwards those which are less evident. I say that whatsoever takes food desires food, and feels pleasure in satiety and pain when it is hungry, and that these dispositions do not occur without the accompaniment of sensation.



The view of Plato, then, who held that plants have sensation and desire was remarkable, but not unsound; but Anaxagoras and [15] Democritus and Empedocles declared that they possessed intellect and intelligence. These views we must repudiate as unsound and pursue a sane statement of the case. I assert, then, that plants have neither sensation nor desire; for desire can only [20] proceed from sensation, and the end proposed by our volition changes in accordance with sensation. In plants we do not find sensation nor any organ of sensation, nor any semblance of it, nor any definite form or capacity to pursue objects, nor [25] movement or means of approach to any object perceived, nor any sign whereby we may judge that they possess sense-perception corresponding to the signs by which we know that they receive nutriment and grow. Of this we can only be certain because nutrition and growth are parts of the soul, and when we find a plant to be [30] possessed of such a nature, we perceive of necessity that some part of a soul is present in it which lacks sensation; but we ought not to allow that a plant is a thing possessed of sense, because while sensation is the cause of the glorification of life, nutrition is the cause of growth in the living thing.

[35] These differences of opinion come into consideration in their own proper place. It is certainly difficult to find a state intermediate between life and the absence of [816<sup>a</sup>1] life. Some, too, will urge that a plant, if it be alive, is therefore an animal; for it is difficult to assign any principle to the life of plants except that of the life of nutrition. But, when men deny that plants have life, they do so because plants do not [5] possess sensation—for there are certain animals which lack foresight and intelligence. For nature, which destroys the life of the animal in death, preserves it in the continuation of its kind by generation, and it is wrong for us to suppose any [10] intermediate state between the animate and the inanimate. We know that sea-shells are animals which lack foresight and intelligence and are at once plants and animals. The only reason, therefore, for their being called animals is that they have sensation; for genera give names and definitions to the species which fall under them, while the species give names to the individuals, and the genus ought to rest on [15] a common cause present in the several individuals and not on several causes; but the nature of the cause, on which the genus is based, is not familiar to every one. Now there are animals which have no female sex, and some which do not procreate their kind, and some which lack the power of movement, and some in which the colour [20] varies, and some which produce an offspring unlike themselves, and some which grow from the earth or from trees.

What, therefore, is the principle of life in animals? What is it that raises the noble animal, i.e. that which surrounds the heavens, the sun and the planets, from [25] the sphere of perplexity and doubt? For the heavenly bodies feel no outside influence, and sensation is an effect produced on a sentient being. Now a plant has no movement of itself, for it is fixed in the earth, which is itself immovable. Whence, then, shall we infer any similarity which may enable us to attribute life to the plant? [30] For there is no one thing which includes all of them. We therefore assert that sensation is common to all animal life, because sensation marks the distinction between life and death; but the heavens, which pursue a nobler and more sublime path than we do, are far removed from life and death. But it is fitting that animals should have<sup>3</sup> some common characteristic perfect in itself but less sublime, and this [35] is the acquisition and deprivation of life. And one ought not to shrink from the use of these terms on the ground that there is no mean between the animate and the inanimate, between life and the deprivation of life; indeed, there is a mean between life and the inanimate, because the inanimate is that which has no soul nor any portion of it. But a plant is not one of those things which entirely lack a soul, because there is some portion of a soul in it; and it is not an animal, because there is no sensation in it, and things pass one by one gradually from life into non-life. We can [816<sup>b</sup>1] put the matter in a different way and say that a plant is animate. I cannot, however, assert that it is inanimate as long as it possesses soul and some form of sensation; for that which receives food is not entirely without soul. And every animal has soul, but [5] a plant is imperfect, and, whereas an animal has definite limbs, a plant is indefinite in form, and a plant derives its own particular nature from the motion which it possesses in itself. Someone might say that a plant has soul, because the soul is that which causes locomotion and desire to arise, and locomotion can only arise when [10] sensation is present. But the absorption of food is in accordance with a natural principle, and is common both to animals and plants, and no sensation at all will accompany the absorption of food; for everything that absorbs food employs two [15] qualities in feeding, namely, heat and cold, and an animal properly requires moist food and dry food, for coldness is always found in dry food; for neither of these two natures is ever unaccompanied by the other. And so food is continuously being supplied [20] to that which feeds on it till the time when it begins to decay, and animals and plants have to be provided with food similar in kind to themselves.

2 · Let us now investigate what we have already mentioned, namely, desire in plants, their movement, and their soul and its function. A plant has not [25] respiration, although Anaxagoras declared that it has; and we even find many animals which have not respiration. We can see by ocular demonstration that plants do not sleep and wake, for waking is due to an effect of sensation, and sleeping is an [30] enfeebled condition of sensation, and nothing of this kind is found in that which vegetates at all times in the same condition, and is itself naturally without sensation. When an animal takes food, a vapour rises from the food into its head and it falls asleep, and, when the vapour which rises to its head is consumed, it wakes up. In [35] some animals this vapour is plentiful and yet they sleep but little. Sleep is the suppression of motion and this involves the quiescence of the thing moved.

The most important and appropriate subject of inquiry which arises in this [817<sup>a</sup>1] science is that proposed by Empedocles, namely, whether female and male sex is found in plants, or whether there is a combination of the two sexes. Now we assert<sup>4</sup> that when the male generates it generates *in* another, and when the female generates it generates *from* another, and both are mutually separate. This is not [5] found to be the case in plants; for in a particular species the produce of the male plant will be rougher, harder, and stiffer, while the female will be weaker but more productive. We ought also to inquire whether the two kinds are found in combination [10] in plants as Empedocles states that they are. But my opinion is that this is not the case, for things which mingle together ought first to be simple and separate, and so the male will be separate and the female separate; they afterwards mingle, and [15] the mingling will only take place when it is produced by generation. A plant, therefore, would have been discovered before the mingling had taken place, and it ought therefore to be at the same time an active and a passive agent. The two sexes cannot be found combined in any plant; if this were so, a plant would be more [20] perfect than an animal, because it would not require anything outside itself in order to generate; whereas the plant *does* require the right season of the year and sunshine and its natural temperature more than anything. Thus it requires them at the time when the tree sprouts, and while the nutritive principle in plants is derived from the [25] earth, the principle which generates seeds is derived from the sun. Hence Anaxagoras said that the seeds of plants derive from the air, and others call<sup>5</sup> the earth the mother and the sun the father of plants. But we must suppose that the mingling of the male and the female in plants takes place in some other way, because the seed of a

plant resembles the embryo in animals, being a mixture of the male and female [30] elements. And just as in a single egg there exists the force to generate the chicken and the material of its nutriment up to the time when it reaches perfection and emerges from the egg, and the female lays the egg in a short space of time; so too [35] with the plant. And Empedocles is right when he said the tall trees do not bear their young; for that which is born can only be born from a portion of the seed, and the rest of the seed becomes at first the nutriment of the root; and the plant begins to move as soon as it is born. This, then, is the opinion which we ought to hold about [817<sup>b</sup>1] the mingling of the male and female in plants, similar to that which we hold about animals. This process is the cause of plants under a certain disposition of circumstances; for in the case of an animal when the sexes mingle the powers of the [5] sexes mingle after they have separated, and a single offspring is produced from them both. But this is not the case with plants. And if nature has mingled the male and the female together, she has followed the right course; and in plants the only [10] operation which we find is the generation of fruits; and an animal is only separated at the times when it is not having sexual intercourse, and this separation is due to its multifarious activities and intellectual pursuits.

But there are some who hold that the plant is complete and perfect because of [15] its possession of these two powers, and because of the food which is adapted to feeding it, and the length of its existence and duration. When it bears leaves and fruit its life will continue and its youth return to it. No excrement will be produced [20] from plants. A plant does not require sleep for many reasons, for it is placed and planted in the earth and attached to it and has no movement of itself; nor has it any definite bounds to its parts, nor does it possess sensation or voluntary motion, or a [25] perfect soul; indeed it has only part of a soul. Plants are only created for the sake of animals, and animals are not created for the sake of plants. Someone will urge that a plant requires food which is easily obtained and poor, yet it needs it very regularly and continuously, and without interruption. If it were agreed that a plant has an [30] advantage over an animal, it would follow that things which are inanimate were better and nobler than those which are animate; yet we see that the function of the animal is nobler and better than all those of the plant, and we find in the animal all the virtues which are present in the plant and many others. Empedocles said that [35] plants had their birth when the world was yet small and its perfection not attained, while animals were born after it was completed. But this account does not suit

the facts, for the world is a whole, perpetual and eternal, and has never ceased to produce animals and plants and all their species. In every kind of plant there is [818<sup>a</sup>1] natural heat and moisture, and, when these are consumed, the plant will become weak and grow old and decay and dry up. Some people call this corruption, others do not.

3 · Some trees contain a gummy substance, such as resin and almond-gum [5] and myrrh, and frankincense, and gumarabic. Some trees have knots and veins and core and wood and bark and marrow within them; some trees consist almost wholly of bark. In some the fruit is underneath the bark, that is, between the bark and the wood. Some parts of the tree are simple, such as the moisture found in it and the [10] knots and veins; other parts are compounded from these, such as the branches and twigs and the like. These are not all found in all plants; for some have composite and some simple parts, while others do not have them. Plants possess various other parts as well—roots, twigs, leaves, branches, flowers, catkins, tendrils, and bark [15] surrounding the fruit.

Just as in the animal, so also in the plant there are homogeneous parts, and all the composite parts of a plant are like the members of an animal: the bark of a plant resembles the skin of an animal, while the root of a plant is like the mouth of an [20] animal, and its fibres are like an animal's sinews, and so with its other parts. Any of these parts can be divided on one principle into similar parts, or a division can be made by dissimilar parts (just as mud can be divided in one way into earth only and in another into water; similarly the lungs and flesh can be divided up on one principle so that they are pieces of flesh, while on the other principle they can be [25] divided into their elements or radical parts). But a hand cannot be divided up into another hand, nor a root into another root, nor leaves into other leaves; but these roots and leaves are themselves the result of composition. Some fruits are composed [30] of few parts, some of many—olives, for example, which are made up of bark and flesh and a shell and a seed. Some fruits<sup>6</sup> have as many as three coverings. All seeds have two barks. We have now mentioned the parts of which individual plants [35] consist. The aim of our discussion is to determine the parts of the plant and its coverings and its variations—this is very difficult—and in particular, to define its essential nature and its colour, and the period of its duration, and the effects which are produced upon it. Plants have not fixed habits of mind and the power of action [818<sup>b</sup>1] like that possessed by animals; and if we compare the parts of an

animal with those of a plant, our discussion will be a long one, and we shall hardly avoid considerable differences of opinion in naming the parts of plants. For a part of a thing is of its [5] own kind and of its own particular substance, and, when it is once produced, each kind will remain in its original condition, unless it departs from it owing to some long continued infirmity. Flowers, fruits, and leaves will, in some cases, be produced [10] annually, in others they are not, nor do they remain as the bark does . . .<sup>7</sup> This does not happen in plants; for various undetermined parts of plants are often shed (like [15] hair in the case of man and claws in the case of animals), and in their stead other parts grow either where the lost parts were, or elsewhere in some other place. It is clear from this that it is not determined whether the parts of a plant are really parts or not. It is wrong for us to say that those things with which an animal grows and by [20] which it reaches completion are not parts of it; but the leaves and everything that is found in a plant<sup>8</sup> are parts of that plant, although they are not determined and are [25] gradually shed; for the antlers of a stag and the hair of certain animals, and the fur of certain of those which hibernate in hollows underground, fall off, and this process resembles the shedding of leaves.

We ought, therefore, to treat of the subjects which we mentioned first, and [30] begin to name the parts which are peculiar to certain plants and those which are common to all, and their differences. Let us say, therefore, that there is a great diversity in the parts of plants in respect of number and fewness, largeness and smallness, and in respect of strength and weakness. The reason of this is that the [35] moisture which is found in large trees, is in some trees, the fig, for example, like milk, in others it is like pitch, as in the pine, in others it is watery, like the liquid found in the vine, in others it is acrid, like that found in marjoram and in the herb called opigaidum. There are also plants which have their parts dry. Some plants have their parts well defined, and neither alike nor equal in size; others have parts which are similar to one another but not equal, in others they are equal but not [819<sup>a</sup>1] similar, and their position is not fixed. The differences of plants are recognized in their parts—differences in form and colour and sparseness and density and roughness and smoothness, and all their incidental differences in equality of size, [5] numerical increase and decrease, largeness and smallness. Some plants, too, will not be uniform, but will show great variation, as we have already said.

4 · Some plants produce their fruit above their leaves, others beneath; in [10] some plants the fruit is suspended from the stock of the tree, in others it grows from the root, as in the Egyptian trees which are called *vargariaton*; in some cases it grows in the middle of the plant. In some plants the leaves and knots are not separated; in others the leaves are equal in size and similar to one another, and some [15] of those which have branches have branches equal in size. The following parts, which we will name, are found in all plants, and admit of growth and addition— namely, the root, the shoots, the stem, and the branches; these resemble the limbs of animals which include all the other limbs. The root acts as an intermediary between [20] the plants and its food, and for that reason the Greeks call it the root and cause of life in plants, for it supplies the plant with the cause of life. The stem is the only part which grows out of the ground and forms and is like the stature of a tree. The [25] suckers are the parts which sprout from the root of a tree, while the branches are above the suckers. They are not found in all plants; and in some plants which have branches these are not permanent, but only last from year to year. There are plants which do not have branches or leaves, fungi, for example, and mushrooms. [30] Branches are only found on trees. Bark and wood and the pith of a tree are produced from moisture; some call this pith the womb of the tree, others the viscera, others the heart. The knots and veins and flesh of the whole plant are made up from the [35] four elements. Parts are often found which are adapted to reproduction, leaves, for example, and flowers and small twigs (which are flowers outside the plant); similarly with the fruit and leaves of a plant, and what is produced from the seed [40] and the shell which surrounds it.

Of plants some are trees, some are midway between trees and herbs and are called bushes, some are herbs, and some are vegetables. Almost every plant falls [819<sup>b</sup>1] under one of these names. A tree is a plant which has a stem growing from its root, from which stem numerous branches grow, olive-trees, for example, and fig-trees. A [5] plant which is something between a tree and a small herb, and is called a bush, has many branches growing out of its roots, like the thorn tree and bramble. Vegetables are plants which have a number of stems growing out of one root and a number of [10] branches, rue, for example, and cabbage. Herbs are plants which have no stem, but their leaves grow out of their roots. Some plants are produced and dry up every year, wheat, for example, and vegetables. We can only indicate these various classes of plants by general inferences, and by giving examples and descriptions. Some plants [15] verge towards two extremes, mallow, for example (since

it is both a herb and a vegetable), and likewise beet. Some plants grow at first in the form of low bushes and afterwards become trees, as, for instance, the nut-tree, the chaste-tree, and the [20] plant called 'goatberry'. Perhaps myrtles, apple-trees, and pear-trees fall also under this class, for all of them have a number of superfluous stems growing from their roots. It is worth while to specify these that they may serve for purposes of example [25] and inference, but we must not investigate the definitions of every kind of plant.

Some plants are indoor plants, others garden plants, and others wild, in the same way as animals. I think, too, that all species of plants which are not cultivated become wild. Some plants produce fruit, others do not; some produce oil, others do [30] not; some have leaves and not others; some plants shed their leaves, others do not; some have branches, others do not. Plants differ greatly in their large or small size, [35] in beauty and ugliness, and in the excellence, or the contrary, of their fruits. Trees in a wild state bear more fruit than garden trees, but the fruit of the garden tree is better than that of the wild. Some plants grow in dry places, some in the sea, others [40] in rivers. Plants which grow in the Red Sea will there reach a great size, whereas they are only small in other places. Some plants grow on the banks of rivers, others in standing water. Of plants which grow in dry places, some grow on mountains, [820<sup>a</sup>1] others in the plain; some plants grow and flourish in the most arid districts, as, for example, in the land of the Ethiopians which is called Zara, and increase there better than anywhere else. Some plants live at high altitudes, some on moist ground, [5] others in dry, others equally well in either, as, for instance, willow and tamarisk. A plant changes very much with a difference of locality, and such variations must be taken into consideration. [10]

5 · A plant which is fixed in the ground does not like to be separated from it. Some places are better for certain plants than others; similarly some fruits are [15] better in one place than in another. In some plants the leaves are rough, in others smooth; in some they are small, in others they are cleft as in the vine. Some trees have a single bark, as the fig, others have several layers of bark, as in the case of the pine; some are bark throughout, as, for example, the mediannus. Some plants have [20] joints, reeds, for example; some have thorns, like the bramble. Some have no branches, others have a great number, like the sycamore. Other plants show various differences; for instance, suckers grow from some and not



from others; this can only [25] be due to a difference in the root. Some plants have a single root only, the squill for example; for it grows in a single shoot and spreads by expansion underground, and will increase as it grows more and more and approaches the sunlight, because the sun draws out its shoots.

[30] Of the juices which are found in fruits, some are drinkable, as, for instance, the juice of grapes, pomegranates, mulberries, and myrtles. Some juices are oily, as in the olive and pine-nut; others are sweet like honey, as in the date and fig; others are [35] hot and pungent, as in marjoram and mustard; others bitter, as in wormwood and centaury. Some fruits are made up of a fleshy and a bony substance and a seed, plums for example; others, cucumbers for instance, are made up of a fleshy substance and seeds, others of moisture and seeds like the pomegranate. Some have rind outside and flesh inside, others flesh outside and seed inside; in others one [820<sup>b</sup>1] comes immediately upon the seed with the envelope which encloses it, as in dates and almonds; in others this is not so. Fruits are edible or inedible accidentally, and some people can eat certain fruits while others cannot, and certain animals can eat [5] certain fruits while others cannot. Some fruits, again, are in pods, like seeds; others in sheaths, like<sup>9</sup> weapons, wheat for example; others are enclosed in a fleshy [10] substance, dates for instance; others in husks, acorns for example, and some in several husks, a cuticle and a shell, nuts for example. Some fruits mature quickly, like mulberries and cherries, others slowly, as do all or most wild fruits. Some plants [15] produce their leaves and fruits quickly, others slowly—and of these some wait for the winter before coming to maturity. The colours of fruits and flowers vary very [20] much. One plant is green throughout, another has a tendency to blackness, another to whiteness, another to redness. Also the conformation of the fruit, if it be wild, varies considerably; for all fruits are not angular, nor do they take the form of [25] straight lines.

6 · In aromatic trees it is sometimes the root which is aromatic, sometimes the bark, sometimes the flower, and sometimes the wood; in other cases every part is aromatic, in the balsam for example.

Some trees come into existence by being planted, some from seeds, others [30] spontaneously. Those which are planted are separated either from the root, the stem, the branches, or the seed, or else the whole is transplanted; some are slightly bruised before being planted. Some are planted in the earth again, others are planted, that is, grafted, on other

trees. It is better to graft on trees which are [35] similar and have the same proportions; the best results are obtained in the grafting, for instance, of apple on pear, fig on fig, or vine on vine. Sometimes grafting of different species is resorted to, bay, for example, on wild plane, olive-trees on terebinth, mulberries on a number of different trees, and wild trees on garden trees. [821<sup>a</sup>1] Every plant does not produce a seed similar to that from which it is sprung; some produce a better seed, others a worse, and good trees sometimes grow from bad [5] seeds, as in the case of bitter almonds and pomegranates. In some trees too, when they are weak, the seed fails, in the pine for example, and the palm. But a good plant is not likely to be produced from a bad seed, nor a bad tree from a good seed. This [10] often occurs, however, among animals.

A tree which has hard bark and has become barren, if its root be split and a stone inserted in the cleft will become fruitful again. In palms too, if the leaves or pollen or bark of the male palm be applied to the leaves of the female palm so as to [15] cohere,<sup>10</sup> its fruits will come to maturity quickly, and it will prevent their falling off. The male can be distinguished from the female palm, because it sprouts first and its leaves are small, and also because of its odour; sometimes all these conditions are present, sometimes only some of them. It will perhaps happen that the wind will [20] bear the odour of the male to the female palm, and then the dates will come to maturity; the foliage of the male will also cohere to that of the female palm when they catch in one another. Wild fig-trees, too, spread along the ground and contribute to garden fig-trees; similarly wild olives contribute to olives, when they [25] are planted together.

7 · Again, some plants change into other species, the nut-tree, for example, when it becomes old. It is also said that catmint changes into mint, and basil, if [30] plucked up and planted by the Persian Gulf, will perhaps turn into thyme. Also wheat and flax change into tares. The poisonous nightshade which grows in Persia changes its nature if transplanted into Egypt and Jerusalem and becomes edible. [35] Almond-trees and pomegranates change their condition for the better under cultivation. Pomegranates are improved by being manured with pigs' dung and watered with fresh cold water. Almond-trees with pegs driven into them exude gum for a long while. Many wild plants are thus artificially changed into garden plants. [821<sup>b</sup>1] Position and care, and, above all, the season of planting, contribute to this process. Some plants

require some one to plant them, others do not. Most plants are planted in the spring, a few in the winter and autumn, very few in the summer after the [5] rising of the dogstar; planting at this season takes place in few places—nowhere except in the Crimea. In Egypt planting only takes place once in the year.

Some trees produce leaves from their roots, some from their buds, some from [10] the wood, others from every part. In some they are near the ground, in others far from it, in others they are neither high nor low; others produce a few leaves at various times. Some trees bear fruit once a year, others several times, and their fruit does not mature, but remains unripe. Certain trees are very fruitful over a long [15] period, as, for instance, fig-trees. Some bear fruit one year and then recuperate for a year, as do olive-trees, although they produce a number of boughs which cover them. Some trees are more productive when they are young than when they are old; others, on the contrary, are more fertile when they are old, almond-trees, for [20] example, and pear-trees and holm-oaks. Wild and garden plants can be distinguished by virtue of the male and female, each being recognizable by its peculiar characteristics; for the male is thicker and harder and has more branches and less [25] moisture and a smaller fruit, and does not reach such maturity; the leaves, too, and likewise the suckers are different.

In considering this we should form some conjectures whereby we may know trees and their seeds apart, and similarly in the case of small herbs. We must [30] consider what the ancients have said on these points, and examine the works written upon them. We shall only be able to take a brief survey and extract the essence of them. This means that we shall consider those plants which contain oil, those which [35] produce seeds, and those which produce wine, and plants which have medicinal properties, and those which destroy life. All these particulars about trees and plants are well known. But in order to know their causes, we ought to inquire into their production, and discover why certain plants grow in certain places and not in others, and at certain seasons and not at others; we must examine their methods of planting, their roots, their differences of sap and odour and juice and gum, and the [822<sup>a</sup>1] excellence and defects of particular plants, and the fact that the fruits of some trees last but not those of others, and why some fruits putrefy quickly, others more slowly. We must inquire into the properties of all plants, and particularly those of [5] their roots; and why some fruits grow soft while others do not; and why some arouse lust, others cause sleep, and others are fatal to life; and many other differences; and why the fruits of some produce

milk, of others not.

## BOOK II

[10] 1 · A plant has three powers, the first derived from the element of earth, the second from that of water, the third from that of fire. From the earth the plant [15] derives its fixity, from water its solidity, and from fire the unity of its fixity. We see much the same thing in vessels of pottery, which contain three elements—clay, which is, as it were, the material of pottery; secondly, water, which binds the pottery [20] together; and, thirdly, fire, which draws its parts together, until it completes the process of manufacture. The appearance, then, of complete unity is due to the fire; because rarity is present in pottery according to the composition of its parts, and, when the fire heats them, the moist matter is completed, and the parts of the clay [25] will cohere together. Dryness will thus take the place of moisture, owing to the predominance of the fire and the process of concoction which takes place in all animals, plants, and metals. For concoction takes place where moisture and heat are present, when the struggle between them is allowed to run its course; and this is [30] what will take place in the concoction of stone and metals. It is not so in animals and plants; for their parts are not closely compacted, and so there is an escape of moisture from them. But in metals there is no such escape of moisture or sweating, because their parts have no rarity, and therefore they can give up nothing except parts of themselves to correspond to certain residues which are given off by animals and plants. This escape of moisture can only take place where rarity is present; and so where there is no rarity, nothing at all can be given off. Therefore that which [35] cannot be increased is solid, because that which can increase requires space in which to dilate and grow; and therefore stones, salt, and earth are always the same, neither increasing nor growing. There is motion in plants in a secondary sense, and [822<sup>b</sup>1] this is a form of attraction, namely, the force of the earthly element which attracts moisture; in this attraction there will be motion, and the moisture makes for a certain position, and the process of concoction is thus in a certain way completed. And so small plants usually come into being in the short space of a single day, unlike [5] animals; for the nature of animals is in itself different; for no concoction will take place except by the use of material in the animal itself. But the material of which the plant is formed is near at hand, and therefore its generation is quick, and

it [10] grows and increases, because it is rare, more quickly than if it were dense. For that which is dense requires many powers on account of the diversity of its form and the extension of its parts in relation to one another. Consequently the generation of a plant is quicker on account of the similarity of its parts to one another, and the [15] completion of its growth is speedier. Now the parts of plants are usually rare, because the heat draws the moisture into the extremities of the plant, and the material is distributed through all its parts, and that which is superfluous will flow away; just as in a bath the heat attracts the moisture and turns it into vapour which [20] rises, and, when it is present in superfluity, it will turn into drops of water. Similarly in animals and plants, the superfluities ascend from the lower into the upper parts and then descend in their action from the upper to the lower parts.

We find the same phenomenon in streams which are generated underground [25] and come forth from mountains, and whose material is rain. When the waters increase and are confined within the earth, an excess of vapour will be produced from them on account of their compression underground, and the vapour will break its way through the earth and fountains and streams will appear, which were [30] formerly hidden.

2 · We have set forth the causes which produce springs and rivers in the book on *Meteorology*. An earthquake frequently discloses springs and rivers which had [35] not before been visible, when the earth is rent by vapour. We also often find that springs and rivers are submerged when an earthquake takes place. But this does not happen in the case of plants, because air is present in the rarity of their parts. This is [823<sup>a</sup>1] indicated by the fact that an earthquake never takes place in sandy localities, but only where the ground is hard, that is in districts of water and mountains. Earthquakes occur similarly in these districts, because water and stone are solid, [5] and it is the nature of warm, dry air to ascend. When, therefore, the particles of air become massed together, they gain force and thrust up the ground and the vapour [10] makes its way out; whereas, if the ground were rare, the vapour would make its way out gradually from the first. But the ground being solid, it does not make its way out [15] gradually, but its parts collect, and it is then strong enough to rend the earth. This, then, is the cause of earthquakes in solid bodies; there will, therefore, be nothing to [20] correspond to an earthquake in the parts of plants and animals, though it will occur in other things—

often, for example, in pottery and glass, and in some cases in minerals. Any body which has considerable rarity tends to rise upwards, for the air supports it. This we often see when we throw a gold coin or some other heavy substance into the water and it immediately sinks; whereas if we throw in a piece of wood, which has rarity in it, it does not sink. A gold coin sinks not because of its [25] leaf-like form nor on account of its weight, but because it is solid. That which has rarity can never altogether sink. Ebony and similar substances sink because there is very little rarity in them, and therefore there will not be air present to support them; [30] and so they sink, because their parts are practically solid. Oil and leaves always float on the surface of water. We will now prove this. We know that heat and moisture are present in these substances; and it is characteristic of moisture to [35] cohere with particles of water, while it is characteristic of heat that it causes things to rise and makes its way towards the particles of air; and it is the habit of water to raise objects to its surface, and of air to rise upwards; and water does not rise above [40] its surface, because the whole surface of the water is one and the same, and consequently the air rises with the oil above the water. Some stones too float on [823<sup>b</sup>1] water, because rarity is present in them and is greater in quantity than the matter of which they are formed, and consequently<sup>11</sup> the space occupied by air will be greater than that occupied by the earthly element. It is the nature of water to take up a position above the earth, and of air to rise above water; the material, therefore, which composes the stone, which is of the element of earth, sinks in the water, while [5] the element of air enclosed in the stone rises above the water. Each element therefore attracts its like in a contrary direction to the element with which it is combined. If, then, one element is equal to the other, half the stone will be submerged and half will project above the surface; but if the air is present in greater [10] quantity, the stone will float above the water. The weight of trees is made up in the same way. (These stones are due to a violent collision of waves, and are originally foam which forms an oily milk; when the wave is dashed against the sand, the sand will collect the oily foam, and the dryness of the sea will dry it up together with the [15] superfluous salt, and the particles of sand will collect, and thus in the long process of time stones will be formed.)

The presence of sand under the sea is explained by the fact that earth always [20] has a fresh flavour, and when water stands it will be prevented from undergoing any change, and will form an enclosed mass of water in the place where it is, and the air will not draw it up; the

particles of earth, therefore, gain the upper hand and [25] become salty, and gradually acquire heat. (Now soil is found in its natural state in fresh running water, because there the water is sweet and light.) And because the [30] dryness of the earth gains the upper hand in the water, it changes it into an earthy nature, or something like it, and makes both the earth and water crisp; and this process of drying goes on as long as the earth remains in its place and there is water still left, and it splits up the soil into small particles; and for this reason the earth near the sea is always sandy. The same thing happens on plains which have nothing [35] to protect them from the sun, and which are far from fresh water; the sun has dried up the particles of fresh moisture and that which is of the nature of earth has remained; and because the sun shines continually upon an exposed place of this [40] kind, the parts of the soil become separated and sand is thus formed. A further sign of this is that if we dig deep down in a desert, we shall find natural soil. Natural soil, therefore, will be the basis of sand, and will only become sand accidentally and [824<sup>a</sup>1] under certain circumstances, namely, when the sun's rays dwell on it for a long time and it is far removed from fresh water. The saltiness of the sea is to be accounted for in a similar way; for the basis of all water is fresh water, and saltiness is accidental, [5] occurring only under the circumstances which we have mentioned. The fact that the earth is below the sea and the sea naturally and necessarily above the earth is a self-evident proof of this. Some, however, have held that the common element is [10] that which is present in the greatest quantity, and that there is a greater quantity of water in the sea than elsewhere, and that, therefore, sea-water is the element present in all water. But water naturally has its position above the earth and is lighter than it; for we have already shown that water is at a higher elevation than [15] the earth according to the altitude at which the mass of water stands. Let us take two vessels of the same size and place fresh water in one and salt water in the other; then let us take an egg and place it in the fresh water; it will sink, whereas, if we [20] place it in the salt water, it will float. It therefore rises above the particles of salt water because these particles do not let it sink,<sup>12</sup> as do those of fresh water, but they can uphold the weight, which therefore does not sink. So in the Dead Sea no animal [25] can sink, nor is any animal life produced in it, because dryness predominates in it and it is like the form of earth. It is clear, therefore, that dense water finds a lower level than water which is not dense; for the dense is of the nature of earth, the rare of [30] the nature of air; therefore, fresh water stands at a higher elevation than any other water, and is therefore further removed



from earth. Now we already know that the water which is furthest removed from earth is the natural water, and we have shown that fresh water is higher in position than all other kinds of water; as this sign shows, [35] then, it certainly and necessarily is the natural water. Salt water is also produced in pools, because fresh water becomes salt. The saltiness, therefore, of the earth prevails over that saltness, and the air will remain enclosed, and the mass of water will not therefore be fresh. Saltiness may also be produced from water by being given [824<sup>b</sup>1] off from it like sweat.

3 · So too in the case of plants: their species will be formed, not from a simple element, but by a process of composition, just as saltiness and the substance of sand [5] are formed from the water of the sea. For vapours which rise, when they become solidified, will be able to conceive these plants, and the air will descend and bedew [10] the ground, and from it will come forth the form of their seeds through the powerful influence of the stars. But plants must necessarily have some material, and this material is water. There are, however, different kinds of water, and water only rises [15] if it is fresh, and salt water is heavier than fresh; and so that which rises above water is rarer than water. When, therefore, the air draws it up, it will become rarefied and rise still higher; and this is why fountains and streams are formed in mountains. [20] Similarly phlegm and blood rise to the brain, and all foods also rise; so too all water rises. Even salt water rises in that part of it which heat dries out into the element of air, and, because air is always higher than water, that which rises above salt water is [25] fresh. We often find the same thing taking place in baths. When heat takes hold of salt water, its parts will be rarefied, and vapour will rise in a contrary direction to the depth of the bath, and the particles of salt and the natural moisture become [30] separated, for the latter is of the nature of air and follows the vapour; and cloud after cloud of vapour rises upwards, and when they reach the roof they press upon it. The vapour will thus collect and become condensed, and will turn into drops of fresh [35] water dripping down, and so in salt baths the vapour will always be fresh.

Plants ought not to grow in salt water, on account of its low temperature and dryness. This is because a plant needs two things—its proper material and a position suitable to its nature; when these two conditions are present a plant will grow. Now [40] we find that snow is the substance furthest removed from an equable temperature, and its

most striking characteristic is the impossibility of its existing in a temperate [825<sup>a</sup>1] region. We do not, therefore, find plants growing in snow; yet we often find plants appearing in the snow, and animals of all kinds, especially worms (for they are bred in the snow), and mullein and all bitter herbs. But it is not the snow which causes [5] this to be so; but a certain characteristic of snow is active. The reason is that snow falls like smoke, and the wind congeals it and the air binds it together. There is therefore rarity amongst its parts, and air will be retained in it and will grow hot, [10] and foul water flows from it, which had before enclosed the air; and when the air is present in considerable quantities and the sun shines upon it, the air which is enclosed in the snow will burst its way out, and a foul moisture will appear and will [15] be solidified by the heat of the sun. But if the place is covered up, plants will grow in it, but without leaves, because it is cut off from the equable temperature of the earth which is congenial to it. This is the reason why there are numerous flowers and leaves on small plants in places where the air and water are temperate, and few [20] flowers and leaves on a plant which occurs in the snow. So too in very salty and dry places plants do not usually appear, because these places are far from being temperate; and the ground is impoverished, because heat and moisture, which are [25] the characteristics of fresh water, are absent. So the soil that is fresh is the mountain soil, and there plants grow quickly.

But in warm places, because there the water is fresh and the heat plentiful, the process of concoction proceeds for two reasons, partly as a result of the position and [30] the air which is found there, and partly because there is a concoction of the air owing to the heat of the sun there. On mountains, because they attract moisture and the clearness of the air assists the process, concoction proceeds apace; and therefore plants are generally found on mountains. In deserts the saltiness gains the upper hand, as we have already shown, and rarities resembling one another are left [35] between the particles of sand; the sun has therefore no power to produce or perpetuate any continuous plant life; and so in deserts separate species of plants will not occur, but species similar to one another.

4 · Plants which grow on the surface of the water will only do so when there is density in the water; the reason of this is that, when heat touches water which has [825<sup>b</sup>1] no current to move it, something of the nature of a cloud comes over it and retains a little of the air, and the

moisture putrefies and the heat draws it up, and it spreads over the face of the water. Such a plant has no root, because roots will only attach [5] themselves to the hard particles of the earth, and the particles of water are loose and scattered. The heat then comes forth with the putrefaction which takes place on the surface of the water. Such a plant has no leaves because it is produced under [10] conditions which are far from temperate, and its parts are not compact, because the parts of water are not compact. It is for this reason too that such plants grow like threads.<sup>13</sup> It is because the parts of earth are compact that the plants too which grow in the earth are compact. Sometimes putrefactions are set up in damp, smoky ground, and hold the air—the sun causing them to appear when rain and winds are [15] frequent—and the dryness of the earth will make their roots dry up and solidify, and thus fungi and mushrooms and the like will be produced. In places that are exceedingly warm, because the heat concocts the water in the interior of the earth [20] and the sun holds the heat, a vapour is formed and a plant is thus produced. This process takes place in all warm places, and the formation of the plant is thus completed. A cold locality causes a similar but contrary process; the cold air forces [25] the heat downwards and its particles collect together, and the ground undergoes concoction with the moisture present in it; the ground is then cleft open and a plant emerges from it. Where the ground is fresh, water is generally not far away. When, [30] therefore, the air which is enclosed in the earth is stirred into motion, the moisture of the water will remain behind, and the air will solidify inside the water and a plant is produced, such as the water-lily and various kinds of small plants; these plants grow straight up and do not expand, because their roots are above the earth. In [35] places too where there is warm water running, plants often grow, because the heat of the water attracts the vapours which are retained in the earth, and draws the cold moisture upwards, and air is solidified from the moisture, which it concocts owing to the heat of the water, and a plant appears, but only after a long lapse of time. Small [826<sup>a</sup>1] plants too appear in sulphurous places: and when the wind blows violently upon the brimstone, it will recoil back again, and the air which is in it will be stirred up, and the place will become hot, and fire will be produced from it, and will continue to be [5] produced from it, because it exists deep down in the brimstone, which is due to impurities deposited by the air; the fire attracts the air when the sulphur putrefies, and a plant will be produced from it. Such a plant, as we have shown before, will not generally have many leaves, because it is produced under conditions which are far [10] from equable.

Edible products will grow from plants in positions which are warm even, and elevated, especially in the third and fourth zones; and products almost edible grow [15] in cold and high districts. Many species are produced in cold, high positions owing to the attraction of the moisture and the temperate conditions which prevail in the warmth of the sun on spring days. Similarly natural soil readily produces plants which are full of oil; such soil, as we have already seen, is found where there is fresh water.

[20] **5** · A plant which grows upon solid rock takes a long time to grow; for the air which is enclosed in the stone strives to rise, and when it cannot find a way, owing to the resistance of the stone, it retreats back again and becomes heated, and attracts the residuum of the moisture in the stone upwards, and with this moisture a vapour [25] comes forth accompanied by a resolution of small particles of the stone; and because the sun often acts upon the stone, it assists the moisture in the process of concoction, and as a result a plant is produced. Such plants do not generally grow to any height, [30] unless they are near some soil or moisture. The rest of the plant requires soil, water, and air. If you look at the matter, you will see that if a plant faces the east, it will grow quickly, and slowly if it faces the west. A plant, when water is the predominant element in it, will retain the air and will not allow it to rise, and thus the plant is not [35] nourished. Similarly, when dryness predominates, the natural heat will be diverted into the extremities of the plant and will block up the ducts through which the flow of water passed, and the plant does not receive nourishment.

**6** · Every plant needs four things (just as an animal needs four things), namely, a definite seed, a suitable position, and a suitable supply of water and air. [826<sup>b</sup>1] When these four conditions are fulfilled, a plant will grow and increase; but if they are lacking, the plant will be correspondingly weakened. A plant which is used for medicinal purposes will be more serviceable and suitable for such purposes if it grows on high mountains; its fruit, however, will be harder to concoct and will [5] contain less nourishment. Places which are secluded from the sun's rays will not produce much plant life (just as they will not produce much animal life), because the sun makes the day long according to the duration of its absence, and it is the sun which draws out the moisture; and so plants which grow in sunless places will not [10] have the strength

to produce leaves and fruit. As for plants which grow in watery places, when the water is still, a foulness is formed, and there will be no power in the air to rarefy the particles of water, and the air will be imprisoned inside the earth, [15] and this will prevent the thick matter in the water from rising; then the wind will invade<sup>14</sup> the spot and the earth will be cleft open, and the air which is enclosed will retreat into the earth, and the wind will solidify the moisture, and from this condition of moisture marsh plants will spring. Usually such plants do not differ from one another in form on account of the constant presence of water and its thick [20] consistency and the heat of the sun overhead. The plants which grow in damp places will appear like patches of verdure on the surface of the earth. In such a place there is, in my opinion, little rarity, and when the sun falls upon it, it will stir up the moisture and the spot will grow warm through the resulting motion and the heat [25] which is enclosed within the earth; and so there is nothing to cause the upward growth of the plant, while the moisture helps its expansion; and so it spreads over the earth in a sheet of verdure and produces no leaves. A kind of plant also grows which appears above the surface of the water and is smaller in quantity than that [30] just mentioned, because it is like the nature of earth, and it neither grows upwards nor expands. Often, too, one plant grows out of another plant of a different form from itself, without any root, and spreads all over the plant. For when a plant which [35] has numerous thorns and contains an oily juice moves, its parts will open and the sun will cause its putrefactions to turn into vapour, and the putrefied place of its own accord will produce a plant, and the wind and a moderate heat assist, and the plant grows in the form of threads and extends over the original plant. This is a peculiarity of very thorny plants, dodder and the like. [827<sup>a</sup>1]

There is also a class of plant which has neither root nor leaves, and another which has a stalk, but no fruit or leaves, the tamarisk, for example.<sup>15</sup>

All herbs and all things that grow above or in earth have their origin in one of five ways, namely, either from seed, or from putrefaction, or from the moisture of [5] water, or from being planted, or from growing as parasites on other plants. These are the five causes of plants.

**7** · Trees have three different methods of production; they produce their fruit either before their leaves, or at the same time as their leaves, or else after their leaves have grown. We have already described these three

methods. A plant which [10] produces its fruit before its leaves contains a considerable amount of oily juice, and when the heat which is natural to the plant has concocted the juice, its maturity will quickly follow, and the juice will acquire force and boil up within the branches of [15] the plant and will prevent the moisture from rising; the result is that the fruit appears before the leaves. But in plants which produce their leaves more quickly than their fruits, the effects of the moisture are various. When the heat of the sun [20] begins to disperse the particles of water, the sun attracts the particles of this moisture upwards, and the process of ripening will be delayed, because the concoction of the fruit will only take place through coagulation, and so the leaves come before the fruit. A plant which produces its leaves and fruit simultaneously has much moisture, and frequently also contains an oily juice. When the heat has concocted the moisture, it will, as a result, rise upward, carrying the juice with it, [25] and the air and sun will draw it out, and the oily juice which forms the fruit will come out, while the moisture will produce the leaves, leaves and fruit coming forth together. The wise men of old used to assert that all leaves were really fruits, but so much moisture was present, because the fruit did not mature or solidify owing to the [30] presence of heat above and the sudden attraction exerted by the sun, and consequently the moisture on which the process of concoction had had no effect changed into leaves; the leaves, they said, are simply intended to attract the [35] moisture and serve as a protection to the fruit from the violence of the sun. The leaves ought therefore, they said, to be equally regarded as fruit. But the truth is that the moisture rises above them and the leaves are converted into real fruits, as we have already said. The same theory applies to olives, which often fail to produce [827<sup>b</sup>1] fruit; for when nature brings about concoction of moisture, some of the thin moisture, which has not matured, will rise first, and this will produce leaves and its concoction will produce flowers, and when in the second year the process of concoction is completed, the fruit will grow and will eventually use up all the [5] available material according to the space which it has in it.

Thorns are not characteristic of plants or natural to them. My opinion is that there is rarity present in a plant, and concoction will take place at the beginning of its existence, and moisture and cold rise upwards, and they are accompanied by a [10] slight concoction; this circulates where there is rarity, and the sun causes it to solidify, and thus the thorns will be produced. Their form is pyramidal; for they begin by being thin at the point and gradually grow thicker, because when the air is withdrawn from the plant its parts increase, and the material expands. The same is

[15] true of any plant or tree which is pyramidal at the top.

8 · Greenness must be the most common characteristic of plant life; for we see that trees are white internally and green externally. The reason is that the [20] material which supplies their nutriment is more readily accessible: it follows therefore that there is greenness in all plants, because their material is absorbed and rarefies the wood of the tree, and the heat causes a slight concoction, and the moisture remains in the tree and appears externally: consequently there will be greenness. This is also the case with the leaves, unless the concoction in them is [25] unusually powerful; and leaves are in respect of strength midway between bark and wood. But greenness does not persist, nor indeed come into existence without the presence of moisture, and is of the element of earth, and is the intermediate colour between that of earth and water. This is indicated by the fact that when the bark of [30] trees dries up it turns black, and the wood inside the tree becomes white, and the green, which comes between these two colours, is the colour presented by the outward appearance of the plant.

The shapes of plants fall under three classes. Some spread upwards, others downwards, while others are intermediate. The upward extension is due to the fact [35] that the nutritive material makes its appearance in the marrow of the plant, and the heat draws it up, and the air, which is present in the rarities of the plant, compresses it, and it assumes a pyramidal form, just as fire assumes a pyramidal form in bodies in which it is present and rises upwards. Downward extension is due to the blocking of ducts in the plant, and, when the material is concocted, the water, which contains [828<sup>a</sup>1] the marrow of the plant, will thicken, and the rarefied portion proceeds on its upward course, while the water returns to its former position in the lower portion of the plant, and by its weight presses the plant downwards. In the plants which are intermediate between the two classes already mentioned, the moisture is rarefied and the natural state of the plant is very nearly a temperate condition during the process of concoction, and the ducts are open through the middle of the plant, and [5] the nutritive material spreads upwards and downwards. There is a double process of concoction; the first takes place below the plant, while the second takes place in the marrow which comes out of the earth and is in the middle of the plant; afterwards the nutritive materials make their appearance fully matured and are distributed [10] through the plant, and do not undergo a third concoction. In animals there is a third

process of concoction; this is due simply to the diversity of their limbs and to the distinctness of their parts from one another. Plants, on the other hand, are more [15] homogeneous and repeat the same members over and over again, and the nutritive material generally has a downward tendency. The shapes of plants will depend on the quantity of the seed, while the flower and fruit is dependent on the water and nutritive material. In all animals the first process of maturation and concoction [20] takes place within the animal; there is no exception to this rule. But in plants the first concoction and maturation takes place in the nutritive material. Every tree continues to grow up, until its growth is completed and it dies. The reason is that, while in any animal its height is much the same as its width, in a plant it is far from [25] being so, because water and fire, the elements which compose it, rise quickly, and therefore the plant grows. Variety in the branches of a plant is due to excessive rarity, and, when the moisture is intercepted there, the process of nature will cause it to grow hot and will hasten the concoction, and thus boughs will form and leaves [30] will appear, as we have already said.

9 · The shedding of leaves from trees will be due to the tendency to fall, induced by quickly formed rarity. When the moisture is concocted with the nutritive material, it will assume a pyramidal form, and therefore the ducts within [35] will be wide and will afterwards become narrow and pyramidal; when the nutritive material makes its appearance already concocted and formed, it will close up the extremities of the ducts above, and the leaves will have no nutritive material, and therefore dry up. When the contrary process to the one we have described takes place, the leaves do not fall from the trees. When coldness dominates in the plant, it [40] will affect its colour owing to the secretion of heat in the middle of the plant and the presence of cold outside in its extremities; the result is that the leaves are blue-grey [828<sup>b</sup>1] and do not fall, as in the olive, and myrtle, and similar trees. When trees or plants exercise a violent force of attraction, fruit will be produced once a year; when they [5] do not exercise such a force, nature will employ the process of concoction on successive occasions and at each concoction they produce fruit, and so some plants bear fruit several times in the year. Plants which are of the nature of water bear fruit with difficulty on account of the predominance of moisture in them, and the [10] wideness of their ducts and the tendency of their roots to fall off; when the heat is intense, the concoction will be quick and will be rarefied owing to the water and will not solidify; this we find to be the case in all small herbs and in some



vegetables. [15]

A grey colour will occur where the ground is exceedingly hot; here there will be little moisture and the ducts will become narrow, and when nature wishes to bring about concoction it will not have sufficient moisture to supply the nutritive material [20] and the ducts will become narrow. The process of concoction therefore will be reversed and the heat will cause it to continue, and the plant will be seen to have a colour intermediate between white and black. When this happens it will have black wood or anything like it between white and ebony, that is, any of the whole range of [25] colours from that of ebony to that of elm;<sup>16</sup> and so such wood sinks in water because its parts are compact and the ducts in it are narrow, and no air enters into them. When white wood sinks the reason will be the narrowness of the ducts and the [30] presence of superfluous moisture, which blocks up the ducts so that the air does not enter; consequently it sinks. Every flower is composed only of rarefied material when concoction first begins; and so the flower generally precedes the fruit in plants. We have already shown why it is that plants produce their leaves before their fruits. In the case of plants which have slender parts the colour of the flower will [35] resemble a bright blue; when the parts are not closely compressed, it will tend to whiteness; under medium conditions it will be a blue-grey. The absence of flowers in certain plants is usually due to the solidity of their parts or their rarity or their roughness or thickness. The palm and similar trees therefore have no flowers.

[829<sup>a</sup>1] A plant which has thick bark expands owing to the pressure of moisture and the impelling force of heat; we see this in the pine and palm. A plant which gives [5] forth a milky juice will have such juice within it; there will be powerful heat within and an oily substance will be present there. When the heat begins to cause concoction, the oily substance will be turned into moisture, and the heat will solidify it to a slight extent, and local warmth will be caused, and an oily liquid will be produced similar to milk, and vapour will rise from the moisture which attracts the [10] milky substance into the extremities of the plant, and the moisture will retain the heat which appears. The milky substance will not be solidified, because it is the function of heat to solidify it and any milk requires a great deal of solidification. If there is cold present in the tree, the milky substance will solidify when it has left its [15] original position in the tree, and the result will be the formation of gum. Gum comes out warm from the tree by distillation, and, when it comes into contact with the air, it will solidify. Some gums flow in temperate places, and these

will be of the consistency of water; others flow out and solidify as hard as stone or shell. Gum [20] which flows drop by drop keeps its form, as in the tree which is known as *aletafur*. The gum which changes into a stony substance will be very cold on its first appearance, and its appearance will be caused by heat, and when it has flowed out it will turn to stone; it will occur where the soil is very hot. Some trees undergo a [25] change in the winter and will become sometimes green and sometimes blue-grey, and neither their leaves nor their fruits decay; for trees in which this occurs have a great quantity of heat and rarefied water in their lower reservoirs. Thus as the year [30] goes on this water will retain its heat on account of the coldness of the air; and because the heat goes out to the cold, it carries the moisture out with it, and the moisture tinctures it with the colour of heat, and therefore the colour is seen in the appearance of the tree. Consequently cold and heat are converted into activity, and [35] the moisture retains heat, and therefore another colour makes its appearance.

10 · Fruit will be bitter because the heat and moisture have not completed the process of concoction (cold and dryness hindering the completion of this process), and so fruit turns bitter. This is indicated by the fact that what is bitter, when put into fire, becomes sweet. Trees which grow in sour water produce sweet [829<sup>b1</sup>] fruit, because the sourness assisted by the heat of the sun attracts that which is of its own quality, namely, cold and dryness. Sweet liquids therefore make their appearance inside the tree, and the innermost part of the tree becomes hot when the sun shines continuously above it, and the flavour of the fruit will be successively [5] sour, and then, when the process of concoction has taken place, the sourness will be gradually dissolved until it disappears, and sweetness will make its appearance. Consequently the fruit will be sweet, while the leaves and extremities of the tree will be acid. When the maturation is complete, the fruit will be bitter: this is due to a superfluity of heat with very little moisture. The moisture is used up and the fruit [10] makes the heat rise, and so the fruit will be bitter, and the stones in the fruit will be pyramidal in form on account of the upward attraction of the heat and the downward attraction of the cold and moisture which are of the same nature as sour [15] water; and the moisture remains in the trunk of the tree, which consequently thickens, while its extremities are thin. If trees are planted in temperate soil, they reach maturity quickly before the days of spring, because, when the heat is almost temperate and the moisture has made its appearance and the air

is clear, the fruit [20] will not require much heat during the process of concoction. Consequently maturity comes quickly and takes place before the days of spring. Bitterness or harshness of flavour is prevalent in all trees when they are first planted. The reason is that when [25] the moisture is in their extremities and has concocted the parts that are in the middle of the tree, from which the material of the fruit comes, the dryness comes forth and follows the moisture, and the first concoction will be sour or bitter or harsh. The reason is that the concoction takes place in the heat and moisture, and [30] when moisture or dryness prevails over the heat, the fruit so produced will not at first have undergone proper concoction, and consequently the production of fruit is at first without sweetness.

The fruit of the bennut-tree when it first appears is sweet, but subsequently becomes harsh in flavour and finally bitter. The reason for this is that the tree has [35] excessive rarity in it, and at the time of concoction, when the ducts are wide, the heat will follow the moisture and will cause the fruit to mature; consequently the fruit will be sweet at first. Subsequently the heat attracts the dryness which resembles its own nature, and will cause the ducts to contract, and cold and dryness [40] will prevail over heat and moisture; the fruit, therefore, will change to a harsh flavour. Next, the sun with its heat will prevail through the attraction of [830<sup>a</sup>1] superfluous<sup>17</sup> moisture in the seed, which is present at the first appearance of the tree, and the cold will prevail over the dryness; the fruit will therefore become exceedingly harsh in flavour. Next, the natural heat will rise upwards, and the heat [830<sup>b</sup>1] of the sun outside will assist it; therefore the heat and dryness will prevail, and the fruit will become bitter.

<sup>1</sup>Omitting *constaret enim*.

<sup>2</sup>See *Timaeus* 77AC.

<sup>3</sup>Reading *habeat*.

<sup>4</sup>Omitting *sicut diximus*.

<sup>5</sup>Reading *dicunt alii* for *dicit lechineon*

<sup>6</sup>Reading *semen, et fructus quidam*.

<sup>7</sup>The next sentence is unintelligible: *et corpus cadens aere abiciente ipsum propter causam*.

<sup>8</sup>Reading *ilia*.

<sup>9</sup>Reading *ut tela*.

<sup>10</sup>Reading *cohaereant*.

<sup>11</sup>Reading *ideo* for *idem*.

<sup>12</sup>Reading *mergunt*.

<sup>13</sup>Reading *fila*.

<sup>14</sup>Reading *inundabit*.

<sup>15</sup>This sentence occurs in the MSS after ‘have grown’, in line 10.

<sup>16</sup>Reading *ulmum*.

<sup>17</sup>Reading *superfluae*.

# ON MARVELLOUS THINGS HEARD\*\*

*L. D. Dowdall*

[830<sup>a</sup>5] 1 · Men say that in Paeonia, on the mountain called Hesaenus, which forms the boundary between the Paeonian and Maedian districts, there is found a wild beast, which is called Bolinthos, but by the Paeonians is named Monaepos. They state that this in its general nature is similar to the ox, but surpasses it in size and [10] strength, and moreover is distinguished from it by its mane; for like the horse it has a mane hanging down very thick from the neck, and from the crown of the head as far as the eyes. It has horns, not such as oxen have, but bent downwards, the tip [15] being low down near the ears; and these severally contain more than three pints, and are very black, and shine as though they were peeled; and when the hide is stripped off it occupies a space capable of containing eight couches. When the animal is struck with a weapon it flees, and only stops when it is quite exhausted. Its flesh has an agreeable taste. It defends itself by kicking, and voiding excrement over [20] a distance of about twenty-four feet. It easily and frequently employs this kind of defence, and the excretion burns so severely that the hair of the dogs is scraped off. They say, however, that the excrement produces this effect only when the animal is disturbed, but when it is undisturbed it does not burn. When they bring forth young, assembling in larger numbers and being all gathered closely together, the full-grown ones bring forth, and void excrement as a defence round their young; for the animal discharges a large quantity of this excretion.

[830<sup>b</sup>5] 2 · The camels in Arabia, they say, do not copulate with their mothers, but that even if someone tries to force them they are unwilling. For it is said that once, when there was no stallion present, a keeper disguised the mother and set her foal on [10] her. And the foal, it seems, finished its task then, but a little later bit the keeper and killed him.

3 · Men say that the cuckoos in Helice, when about to breed, do not build a nest, but lay their eggs in the nests of ring-doves or turtle-doves, and neither sit on their eggs, nor hatch them, nor rear their young; but when the chick is born and reared, it expels its companions from the nest. Moreover, it appears, it grows large [15] and beautiful, so that it easily overcomes the rest. They say that the ring-doves also take such a delight in it that they even assist it to drive out their own young.

4 · The she-goats in Crete, when they are shot with arrows, seek, it would [20] appear, for the dittany, which grows there; for as soon as they have eaten it, they straightway expel the arrows from their bodies.

5 · Men say that some of the stags in Achaea, when they have shed their horns, proceed to places of such a kind that they cannot be easily found; and that they act in this way because they have no means of defence, and also because the [831<sup>a</sup>1] parts from which they have shed their horns give them pain; and it is stated that, in the case of many of these animals, ivy is seen growing in the place of the horns.

6 · Men say that in Armenia a certain poison grows, which is called leopard's bane. So, when a leopard is seen, they anoint a victim with this, and let it go. When [5] the leopard touches it, she goes, it would appear, in quest of human excrement. Therefore the hunters put excrement in a vessel, and suspend it from a tree, so that the leopard, by leaping up towards it and becoming exhausted, may be paralysed by it, and fall into their power. [10]

7 · Men say that in Egypt the sandpipers fly into the mouths of the crocodiles, and clean their teeth, pulling out the pieces of flesh, which stick in their snouts, while the crocodiles are pleased, and do them no harm.

8 · Men say that the hedgehogs in Byzantium perceive when north or south [15] winds are blowing, and immediately change their holes; and, when the winds are southerly, make their holes opening out of the ground, but, when they are northerly, out of the walls.

9 · The she-goats in Cephallenia do not drink, as it appears, like other quadrupeds; but daily turning their faces towards the sea, open their mouths, and [20] take in the breezes.

10 · They say that in Syria one of the wild donkeys leads the herd, and that when one of the younger foals mounts a female the leader gets angry and chases him until he catches him; and then, ducking down to his back legs, he tears off his [25] genitals with his teeth.

11 · Men say that tortoises, when they have eaten part of a viper, eat marjoram as an antidote, and, if the creature fails to find it at once, it dies; that many of the countryfolk, wishing to prove whether this is true, whenever they see it acting in this manner, pluck up the marjoram, and when they have done so, the [30] tortoise is presently seen dying.

[831<sup>b1</sup>] 12 · They say that the penis of the marten is not like that of the other animals, but is always stiff like a bone, whatever state the marten may be in. They say that it is one of the best drugs for strangury and is given in powdered form.

[5] 13 · Men say that the bird called the woodpecker climbs upon the trees like lizards, both hanging from and standing on the branches. It is further stated that it feeds upon the grubs out of the trees, and digs so deeply into the trees, in its search for the grubs, that it even brings the trees down.

[10] 14 · Men say that the pelicans dig up the mussels that are found in the rivers, and swallow them; then, when they have devoured a large quantity of these, they vomit them up again, and thereupon eat the meat of the mussels, but do not touch the shells.

15 · Men say that in Cyllene in Arcadia the blackbirds are born white, [15] which happens nowhere else, and that they give utterance to various sounds, and go forth by the light of the moon; but that, if any one should attempt to capture them by day, they are caught with great

difficulty.

**16** · It is stated by certain persons that what is called flower-honey is [20] produced in Melos and Knidos, and that, while fragrant in smell, it lasts for only a short time; and that in it bee-bread is produced.

**17** · In some parts of Cappadocia they say that the honey is made without a honey-comb, and that in consistency it resembles olive-oil.

**18** · At Trapezus in Pontus the honey gathered from the box-tree is [25] produced, having an oppressive smell, and they say that this drives out of their senses those who are sound in mind, while it completely cures those who suffer from epilepsy.

**19** · Men say that in Lydia also the honey is gathered from the trees in abundance, and that the inhabitants form out of it balls without wax, and cutting [30] off portions by very violent rubbing make use of it. It is produced indeed in Thrace likewise, not so solid, but as it were of a sandy nature. They say that all honey when [832<sup>a</sup>1] congealed preserves an equal volume, not like water and all other liquids.

**20** · The grass of Chalcis and almonds are most useful for making honey; for they say that a very large quantity is produced by them.

**21** · People say that bees are stupefied by unguents, and are unable to [5] endure the smell of them; while some say that they especially sting those who have been anointed.

**22** · They say that among the Illyrians those who are called Taulantians make wine out of honey. When they have squeezed out the honey-combs, they pour water on the honey, and boil it in a caldron until half is consumed; then they pour it out into earthen jars, fill them half full, and lay them on boards; and on these they [10] say it ferments for a long time, and becomes like wine, while for the rest it is sweet and strong. But now they state that this mode of preparation was adopted also



among some of the inhabitants of Greece, so that the drink did not differ from old wine, and that in later times, when they inquired into the method of mixing it, they were unable to discover it.

**23** · They relate that in Thessaly once upon a time so large a number of serpents was bred alive that, if they had not been exterminated by the storks, the [15] inhabitants would have left the country. That is why they also honour the storks, and it is unlawful to kill them, and, if any one kills them, he becomes liable to the same penalties as a homicide.

**24** · Likewise also it is related that there was once in Lacedaemon so great a multitude of serpents that the Lacedaemonians, owing to a scarcity of corn, used [20] them as food; whence also they say that the Pythian priestess called them 'serpent-necked'.

**25** · It is said that in the island of Gyaros the mice eat iron.

**26** · Men say that among the Chalybians, in an islet situated beyond them, gold is collected by mice in large numbers: that is why also, as it appears, they cut up those that are found in the mines. [25]

**27** · It is said that travellers going from Susa to Media meet with an immense multitude of scorpions at the second stage. So the King of the Persians, whenever he was passing through the place, remained there for three days, ordering all his men to hunt them down; and he gave a prize to him who caught the greatest number. [30]

**28** · Men say that in Cyrene there is not merely one sort of mouse, but several kinds differing both in forms and in colours; for some are broad-faced, like [832<sup>b</sup>1] weasels, and some like hedgehogs, which they call 'hedgehogs'.

**29** · In Cilicia they say that there is a whirlpool, in which birds, and animals besides, that have been suffocated, when immersed come to life again. [5]

**30** · Among the Scythians who are called Geloni, they say that there is a certain wild animal, excessively rare indeed, which is named Tarandos. Now this is said to change the colour of its hair, according to the place in which it may be; and [10] for this reason it is hard to catch; for it becomes in colour like to trees and places, and its surroundings generally. But the most wonderful thing is its changing its hair; [15] for other animals change the colour of the skin, such as the chameleon and octopus. In size it resembles an ox, while the form of its face is like that of a stag.

**31** · It is said that a certain man in Abydos being deranged in mind, and going to the theatre on many days looked on (as though actors were performing a [20] play), and applauded; and, when he was restored to his senses, he declared that that was the happiest time he had ever spent.

**32** · Moreover they say that at Tarentum a certain wine-merchant was mad at night, but sold his wines during the day: he also kept the key of the cellar attached to his belt, and though many tried to steal it from him and get possession of it, he [25] never lost it.

**33** · In the island of Tenos they say there is a small bowl containing a mixture, from which people kindle fire very readily. Moreover in the Thracian Bithynia there is found in the mines the stone which is called 'the chaffinch' from [30] which they say that fire is kindled.

**34** · People say that in the island of Lipara there is a certain place where the air is sucked down into the earth, and that if they bury a pot there they can put in it whatever they please and boil it.

[833<sup>a</sup>1] **35** · Both in Media and in Psittacene, a district of Persia, there are fires burning, that in Media small, but that in Psittacene large and with a bright flame; for which reason also the King of the Persians constructed kitchens near it. Both [5] these are in level, not in elevated places. These fires are conspicuous both by night and by day, while those in Pamphylia are seen only at night.

**36** · They say also that at Atitania, near the borders of the district of Apollonia, there is a certain rock, and fire rising from it is not visible, but whenever [10] oil is poured on it it blazes up.

**37** · It is said that the places outside the Pillars of Hercules burn, some constantly, others at night only, as Hanno's *Circumnavigation* relates. The fire also in Lipara is visible and flaming, yet not by day, but only at night. They say also that [15] in Pithecusae the ground is fiery, and extraordinarily hot, yet not burning.

**38** · Xenophanes states that the fire in Lipara once failed for sixteen years, but returned in the seventeenth year. They say that the lava-stream in Etna is neither flaming nor continuous, but returns only after an interval of many years.

[20] **39** · It is said that in Lydia a vast amount of fire blazed up, and continued burning for seven days.

**40** · The lava-stream in Sicily is an extraordinary phenomenon. The breadth of the fire that blazes up amounts to forty stadia, while the height to which it is carried amounts to three.

**41** · They say that the stone in Thrace which is called 'the chaffinch' burns [25] when split in two, and that it also, like charcoal-embers, when put together again, and sprinkled with water, burns; and that the stone called 'marieus' does the same.

**42** · At Philippi in Macedonia they state that there are mines, the refuse from which, they say, increases and produces gold, and that this is an observable fact.

**43** · They say that in Cyprus, at the place called Tyrrhias, copper is [833<sup>b</sup>1] produced in like manner; for men having cut it up, as it appears, into small pieces, sow it, and then, when the rains have come on, it grows and springs up, and so is collected.

44 · They say that in the island of Melos, in those parts of the ground that are dug up, the earth fills itself up again. [5]

45 · In Paeonia they state that when continuous showers have fallen, and the ground is thoroughly soaked, there is found what is called gold without fire. They state, too, that in Paeonia the ground is so rich in gold that many persons have found gold even exceeding a pound in weight. And they say that certain persons, who had [10] found them, brought two nuggets to the king, one weighing three pounds, the other five; and they say that these are set beside him on the table, and, if he eats anything, he first offers a libation upon them.

46 · They say that among the Bactrians also the river Oxus carries down numerous small nuggets of gold, and moreover that in Iberia the river called [15] Theodorus both throws out much gold on its banks, and likewise also carries it down the stream.

47 · They state also that in Pieria, a district of Macedonia, some uncoined gold was buried by the ancient kings, and, while there were four cavities, from one [20] of them gold grew up a span in length.

48 · It is said that the production of the Chalybian and Amisenian iron is very peculiar; for it grows together, as at least they assert, from the sand that is carried down by the rivers. Some say that they simply wash this, and smelt it in a [25] furnace; but others that, after frequently washing the deposit left by the first washing, they burn it, and insert what is called the fire-proof stone which is abundant in the country. This iron is far more beautiful than the other kinds. But if [30] it were not burnt in the furnace it would not at all differ, as it appears, from silver. Now they say that it alone is not liable to rust, but that it is not very plentiful.

[834<sup>a</sup>1] 49 · They say also that among the Indians the copper is so bright, pure, and free from rust that it cannot be distinguished in colour from gold; moreover that among the cups of Darius there are certain goblets, and these not inconsiderable in [5] number, as to which, except

by their smell, one could not otherwise decide whether they are of copper or gold.

**50** · They say that Celtic tin melts much more quickly than lead. A proof of its fusibility is that it is believed to melt even in water: at any rate, it seems, it stains [10] quickly. Now it melts in the cold also, when the weather is frosty, because, as they say, the hot substance inherent in it is by reason of its weakness shut up and compressed within.

**51** · In the Pantheon there is an olive-tree, which is called that 'of the beautiful crowns'. But all its leaves are contrary in appearance to those of other [15] olive-trees; for it has the pale-green outside, instead of inside, and it sends forth branches, like those of the myrtle, suitable for crowns. From this Heracles took a shoot, and planted it at Olympia, and from it are taken the crowns which are given to the competitors. This tree is near the river Ilissus, sixty stadia distant from the [20] river. It is surrounded by a wall, and a severe penalty is imposed on any one who touches it. From this the Eleians took the shoot, and planted it in Olympia, and from it they took the crowns which they bestowed.

**52** · In the Lydian mines near Pergamos, which also Croesus had worked, [25] the following incident occurred. When a certain war arose the workmen fled to them; but, as the mouth was built up, they were suffocated; and a long time afterwards, when the mines were cleared out, vessels, which they used to employ for [30] daily uses, such as jars and the like, were found petrified. These, being filled with whatever liquid it might be, had been turned to stone, as well as the bones of the men.

**53** · In the Ascanian lake the water is so impregnated with soda that garments have need of no other detergent; if one leaves them too long in the water they fall to pieces.

**54** · Near the Ascanian lake is Pythopolis, a village about one hundred and twenty stadia distant from Cius, in which all the wells are dried up in the winter, so [834<sup>b1</sup>] that one cannot dip a pitcher into them; but in the summer they are filled up to the brim.

**55** · The strait between Sicily and Italy increases and diminishes along with the changes of the moon.

[5] **56** · On the road to Syracuse there is in a meadow a spring, neither large nor containing much water; but, when once a great crowd met at the place, it supplied water in abundance.

**57** · There is also a certain spring in Palici in Sicily, about as large as the space ten couches would occupy. This throws up water to the height of six cubits, so that it is thought by those who see it that the plain will be inundated; and again it [10] returns to its original state. There is also a form of oath, which is considered to be sacred there; whatever oaths a man swears he writes on a little tablet, and throws into the water. If therefore he swears truly, the tablet floats on the top; but if he swears falsely, they say that the tablet grows heavy and disappears, while the man is [15] burnt. That is why the priest takes security from him that some one shall purify the temple.

**58** · Demonesus, the island of the Chalcedonians, received its name from Demonesus, who first cultivated it. The place contains the mine of cyanos and [20] gold-solder. Of this latter the finest sort is worth its weight in gold, for it is also a remedy for the eyes. In the same place there is also copper, obtained by divers, two fathoms below the surface of the sea, from which was made the statue in Sicyon in the ancient temple of Apollo, and in Pheneus the so-called statues of mountaincopper. On these is the inscription—‘Heracles, son of Amphitryon, having captured [25] Elis, dedicated them’. Now he captured Elis guided, in accordance with an oracle, by a woman, whose father, Augeas, he had slain. Those who dig the copper become very sharp-sighted, and those who have no eyelashes grow them: that is why also physicians use the flower of copper and Phrygian ashes for the eyes. [30]

**59** · Now in the same place there is a cave which is called the pretty cave. In this pillars have been formed by congelation from certain drippings of water: and this is evident at the point where they join the ground, for the narrowest part is there.

60 · Of the offspring of a pair of eagles, so long as they pair together, every second one is a sea-eagle. Now from the sea-eagles springs an osprey, and from [835<sup>a</sup>1] these black eagles and vultures: yet these on the other hand do not bring the breed of vultures to a close, but produce the great vultures, and these are barren. And a proof [5] is this, that no one has ever seen a nest of a great vulture.

61 · A wonderful thing they say happens among the Indians with regard to the lead there; for when it has been melted and poured into cold water it jumps out of the water.

62 · Men say that the copper of the Mossynoeci is very brilliant and white, [10] no tin being mixed with it; but there is a kind of earth there, which is smelted with it. They state that the man who discovered the mixture did not inform any one; so the copper vessels formerly produced in these parts were excellent, but those subsequently made were no longer so.

63 · Men state that in Pontus some birds during the winter are found lurking [15] in holes, and not discharging excrement, and when people pluck out their feathers they do not feel it, nor yet when they are pierced on a spit, but only when they have been burnt through with fire. They say that many fishes also, when trimmed and cut [20] round, have no perception of it, but only when they have been warmed through by fire.

64 · The bee is thought to announce the solstices by going to its labours, [25] which the bee-keepers also use as a sign, for then they have rest. The grasshoppers also appear to chirp only after the solstices.

65 · They say also that the hedgehog continues without food for a year.

66 · It is said that the spotted lizard, when it has stripped off its slough, like snakes, turns round and swallows it, because physicians look out for it, from its being serviceable to those who suffer from epilepsy.

[30] **67** · Men state also that the fat of the bear, when it has been congealed owing to the winter, increases as long as the bear lies hidden in its den, and overflows the vessels in which it is kept.

**68** · They say that the frogs in Cyrene are altogether dumb, and that in Macedonia, in the country of the Emathiotae, the swine have solid hoofs.

[835<sup>b</sup>1] **69** · They say that in Cappadocia there are fertile mules, and in Crete black poplars which yield fruit.

**70** · They say also that in Seriphos the frogs do not croak; but if they are transferred to another place they croak.

[5] **71** · Among the Indians, in what is called the Horn, it is stated that there are little fishes, which wander about on the dry land, and run away again into the river.

**72** · Some say also that in the neighbourhood of Babylon certain fishes remain in the holes, which contain moisture, while the river is drying up; that they [10] go out to the threshing-floors and feed, and walk upon their fins, and move the tail to and fro, and when they are pursued they flee, enter into their holes, and stand facing their pursuer; for people often approach and tease them. Their head is like that of the sea-frog, while the rest of the body resembles that of the gudgeon, and they have gills like other fishes.

[15] **73** · At Heraclea in Pontus, and in Rhegium, they say there are fish obtained by digging, especially in places near rivers, and such as are well watered; and that it sometimes happens that when these places dry up at certain seasons, the fish shrink under the earth, and then when this dries up still more, they, in search of humidity, enter into the mud; then when this becomes dry, they remain in the [20] moisture, like animals which continue in their holes; but, when they are dug up before the waters come on, they then move.



74 · They say also that in Paphlagonia the fish obtained by digging are met with deep in the ground, and that these are of an excellent quality, though neither is [25] water to be seen close at hand, nor do rivers flow into the place; the earth engenders them of itself.

75 · Men say that the stags in Epirus bury their right horn, when they have shed it, and that this is useful for many purposes.

76 · They say that the lynx too covers up its urine, because of its being useful [30] for signet-rings as well as for other things.

77 · They also state that the seal, when taken, vomits out rennet, and that this is medicinal and serviceable to those who suffer from epilepsy.

78 · It is said that on the Circaean mountain in Italy there grows a deadly poison, which is so potent that, if it be sprinkled on any one, it straightway causes [836<sup>a</sup>1] him to fall, and the hairs of his body to drop off, and generally the limbs of his body to waste away, so that the surface of the body of those who are dying is a pitiable sight. They say too that Aulus the Peucestian and Gaius were detected when about to administer this poison to Cleonymus the Spartan, and that having been examined [5] they were put to death by the Tarentines.

79 · In the island of Diomedea, which lies in the Adriatic, they say there is a temple of Diomedes, wonderful and holy, and round the temple there sit in a circle birds of a large size, having great hard beaks. These birds, they state, if Greeks land [10] at the place, keep quiet; but if any of the barbarians who live around them approach, they fly up, and soaring in the air swoop down upon their heads, and, wounding them with their beaks, kill them. The story goes that the companions of [15] Diomedes were metamorphosed into these, when they had been shipwrecked off the island and Diomedes was treacherously slain by Aeneas, who was then king of those regions.

80 · Among the Umbrians they say that the cattle bring forth young three [20] times in a year, and that the earth yields many times more fruit than the seed that is sown: that the women also are prolific, and rarely bring forth only one child at a time, but most of them have two or three.

81 · In the Amber islands, which are situated in the corner of the Adriatic, [25] they say that there are two statues erected, the one of tin, the other of bronze, wrought after the ancient fashion. It is stated that these are works of Daedalus, a memorial of old times, when he, fleeing before Minos from Sicily and Crete, put in [30] to these places. But they say that the river Eridanus formed these islands by alluvial deposit. Moreover, as it appears, there is near the river a lake, containing hot water, and a smell exhales from it heavy and unpleasant, and neither does any animal [836<sup>b</sup>1] drink from it, nor does a bird fly over it, but falls and dies. It has a circumference of two hundred stadia, a width of about ten. Now the inhabitants tell the story that Phaethon, when struck by the thunderbolt, fell into this lake; and that therein are many black poplars, from which falls what is called amber. This, they say, [5] resembles gum, and hardens like a stone, and, when collected by the inhabitants, is carried over to the Greeks. To these islands, therefore, they state that Daedalus came, and, having obtained possession of them, dedicated in one of them his own [10] statue, and in the other that of his son Icarus; but that afterwards, when the Pelasgians, who had been expelled from Argos, sailed against them, Daedalus fled, and arrived at the island of Icarus.

[15] 82 · In Sicily, in the neighbourhood of the place called Enna, there is said to be a cave, round about which they assert that there not only grows a quantity of other kinds of flowers at every season of the year, but that especially an immense space is covered with violets, which fill the adjoining country with fragrance, so that the huntsmen are unable to track the hares, as their dogs are overcome by the smell. [20] Through this chasm there is an invisible subterranean passage, by which they say Pluto carried off Proserpine. In this place it is said that wheat is found, resembling neither the native sorts, which people use, nor other kinds that are imported, but possessed of a great peculiarity. And this they use as an argument to prove that the [25] wheat-fruit appeared first among

themselves; whence also they lay claim to Demeter, affirming that the goddess was born among them.

**83** · In Crete men say that there are no wolves, bears, and vipers, and similarly no wild beasts like them, because Zeus was born there.

[30] **84** · In the sea outside the Pillars of Hercules they say that an island was discovered by the Carthaginians, desolate, having wood of every kind, and navigable rivers, and admirable for its fruits besides, but distant several days' [837<sup>a</sup>1] voyage from them. But, when the Carthaginians often came to this island because of its fertility, and some even dwelt there, the magistrates of the Carthaginians gave notice that they would punish with death those who should sail to it, and destroyed all the inhabitants, lest they should spread a report about it, or a large number [5] might gather together to the island in their time,<sup>1</sup> get possession of the authority, and destroy the prosperity of the Carthaginians.

**85** · From Italy as far as the country of the Celts, Celtoligurians, and Iberians, they say there is a certain road, called the 'road of Heracles', by which [10] whether a Greek or a native travels, he is watched by the neighbouring tribes, so that he may receive no injury; for those among whom the injury has been done must pay the penalty.

**86** · They say that among the Celts there is a poison called by them 'arrow-poison', which they assert produces corruption so quickly that the Celtic huntsmen, when they have shot a stag, or any other animal, run up to it in haste, and [15] cut out the wounded part of the flesh, before the poison spreads, as well for the sake of the food as to prevent the animal from putrefying. They say, however, that the bark of the oak was found to be an antidote for this; but others maintain that the antidote is something different, a leaf, which they call ravenswort, because a raven, [20] which had tasted the poison, and become sick, was observed by them to hasten for this leaf, and, after devouring it, to be delivered from its pain.

**87** · In Iberia they say that, when the coppices were set on fire by certain shepherds, and the earth was heated by the wood, the country

visibly flowed with [25] silver; and when, after some time, earthquakes succeeded, and the ground in different places burst asunder, a large quantity of silver was collected, which brought in no ordinary revenue to the Massilians.

**88** · In the islands called Gymnesiae, that lie off the coast of Iberia, which [30] they assert to be the largest, after the so-called seven islands, they say that oil is not produced from olives, but from the turpentine-tree in very large quantities, and adapted for every purpose. Moreover they affirm that the Iberians, who inhabit those islands, are so fond of women that they give to the merchants four or five males in exchange for one female. When they receive their pay, while serving with [837<sup>b</sup>1] the Carthaginians, they purchase, it seems, nothing else but women; for no man among them is allowed to have gold or silver. But as a reason for their forbidding the introduction of money, some such statement as this is added, that Heracles made his [5] expedition against Iberia for the sake of the riches of the inhabitants.

**89** · In the country of the Massilians, on the borders of Liguria, they say there is a certain lake, and that this boils up and overflows, and casts out so great a quantity of fish as to surpass belief. But whenever the Etesian winds blow the soil is [10] heaped up upon it (such dust arises there), and its surface becomes solid like the ground, and the natives, piercing it with tridents, easily take out of it as many fish as [15] they please.

**90** · It is said that some of the Ligurians sling so skilfully that, when they see several birds, they contend with one another about which bird each is preparing to strike, presuming that all will easily hit their mark.

**91** · They say that there is also this peculiarity among them: the women give [20] birth while engaged in work, and after washing the child with water, they immediately dig and hoe, and attend to their other household duties, which they were obliged to perform before the time of their delivery.

**92** · This is also a marvel among the Ligurians: they say that there is

a river [25] in their country whose stream is lifted up on high and flows along so that those on the other side cannot be seen.

**93** · In Etruria there is said to be a certain island named Aethaleia, in which out of a certain mine in former days copper was dug, from which they say that all the copper vessels among them have been wrought; that afterwards it could no [30] longer be found: but, when a long interval of time had elapsed, from the same mine iron was produced, which the Etrurians, who inhabit the town called Populonium, use to the present day.

**94** · Now in Etruria there is a certain city called Oenarea, which they say is exceedingly strong; for in the midst of it there is a lofty hill, rising upwards to the height of thirty stadia, and having at its foot wood of all sorts, and waters. They say, [838<sup>a</sup>1] therefore, that the inhabitants, fearing lest some one should become despot, set over themselves those of their slaves who had been manumitted, and these have dominion over them; but every year they appoint others of the same class in their stead.

[5] **95** · At Cumae in Italy there is shown, it appears, a subterranean bed-chamber of the prophetic Sibyl, who, they say, was of a very great age, and had always remained a virgin, being a native of Erythrae, but by some of the inhabitants [10] of Italy called a native of Cumae, and by some named Melanraera. It is said that this place is under the sway of the Lucanians. They state moreover that in those parts about Cumae there is a certain river called Cetus, and they say that whatever is thrown into this is after a considerable time first coated over, and finally turns into stone.

[15] **96** · Men say that for Alcimenes, the Sybarite, a mantle was prepared of such magnificence, that it was exhibited at Lacinium during the festival of Hera, to which all the Italians assemble, and that it was admired more than all the things [20] that were shown there. Of this they say that Dionysius the Elder obtained possession, and sold it to the Carthaginians for one hundred and twenty talents. It was of purple, fifteen cubits in width, and was adorned on either side with little figures inwoven, above with Susa, below with Persians; in the middle were Zeus,

[25] Hera, Themis, Athene, Apollo, and Aphrodite. Near each extremity was Alcimenes, and on both sides Sybaris.

**97** · In the neighbourhood of the Iapygian promontory, from a certain place [30] in which, as the legends relate, the fight of Heracles with the giants took place, they say that ichor flows in great abundance, and of such a nature that, owing to the oppressiveness of the smell, the sea off that place is not navigable. They state besides that in many parts of Italy many memorials of Heracles still exist on the roads by which he travelled. Near Pandosia in Iapygia footprints of the god are shown, on which no one must tread.

**98** · There is also in the neighbourhood of the Iapygian promontory a stone [838<sup>b</sup>1] big enough to load a waggon, which they say was lifted up by him and transferred to this spot, and it was actually moved with one finger.

**99** · In the city of the Orchomenians in Boeotia they say that a fox was seen, which, being pursued by a dog, entered into a certain subterranean passage, and [5] that the dog entered along with her and, barking, produced a great noise, as though he found a wide space about him; but the huntsmen, thinking there was something marvellous there, broke open the entrance, and forced their way in as well: and that, seeing the light coming in by certain holes, they had a clear view of all that was in [10] the cave, and went and reported it to the magistrates.

**100** · In the island of Sardinia they say there are many beautiful buildings constructed in the ancient Greek style, and, among others, domes carved in remarkable proportions. It is said that these were built by Iolaus, son of Iphicles, [15] when he, having taken with him the Thespiadae, the sons of Heracles, sailed to those parts with the intention of settling there, considering that they belonged to him through his relationship with Heracles, because Heracles was lord of all the [20] western land. This island, as it appears, was formerly called Ichnussa, because it was shaped in its outline very similarly to a human footstep. It is stated to have been previously fertile and productive; for the legend states that Aristaeus, whom they assert to have been most skilful in

agriculture among the ancients, ruled over these parts, which were formerly occupied by many large birds. At the present day, [25] however, it is no longer fertile, because when ruled by the Carthaginians it had all its fruits that were useful for food destroyed, and death was fixed as the penalty for the inhabitants if any one should plant again anything of the kind.

**101** · In one of the seven so-called islands of Aeolus, which bears the name [30] Lipara, the legend goes that there is a tomb, about which they tell many other portentous stories, and agree in asserting that it is unsafe to approach that place at night; for from it are distinctly heard the sound of drums and cymbals, and [839<sup>a</sup>1] laughter, along with uproar and the rattle of castanets. But they state that a still more prodigious event occurred with regard to the cave; for a certain man, under the influence of wine, fell asleep in it before daylight, and continued to be sought for by his servants for three days; but on the fourth, being found apparently dead, he [5] was conveyed by his servants to his own tomb, and after obtaining all the usual rites, he suddenly rose up, and related all that had befallen him. This story seems to me somewhat fabulous, yet it was necessary for me not to leave it unmentioned, while [10] giving a record of circumstances connected with that place.

**102** · Near Cumae in Italy there is a lake called Avernus, containing in itself, as it seems, nothing wonderful; for they say that hills lie round about it not [15] less than three stadia in height; that it is itself circular in form and of unsurpassable depth. But this is what seems marvellous: while trees stand thickly above it, and [20] some lean over it, one cannot see a single leaf floating upon the water, while the water is so very pure that those who behold it wonder. On the mainland not far distant from it hot water springs forth from many parts, and all the place is called [25] Pyriphlegethon. But to say that no bird flies over it is a lie; for those who have been there maintain that there is a large number of swans in it.

**103** · They say that the Siren islands are situated in Italy at the point of the headland in the strait, which lies before the promontory separating the two bays, <sup>2</sup>[30] i.e. the one surrounding Cumae and the one which cuts off from it the city called Posidonia; on this promontory also a temple of the Sirens has been built, and they are honoured

exceedingly by the neighbouring peoples with diligent sacrifices, and they, making mention of their names, call one Parthenope, another Leucosia, and the third Ligeia.

**104** · It is stated that between the Mentoric district and that of Istria there [839<sup>b</sup>1] is a mountain named Delphium with a high crest. When the Mentores, who dwell near the Adriatic, ascend this crest they can discern, as it appears, the ships sailing [5] into the Pontus: there is also a spot, half-way between, at which when a common market is held, Lesbian, Chian, and Thasian wares are sold by the merchants coming up from the Pontus, and Corcyraean jars by the merchants from the Adriatic.

**105** · Men say that the Ister, flowing from what are called the Hercynian [10] woods, divides, and in one direction flows into the Pontus, and in the other discharges its waters into the Adriatic. And we have seen a proof not only in the present times, but also more fully in antiquity, that the waters there are not<sup>3</sup> innavigable; for they say that Jason sailed into the Pontus by the 'Dark Rocks', [15] while he sailed out of it by the Ister; and for this, besides alleging not a few other evidences, they point out altars set up by Jason in the country, and in one of the islands in the Adriatic a costly temple of Artemis erected by Medea. Moreover they [20] affirm that Jason could not have sailed past the 'Wandering Islands', if he were not sailing away from that quarter. And moreover in the island of Aethaleia, which lies in the Tyrrhenian Sea, they point to other memorials of the chiefs of the Argonautic Expedition, and also to what is said respecting the pebbles; for they say that along the shore there are pebbles of various colours; and the Greeks who inhabit the island [25] say that they received their colour from the oil and dirt which the heroes scraped off, while anointing themselves; for, according to the legend, neither before these times were such pebbles seen nor afterwards had any such been found. Moreover they mention still clearer proofs of this, that they did not sail out through the [30] Symplegades, citing the poet himself as a witness in the case of those regions; for (say they) he, pointing out the gravity of the danger, states that it is impossible to sail past the place—

Planks of ships and bodies of men together are carried

By the waves of the sea and storms of fire destructive.<sup>4</sup>

As regards the 'Dark Rocks' indeed it is not said that they send forth fire; but it [840<sup>a</sup>1] happens near the strait which divides Sicily from Italy,



as the eruptions of fire are found on both sides; while not only is the island continually burning, but also the stream of lava round Etna often spreads over the country. [5]

**106** · In Tarentum they say that at certain times people offer sacrifices to the shades of the Atridae, Tydidae, Aeacidae, and Laertiadae, and besides that they celebrate a sacrifice separately to the Agamemnonidae on another special day, on which it is unlawful for the women to taste the victims offered to those heroes. [10] There is also amongst them a temple of Achilles. Now it is said that after the Tarentines had taken it, the place which they at present inhabit was called Heraclea; but in the early times, when the Ionians were in possession, it was named Pleum and at a still earlier date it was called Sigeum by the Trojans, who had [15] gained possession of it.

**107** · Among the Sybarites Philoctetes is said to be honoured; for on his return from Troy he founded in the Crotonian territory the town called Macalla, which they say is one hundred and twenty stadia distant; and they relate that he dedicated the bow and arrows of Heracles in the temple of Apollo the sea-god: but [20] from there they say that the Crotonians, during their dominion, took them, and dedicated them in the temple of Apollo in their own city. Now it is said that having died there he lies by the river Sybaris, after he had given help to the Rhodians, who along with Tlepolemus had been carried out of their course to those parts, and had [25] engaged in battle with the barbarians who inhabited that country.

**108** · In that part of Italy which is called Gargaria, close to Metapontum, they say there is a temple of Athene Heilenia, where they state that the tools of Epeus were dedicated, which he had prepared for the construction of the wooden horse; he gave the goddess this name—for Athene appeared to him in a dream and [30] desired him to dedicate the tools; and he being therefore delayed in putting out to sea was cooped up in the place, unable to sail out: hence the temple was called that of Athene Heilenia.

**109** · In the district which bears the name of Daunia, there is said

to be a [840<sup>b</sup>1] temple called that of the Achaean Athene, in which bronze axes and the arms of Diomedes and his companions are dedicated. In this place they state that there are dogs which do no harm to such of the Greeks as come there, but fawn upon them, as [5] though they were most familiar to them. Now all the Daunians and the neighbouring tribes, both men and women, wear black garments, apparently for the following reason—because it is said that the Trojan women, who had been taken [10] captives, and had come to those parts, fearing that they might experience hard slavery at the hands of the women who already belonged to the Achaeans in their native land, set fire to their ships, in order that they might escape from the expected slavery, and at the same time, that they, being united in wedlock with those men, [15] now compelled to stay, might have them for their husbands. The poet has also very admirably described them; for one may see those women likewise, it seems, ‘robe-trailing’ and ‘deep-bosomed’.

**110** · In the country of the Peucetians they say there is a temple of Artemis, [20] in which, they state, is dedicated the bronze necklace celebrated in those parts, with the inscription—‘Diomedes to Artemis’. Now the legend relates that he put it round the neck of a stag, and that it adhered there; and in this way having been afterwards found by Agathocles, king of the Sicilians, it was, they affirm, dedicated in the temple of Zeus.

[25] **111** · On the promontory of Sicily, called the promontory of Pelorus, it is stated that so much saffron grows that, while by some of the Greeks dwelling in those parts it is not known what sort of flower it is, on the promontory of Pelorus all [30] who wish bring home large waggon loads of it, and in the spring-time strew their beds and stages with saffron.

**112** · Polycritus, who has written the history of Sicily in verse, states that in a certain part of the interior there is a little lake, with a circumference about that of a shield, and this contains water transparent indeed, but somewhat turbid. Now if [841<sup>a</sup>1] any one enters this, intending to wash himself, it increases in breadth; and if a second person enters, it grows wider still; and finally, having grown larger, it becomes wide enough for the reception of even fifty men. But whenever it has [5]

received this number, swelling up again from the bottom it casts the bodies of the bathers high in the air and out on the ground; and as soon as this has occurred, it returns once more to the original form of its circumference. And not only in the case of men does this occur with regard to it, but also, if a quadruped enters, it experiences the same result.

[10] **113** · In the dominion of the Carthaginians they say there is a mountain which is called Uranion, full of all kinds of wood and variegated with many flowers, so that the contiguous places over a wide extent partaking of its fragrance waft to [15] the travellers a most agreeable odour. Near this spot they say that there is a spring of oil, and that it has a smell like that of cedar sawdust. But they say that the person who approaches it must be chaste, and, if this is the case, it spouts up the oil in greater abundance, so that it can be safely drawn.

[20] **114** · Men say that near this spring also there is a natural rock of great size. Now they say that when summer is come it sends up a flame of fire, but when winter arrives, from the same place it sends gushing up a stream of water so cold that, when compared with snow, it does not differ from it. And this, they declare, is not a secret occurrence, nor does it appear for only a short time; but it sends forth the fire [25] throughout the whole summer, and the water throughout the whole winter.

**115** · It is reported that in that part of Thrace which is called the country of the Sinti and Maedi, there is a certain river named Pontus, in which are carried down certain stones which burn, and are of a nature opposed to that of charcoal [30] from wood; for while fanned they are quickly extinguished, but when sprinkled with water they blaze up and kindle better. Now, when they are burning, they have a smell similar to that of bitumen, so bad and pungent that no creeping thing remains [841<sup>b</sup>1] in the place while they are burning.

**116** · They say, moreover, that in their country there is a certain place, not very small, about twenty stadia in extent, that bears barley, which the men indeed use; but the horses and oxen, or any other animal, will not eat it: indeed, not even [5] does any pig or dog venture to taste

the excrement of men who after eating a cake or bread made from this barley have voided it, as death results from it.

**117** · At Scotussae in Thessaly they say there is a little fountain from which flows water of such a kind that in a moment it heals wounds and bruises both of men [10] and of beasts of burden; and if any one throws wood into it, without having quite broken it, but having merely split it, this unites, and is restored again to its original state.

**118** · In Thrace above Amphipolis they say that a thing happens, which is [15] wonderful and incredible to those who have not seen it; for the boys, going forth from the villages and neighbouring districts to catch little birds, take the hawks to help in catching them, and they do so in this manner:—When they have advanced to a suitable spot they call the hawks by name with a loud cry; and, when they hear the [20] boys' voice, they come and frighten away the birds; these in terror of them take refuge in the bushes, where the boys strike them down with sticks and capture them. But what one would be most of all surprised at is this—whenever the hawks [25] themselves have seized any of the birds, they throw them down to the bird-catchers, while the boys return home, after giving some portion of all their booty to the hawks.

**119** · Another marvel also they say occurs among the Heneti: that countless myriads of jackdaws are frequently borne to their country, and eat up the corn when [30] the people have sown it. To them the Heneti offer gifts, before the birds are about to fly to the borders of the land, throwing before them seeds of all kinds of fruits. Now [842<sup>a</sup>1] if the jackdaws taste these they do not come over into their country, and the Heneti know that they will be in peace; but, if they do not taste them, the people thereupon expect an attack to be made upon them by their enemies.

[5] **120** · In the Thracian Chalcidice, near Olynthus, they say there is a place called Cantharolethros, a little larger in size than a threshing-floor; and that when any other living creature reaches the spot it departs again; but none of the beetles [10] that come there do so; but they going round and round the place die from hunger.

**121** · Among the Thracian Cyclopes there is a little spring containing water, which in appearance indeed is pure, transparent, and like all others; but when an animal drinks of it, straightway it perishes.

[15] **122** · Men say that in Crastonia, near the country of the Bisaltae, the hares that are captured have two livers; and that there is a certain place, about a rood in extent, into which whatever animal enters dies. There is in the same place, besides, a [20] temple of Dionysus, large and beautiful, in which, when the festival and sacrifice take place, it is said that a great blaze of fire is seen when the god is going to produce a good season, and that all those who are assembled round the sacred enclosure see it; when, however, he intends to cause unfruitfulness, this light is not seen, but darkness extends over the place, as during the other nights.

[25] **123** · In Elis they relate that there is a certain building about eight furlongs distant from the city, in which, at the festival of Dionysus, they place three empty copper cauldrons. Having done this, they request any of the Greeks staying in the city, who wishes, to examine the vessels, and to seal the doors of the house: then, [30] when they are about to open them, they point out the seals to the citizens and strangers first of all, before they do so. They on entering find the cauldrons full of wine, but the floor and the walls uninjured, so that it is impossible to entertain a suspicion that they accomplish this by some trick. Moreover, they say that among the same people there are kites, which snatch the meat from those who carry it [842<sup>b1</sup>] through the marketplace, but do not touch the flesh of the sacred victims.

[5] **124** · It is said that at Coronea in Boeotia moles cannot live, or dig up the ground, while the rest of Boeotia possesses a large number of them.

**125** · At Lusi in Arcadia men say there is a certain spring in which field-mice are found and dive, passing their lives in it. The same thing is said to occur likewise at Lampsacus.

[10] **126** · At Crannon in Thessaly they say there are only two crows in the city. When these have hatched their young, they depart from the place, as it appears, but leave behind as many others of their offspring.

[15] **127** · In Apollonia, which lies near to the country of the Taulantii, they say there is bitumen obtained by digging, and pitch springing up from the earth, in the same manner as springs of water, in no respect differing from that of Macedonia, except that it is naturally blacker and thicker than that. And not far from this place [20] there is a fire burning at all times, as those who dwell in the neighbourhood assert. The burning place, it appears, is not large, but about the size of the space occupied by five couches. This spot smells of sulphur and alum, and thick grass grows around, at which one would be most surprised, and also large trees, not four cubits distant [25] from the fire. Moreover, a fire burns constantly in Lycia and near Megalopolis in the Peloponnese.

**128** · It is said also that among the Illyrians the cattle bring forth young twice in the year, and that most of them have twins, and that many goats bring forth three or four kids at a time, and some even five or more; and, besides, that they readily yield nine pints of milk. They say too that the hens do not lay merely once, as [30] among other nations, but twice or thrice in the day.

**129** · It is said that the wild oxen in Paeonia are far larger than those that are found in other nations, and that their horns contain twenty-four pints, and those of some of them even more.

**130** · Concerning the Sicilian Strait, apart from what many other writers [843<sup>a</sup>1] have written, this author states that a portentous occurrence takes place: the billows, he says, being carried with a loud whistling sound from the Tyrrhenian Sea, dash against both the promontories, that of Sicily and that of Italy, which is called [5] Rhegium, and being borne from a great sea are shut up in a narrow space; and when this occurs they raise the waves with a loud roar in mid-air to a very great height, as they dash upwards, so that the rising of the waters is visible to those who are far [10] away, not resembling the rising of the sea, but white and foaming, and similar to the sweeping movements

which take place in excessively violent storms: and that sometimes the waves meet each other on both the promontories and produce a collision incredible in description, and unendurable for the eyes to behold; but at [15] other times parting, after dashing against each other, they show an abyss, so deep and horrible to those who are compelled to look on, that many are unable to restrain themselves, and fall, blinded with terror. But when the waves, after dashing on [20] either of the two places and being carried to the tops of the promontories, have descended again into the sea flowing beneath, then again with loud bellowing and great and swift eddies the sea boils up, and is lifted on high from the depths in confusion, and assumes alternately all kinds of hues, for it appears at one time dark, [25] at another blue, and often of a purplish colour: but no creeping thing can endure either to hear or to see the quick rush and length of this sea, and besides these its ebb, but all flee to the low-lying skirts of the mountains; but, when the heaving of the billows ceases, the eddies are borne on high, making such various twistings that [30] they seem to produce movements resembling the coils of presteres, or some other large snakes.

**131** · Men say that, while the Athenians were building the temple of [843<sup>b</sup>1] Demeter at Eleusis, a brazen pillar was found surrounded with rocks, on which had been inscribed—‘This is the tomb of Deïope’, whom some state to have been the wife of Musaeus, others the mother of Triptolemus. [5]

**132** · In one of the islands, called the islands of Aeolus, they say that a large number of palm-trees grow, whence it is also called ‘Palm-island’; therefore that could not be true which is asserted by Callisthenes, that the tree received its name from the Phoenicians, who inhabited the sea-coast of Syria. But some state that the [10] Phoenicians themselves received this name from the Greeks, because they, first of all sailing over the sea, slew and murdered all, wherever they landed. And moreover in the dialect of the Perrhaebians the verb ‘phoenixai’ means ‘to stain with blood’.

[15] **133** · In what is called the Aeniatic district, in the neighbourhood of the city named Hypate, an old pillar is said to have been discovered; and the Aenianians, wishing to know to whom it

belonged, as it had an inscription in ancient characters, sent certain persons to take it to Athens. But as they were proceeding through [20] Boeotia, and were communicating to some of their guest friends the object of their journey, it is said that they were conducted into the so-called Ismenium at Thebes; for there the meaning of the inscription could be most easily discovered, they said, adding that there were in that place some ancient dedicatory offerings having the forms of the letters similar to those of the one in question: whence they say that, [25] having found an explanation of the objects of their inquiry, from what was already known to them, they copied down the following lines:—

I Heracles offered the grove to the beaming goddess Cythera,  
When I had Geryon's herds, and Erytheia for spoil;  
For with desire for her the goddess had vanquished my heart.  
[30] But here my wife Erythe brings forth Erython as her offspring,  
Nymph-born maid Erythe, to whom I yielded the plain,  
Sacred memorial of love under the shade of the beech.

[844a1] With this inscription both that place corresponded, being called Erythus, and also the fact that it was from there, and not from Erytheia, that he drove away the cows; for they say that nowhere either in the parts of Libya or Iberia is the name of [5] Erytheia to be found.

**134** · In the city called Utica in Libya, which is situated, as they say, on the gulf between the promontory of Hermes and that of Hippos, and about two hundred [10] furlongs beyond Carthage (now Utica also is said to have been founded by Phoenicians two hundred and eighty-seven years before Carthage itself, as is recorded in the Phoenician histories), men state that salt is obtained by digging at a depth of eighteen feet, in appearance white and not solid, but resembling the most sticky gum; and that when brought into the sun it hardens, and becomes like Parian [15] marble; and they say that from it are carved figures of animals, and utensils besides.

**135** · It is said that those of the Phoenicians who first sailed to Tartessus, after importing to that place oil, and other small wares of maritime commerce, obtained for their return cargo so great a quantity of silver, that they were no longer able to keep or receive it, but were forced, when sailing away from those parts, to [20] make of silver not



only all the other articles which they used, but also all their anchors.

**136** · They say that the Phoenicians who inhabit the city called Gades, when they sail outside the Pillars of Heracles under an easterly wind for four days, [25] arrive at certain desolate places, full of rushes and seaweed, and that these places are not covered with water, whenever there is an ebb, but, whenever there is a flood, they are overflowed, and in these there is found an exceeding great number of tunnies, of a size and thickness surpassing belief, when they are stranded. These [30] they salt, pack up in vessels, and convey to Carthage. They are the only fish which the Carthaginians do not export; on account of their excellence for food, they consume them themselves.

**137** · In the district of Pedasa in Caria a sacrifice is celebrated in honour of Zeus, at which they send in the procession a she-goat, with regard to which they say [844<sup>b</sup>1] that a marvellous thing occurs; for while it proceeds from Pedasa a distance of seventy furlongs, through a dense crowd of people looking on, it is neither disturbed in its progress, nor is turned out of the way, but, being tied with a rope, advances [5] before the man who holds the priesthood.

What is wonderful is that two crows stay continually about the temple of Zeus, while no other approaches the spot, and that one of them has the front part of its neck white.

**138** · In the country of those Illyrians who are called Ardiaei, near the [10] boundaries separating them from the Antariates, they say there is a great mountain, and near this is a valley, from which water springs up, not at every season, but during the spring, in great abundance, which the people take, and keep during the day in a cellar, but during the night they set it in the open air. And, after they have done this for five or six days, the water congeals, and becomes the most [15] excellent salt, which they preserve especially for the sake of the cattle: for salt is not imported to them, because they live at a distance from the sea, and have no intercourse with others. They have therefore most need of it for their cattle; for they [20] supply them with salt twice in the year; but if they fail to do this, the result is that most of their cattle perish.

**139** · In Argos they say there is a species of locust which is called the scorpion-fighter; for, as soon as it sees a scorpion, it attacks him, and likewise the [25] scorpion attacks it. It chirps as it goes round him in a circle. The other, they say, raises his sting, and turns it round against his adversary in the same spot; then he gradually lets his sting drop, and at last stretches himself out altogether on the ground, while the locust runs round him. At last the locust approaches and devours him. They say that it is good to eat the locust as an antidote against the scorpion's [30] sting.

**140** · They say that the wasps in Naxos, when they have tasted the flesh of the viper (and its flesh, as it appears, is agreeable to them), and when they have afterwards stung any one, inflict so much pain, that their sting seems more dangerous than that of the vipers.

[845<sup>a</sup>1] **141** · They say that the Scythian poison, in which that people dips its arrows, is procured from the viper. The Scythians, it would appear, watch those that are just bringing forth young, and take them, and allow them to putrefy for some days. But when the whole mass appears to them to have become sufficiently rotten, [5] they pour human blood into a little pot, and, after covering it with a lid, bury it in a dung-hill. And when this likewise has putrefied, they mix the sediment, which is of a watery nature, with the corrupted blood of the viper, and thus make it a deadly poison.

[10] **142** · At Curium in Cyprus they say there is a species of snake, which has similar power to that of the asp in Egypt, except that, if it bites in the winter, it produces no effect, whether from some other reason, or because when congealed with cold the reptile loses its power of movement, and becomes completely powerless, unless it be warmed.

[15] **143** · In Ceos they say there is a species of wild pear of such a kind that, if any one be wounded by its thorn, he dies.

**144** · In Mysia they say there is a white species of bears, which, when they are hunted, emit a breath of such a kind as to rot the flesh of the dogs, and likewise of other wild beasts, and render them unfit for

food. But, if any one approaches [20] them with violence, they discharge, it appears, from the mouth a very great quantity of phlegm, which the animal blows upon the faces of the dogs, and of the men as well, so as to choke and blind them.

**145** · In Arabia they say there is a certain kind of hyaena, which, when it [25] sees some wild beast, before being itself seen, or steps on the shadow of a man, produces speechlessness, and fixes them to the spot in such a way that they cannot move their body; and it is said that they do this in the case of dogs also.

**146** · In Syria they say there is an animal, which is called the lion-killer; for the lion, it seems, dies, whenever he eats any of it. He does not indeed do this [30] willingly, but rather flees from the animal; but when the hunters, having caught and roasted it, sprinkle it, like white meal, over some other animal, they say that the lion, after tasting it, dies on the spot. This animal injures the lion even by making water upon it.

**147** · It is said also that vultures die from the smell of unguents, if any one [845<sup>b1</sup>] anoints them, or gives them something smeared with an unguent to eat: likewise they say that beetles also die from the smell of roses.

**148** · They say that both in Sicily and Italy the star-lizards have a deadly [5] bite, and not like those among ourselves a weak and soft bite: moreover that there is a sort of mouse, which flies at people, and, when it bites, causes them to die.

**149** · In Mesopotamia, a region of Syria, and at Istrus, they say that there are certain little snakes, which do not bite the people of the country, but do great [10] injury to strangers.

**150** · At the Euphrates they say that this especially happens; for that many are seen about the edges of the river, swimming also towards either bank; so that while seen in the evening on this side, at daybreak they appear on the other side; and that they refrain from biting such of

the Syrians as are taking their repose, but do not spare the Greeks. [15]

**151** · In Thessaly they say that the snake which is called sacred destroys all persons, not merely if it bites, but even if it touches them; and so when it appears (but it appears rarely), and they hear its voice, both serpents and vipers, and all the [20] other wild beasts flee. It is not large, but of a moderate size. In the city of Tenos in Thessaly they say it was once destroyed by a woman, and that its death happened in the following manner:—The woman, having described a circle and put the charms in it, entered into the circle, herself and her son, and then imitated the hissing of the [25] beast; it answered the sound of her voice and approached; but, while it was hissing, the woman fell asleep, and the more profoundly, the closer it approached, so that she could not overcome the power of sleep: but her son, sitting beside her, aroused her by striking her, as she had bidden him to do, saying that, if she fell asleep, both [30] she and he would perish, whereas if she used force, and drew the animal towards her, they would be saved. But the snake, when it came up to the circle, immediately withered away.

**152** · It is said that near Tyana there is water sacred to Zeus Horcios—they call it Asbamaeon—whose spring rises very cold, but boils up like caldrons. This [846<sup>a</sup>1] water is sweet and propitious to those who observe their oaths; but punishment follows on the heels of the perjured; for it falls upon their eyes, hands, and feet, and they are seized with dropsies and consumptions; and it is not even possible to get away beforehand, but they are held on the spot, and lament beside the water, [5] confessing the perjuries they have committed.

**153** · At Athens they say that the sacred branch of the olive tree in one day buds and increases, but quickly shrinks together again.

**154** · When the craters in Etna once burst forth, and the lava was carried hither and thither over the land like a torrent, the deity honoured the race of the [10] pious; for when they were hemmed in on all sides by the stream, because they were bearing their aged parents on their shoulders, and were trying to save them, the stream of fire, having come near to them, was cleft asunder, and turned aside one [15] part of the

flame in this direction, another in that, and preserved the young men unharmed, along with their parents.

**155** · It is said that the sculptor Phidias, while constructing the Athene in the Acropolis, carved his own face in the centre of her shield, and connected it by an [20] imperceptible artifice with the statue, so that, if any one wished to remove it, he must necessarily break up and destroy the whole statue.

**156** · They say that the statue of Bitys in Argos killed the man who had caused the death of Bitys, by falling upon him while he was looking at it. It appears therefore that such events do not happen at random.

[25] **157** · Men say that dogs pursue wild beasts only to the summits of the so-called Black Mountains, but turn back when they have pursued them as far as these.

[30] **158** · In the river Phasis it is related that a rod called the 'White-leaved' grows, which jealous husbands pluck, and throw round the bridal-bed, and thus preserve their marriage from adultery.

**159** · In the Tigris they say there is a stone found, called in the barbarian language Modon, with a very white colour, and that, if any one possesses this, he is not harmed by wild beasts.

**160** · In the Scamander they say a plant grows, called the Rattle, resembling [35] a chick-pea, and that it has seeds that shake, from which fact it has obtained its name: those who possess it (so it is said) fear neither demon nor apparition of any kind.

**161** · In Libya there is a vine, which some people call mad, that ripens some [846<sup>b</sup>1] of its fruit, others it has like unripe grapes, and others in blossom, and this during a short time.

**162** · On Mount Sipylus they say there is a stone like a cylinder, which, when pious sons have found it, they place in the sacred precincts of the Mother of [5] the Gods, and never err through impiety, but are always affectionate to their parents.

**163** · On Mount Taygetus (it is said) there is a plant called the love-plant, which women in the beginning of spring fasten round their necks, and are loved more passionately by their husbands.

[10] **164** · Othrys is a mountain of Thessaly, which produces serpents that are called Rotters, which have not a single colour, but always resemble the place in which they live. Some of them have a colour like that of land snails, while the scales of others are of a bright green; but all of them that dwell in the sands become like these in colour. When they bite they produce thirst. Now their bite is not rough and [15] fiery, but malicious.

**165** · When the dark-coloured adder copulates with the female, the female during the copulation bites off the head of the male; therefore also her young ones, as though avenging their father's death, burst through their mother's belly. [20]

**166** · In the river Nile they say that a stone like a bean is produced, and that, if dogs see it, they do not bark. It is beneficial also to those who are possessed by some demon; for, as soon as it is applied to the nostrils, the demon departs. [25]

**167** · In the Maeander, a river of Asia, they say that a stone is found, called by contradiction 'sound-minded'; for if one throws it into any one's bosom he becomes mad, and kills some one of his relations.

**168** · The rivers Rhine and Danube flow towards the north, one passing the Germans, the other the Paeonians. In the summer they have a navigable stream, but [30] in the winter they are congealed from the cold, and form a plain over which men ride.

**169** · Near the city of Thurium they say there are two rivers, the Sybaris and the Crathis. Now the Sybaris causes those that drink of it to be timorous, while the Crathis makes men yellow-haired when they bathe in it. [35]

**170** · In Euboea there are said to be two rivers; the sheep that drink from one of them become white—it is called Cerbes; the other is the Neleus, which makes them black.

**171** · Near the river Lycormas it is said that a plant grows, which is like a [847<sup>a</sup>1] lance, and is most beneficial in the case of dim sight.

**172** · They say that the fountain of Arethusa at Syracuse in Sicily is set in motion every five years.

**173** · On Mount Berecynthus it is said that a stone is produced called ‘the [5] Sword’, and if any one finds it, while the mysteries of Hecate are being celebrated, he becomes mad, as Eudoxus affirms.

**174** · On Mount Tmolus it is said that a stone is produced like pumice-stone, which changes its colour four times in the day; and that it is only seen by maidens who have not yet attained to years of discretion.

**175** · On the altar of the Orthosian Artemis it is said that a golden bull [847<sup>b</sup>1] stands, which bellows when hunters enter the temple.

**176** · Among the Aetolians it is said that moles see, but only dimly, and do not feed on the earth, but on locusts.

[5] **177** · They say that elephants are pregnant during the space of two years, while others say during eighteen months; and that in giving birth they suffer hard labour.

178 · They say that Demaratus, the pupil of the Locrian Timaeus, having fallen sick, was dumb for ten days; but on the eleventh, having slowly come to his senses after his delirium, he declared that during that time he had lived most [10] agreeably.



**\*\*TEXT:** O. Apelt, Teubner, Leipzig, 1888

<sup>1</sup>Retaining ἐπ' αὐτῶν.

<sup>2</sup>Reading τοὺς κόλπους.

<sup>3</sup>Reading μὴ εἶναι.

<sup>4</sup>*Odyssey* XII 67.

# MECHANICS\*\*

*E. S. Forster*

Our wonder is excited, firstly, by phenomena which occur in accordance with [847<sup>a</sup>10] nature but of which we do not know the cause, and secondly by those which are produced by art despite nature for the benefit of mankind. Nature often operates contrary to human interest; for she always follows the same course without [15] deviation, whereas human interest is always changing. When, therefore, we have to do something contrary to nature, the difficulty of it causes us perplexity and art has to be called to our aid. The kind of art which helps us in such perplexities we call Mechanical Skill. The words of the poet Antiphon are quite true: [20]

Mastered by Nature, we o'ercome by Art.

Instances of this are those cases in which the less prevails over the greater, and where forces of small motive power move great weights—in fact, practically all those problems which we call Mechanical Problems. They are not quite identical [25] nor yet entirely unconnected with Natural Problems. They have something in common both with Mathematical and with Natural Speculations; for while Mathematics demonstrates *how* phenomena come to pass, Natural Science demonstrates *in what medium* they occur.

Among questions of a mechanical kind are included those which are connected [847<sup>b</sup>10] with the lever. It seems strange that a great weight can be moved with but little force, and that when the addition of more weight is involved; for the very same weight, which one cannot move at all without a lever, one can move quite easily with it, in spite of the additional weight of the lever. [15]

The original cause of all such phenomena is the circle. It is quite natural that this should be so; for there is nothing strange in a lesser marvel being caused by a greater marvel, and it is a very great marvel that contraries should be present together, and the circle is made up of contraries. For to begin with, it is formed by [20] motion and rest, things which are by nature opposed to one another. Hence in examining the

circle we need not be much astonished at the contradictions which occur in connexion with it. Firstly, in the line which encloses the circle, being without breadth, two contraries somehow appear, namely, the concave and the [25] convex. These are as much opposed to one another as the great is to the small; the mean being in the latter case the equal, in the former the straight. Therefore just as, if they are to change into one another, the greater and smaller must become equal [848<sup>a</sup>1] before they can pass into the other extreme; so a line must become straight in passing from convex into concave, or on the other hand from concave into convex and curved. This, then, is one peculiarity of the circle.

Another peculiarity of the circle is that it moves in two contrary directions at [5] the same time; for it moves simultaneously to a forward and a backward position. Such, too, is the nature of the radius which describes a circle. For its extremity comes back again to the same position from which it starts; for, when it moves continuously, its last position is a return to its original position, in such a way that it [10] has clearly undergone a change from that position.

Therefore, as has already been remarked, there is nothing strange in the circle being the origin of any and every marvel. The phenomena observed in the balance can be referred to the circle, and those observed in the lever to the balance; while [15] practically all the other phenomena of mechanical motion are connected with the lever. Furthermore, since no two points on one and the same radius travel with the same rapidity, but of two points that which is further from the fixed centre travels more quickly, many marvellous phenomena occur in the motions of circles, which will be demonstrated in the following problems.

[20] Because a circle moves in two contrary forms of motion at the same time, and because one extremity of the diameter, A, moves forwards and the other, B, moves backwards, some people contrive so that as the result of a single movement a number of circles move simultaneously in contrary directions, like the wheels of [25] brass and iron which they make and dedicate in the temples. Let AB be a circle and CD another circle in contact with it; then if the diameter of the circle AB moves forward, the diameter CD will move in a backward direction as compared with the circle AB, as long as the diameter moves round the same point. The circle CD [30] therefore will move in the opposite direction to the circle AB. Again, the circle CD will itself make the adjoining circle EF move in an opposite direction to itself for the same reason. The same thing will happen in the case of a larger number of circles, [35] only one of them being set in motion. Mechanics seizing on this inherent

peculiarity of the circle, and hiding the principle, construct an instrument so as to exhibit the marvellous character of the device, while they obscure the cause of it.

[848<sup>b</sup>1] **1** · First then, a question arises as to what takes place in the case of the balance. Why are larger balances more accurate than smaller? And the fundamental principle of this is, why is it that the radius which extends further from the centre is displaced quicker than the smaller radius, when the near radius is moved [5] by the same force? Now we use the word ‘quicker’ in two senses; if an object traverses an equal distance in less time, we call it quicker, and also if it traverses a greater distance in equal time. Now the greater radius describes a greater circle in equal time; for the outer circumference is greater than the inner.

[10] The reason of this is that the radius undergoes two displacements. Now if the two displacements of a body are in any fixed proportion, the resulting displacement must necessarily be a straight line, and this line is the diagonal of the figure, made by the lines drawn in this proportion.

Let the proportion of the two displacements be as AB to AC, and let A<sup>1</sup> be brought to B, and the line AB brought down to GC. Again, let A be brought to D [15] and the line AB to E; then if the proportion of the two displacements be maintained, AD must necessarily have the same proportion to AE as AB to AC. Therefore the small parallelogram is similar to the greater, and their diagonal is the same, so that [20] A will be at F. In the same way it can be shown, at whatever points the displacement be arrested, that the point A will in all cases be on the diagonal.

Thus it is plain that, if a point be moved along the diagonal by two displacements, it is necessarily moved according to the proportion of the sides of the parallelogram; for otherwise it will not be moved along the diagonal. If it be moved [25] in two displacements in no fixed ratio for any time, its displacement cannot be in a straight line. For let it be a straight line. This then being drawn as a diagonal, and the sides of the parallelogram filled in, the point must necessarily be moved according to the proportion of the sides; for this has already been proved. Therefore, [30] if the same proportion be not maintained during any interval of time, the point will not describe a straight line; for, if the proportion were maintained during any interval, the point must necessarily describe a straight line, by the reasoning above. So that, if the two displacements do not maintain any proportion during any interval, a curve is produced.

Now that the radius of a circle has two simultaneous displacements is plain from these considerations, and because the point from being vertically above the [849]<sup>a</sup>1 centre comes back to the perpendicular,<sup>2</sup> so as to be again perpendicularly above the centre.

Let ABC be a circle, and let the point B at the summit be displaced to D, and come eventually to C. If then it were moved in the proportion of BD to DC, it would [5] move along the diagonal BC. But in the present case, as it is moved in no such proportion, it moves along the curve BEC. And, if one of two displacements caused by the same forces is more interfered with and the other less, it is reasonable to suppose that the motion more interfered with will be slower than the motion less interfered with; which seems to happen in the case of the greater and less of the radii [10] of circles. For on account of the extremity of the lesser radius being nearer the stationary centre than that of the greater, being as it were pulled in a contrary direction, towards the middle,<sup>3</sup> the extremity of the lesser moves more slowly. This is the case with every radius, and it moves in a curve, naturally along the tangent, [15] and unnaturally towards the centre. And the lesser radius is always moved more in respect of its unnatural motion; for being nearer to the retarding centre it is more constrained. And that the less of two radii having the same centre is moved more [20] than the greater in respect of the unnatural motion is plain from what follows.

Let BCED be a circle, and XNMO another smaller circle within it, both having the same centre A, and let the diameters be drawn, CD and BE in the large [25] circle, and MX and NO in the small; and let the rectangle DYRC be completed. If the radius AB comes back to the same position from which it started, i.e. to AB, it is plain that it moved towards itself; and likewise AX will come to AX. But AX moves [30] more slowly than AB, as has been stated, because the interference is greater and AX is more retarded.

Now let AHG be drawn, and from H a perpendicular upon AB within the circle, HF; and, further, from H let HZ be drawn parallel to AB, and ZU and GK [35] perpendiculars on AB; then ZU and HF are equal. Therefore BU is less than XF; for in unequal circles equal straight lines drawn perpendicular to the diameter cut off smaller portions of the diameter in the greater circles; ZU and HF being equal.

[849<sup>b</sup>1] Now the radius AH describes the arc XH in the same time as the extremity of the radius BA has described an arc greater than BZ in the greater circle; for the natural displacement is equal and the unnatural less, BU being less than XF [5] Whereas they ought to be in proportion,

the two natural motions in the same ratio to each other as the two unnatural motions.

Now the radius AB has described an arc GB greater than ZB. It must necessarily have described GB in this time; for that will be its position when in the two circles the proportion between the unnatural and natural movements holds [10] good. If, then, the natural movement is greater in the greater circle, the unnatural movement, too, would agree in being proportionally greater in that case only, where B is moved along GB while X is moved along XH. For in that case the point B comes by its natural movement to G, and by its unnatural movement to K, GK being [15] perpendicular from G. And as GK to BK, so is HF to XF. Which will be plain, if B and X be joined to G and H. But, if the arc described by B be less or greater than GB, the result will not be the same, nor will the natural movement be proportional to the unnatural in the two circles.

[20] So that the reason why the point further from the centre is moved quicker by the same force, and the greater radius describes the greater circle, is plain from what has been said; and hence the reason is also clear why larger balances are more accurate than smaller. For the cord by which a balance is suspended acts as the centre, for it is at rest, and the parts of the balance on either side form the radii. [25] Therefore by the same weight the end of the balance must necessarily be moved quicker in proportion as it is more distant from the cord, and some weight must be imperceptible to the senses in small balances, but perceptible in large balances; for there is nothing to prevent the movement being so small as to be invisible to the eye. [30] Whereas in the large balance the same load makes the movement visible. In some cases the effect is clearly seen in both balances, but much more in the larger on account of the amplitude of the displacement caused by the same load being much greater in the larger balance. And thus dealers in purple, in weighing it, use [35] contrivances with intent to deceive, putting the cord out of centre and pouring lead into one arm of the balance, or using the wood towards the root of a tree for the end [850<sup>a</sup>1] towards which they want it to incline, or a knot, if there be one in the wood; for the part of the wood where the root is is heavier, and a knot is a kind of root.

2 · How is it that if the cord is attached to the upper surface of the beam of a balance, if one takes away the weight when the balance is depressed on one side, the beam rises again; whereas, if the cord is

attached to the lower surface of the beam, it does not rise but remains in the same position? Is it because, when the cord is [5] attached above, there is more of the beam on one side of the perpendicular than on the other, the cord being the perpendicular? In that case the side on which the greater part of the beam is must necessarily sink until the line which divides the beam into two equal parts reaches the actual perpendicular, since the weight now [10] presses on the side of the beam which is elevated.

Let BC be a straight beam, and AD a cord. If AD be produced it will form the perpendicular ADM. If the portion of the beam towards B be depressed, B will be displaced to E and C to F; and so the line dividing the beam into two halves, which was originally DM, part of the perpendicular, will become DH when the beam is [15] depressed; so that the part of the beam EF which is outside the perpendicular AM will be greater by HP than half the beam. If therefore the weight at E be taken away, F must sink, because the side towards E is shorter. It has been proved then that when the cord is attached above, if the weight be removed the beam rises [20] again.

But if the support be from below, the contrary takes place. For then the part which is depressed is more than half of the beam, or in other words, more than the part marked off by the original perpendicular; it does not therefore rise, when the weight is removed, for the part that is elevated is lighter. Let NO be the beam when horizontal, and KLM the perpendicular dividing NO into two halves. When the [25] weight is placed at N, N will be displaced to S and O to R, and KL to LH, so that KS is greater than LR by HLK. If the weight, therefore, is removed the beam must necessarily remain in the same position; for the excess of the part in which SK is over half the beam acts as a weight and remains depressed.

3 · Why is it that, as has been remarked at the beginning of this treatise, the [30] exercise of little force raises great weights with the help of a lever, in spite of the added weight of the lever; whereas the less heavy a weight is, the easier it is to move, and the weight is less without the lever? Does the reason lie in the fact that the lever acts like the beam of a balance with the cord attached below and divided into two [35] unequal parts? The fulcrum, then, takes the place of the cord, for both remain at rest and act as the centre. Now since a longer radius moves more quickly than a shorter one under pressure of an equal weight; and since the lever requires three elements, viz. the fulcrum—corresponding

to the cord of a balance and forming the centre—and two weights, that exerted by the person using the lever and the weight which is to be moved; this being so, as the weight moved is to the weight moving it, [850<sup>b</sup>1] so, inversely, is the length of the arm bearing the weight to the length of the arm nearer to the power. The further one is from the fulcrum, the more easily will one raise the weight; the reason being that which has already been stated, namely, that a longer radius describes a larger circle. So with the exertion of the same force the [5] motive weight will change its position more than the weight which it moves, because it is further from the fulcrum.

Let AB be a lever, C the weight to be lifted, D the motive weight, and E the fulcrum; the position of D after it has raised the weight will be G, and that of C, the weight raised, will be K.

[10]4 · Why is it that those rowers who are amidships move the ship most? Is it because the oar acts as a lever? The fulcrum then is the thole-pin (for it remains in the same place); and the weight is the sea which the oar displaces; and the power that moves the lever is the rower. The further he who moves a weight is from the [15] fulcrum, the greater is the weight which he moves; for then the radius becomes greater, and the thole-pin acting as the fulcrum is the centre. Now amidships there is more of the oar inside the ship than elsewhere; for there the ship is widest, so that on both sides a longer portion of the oar can be inside the two walls of the vessel. The [20] ship then moves because, as the blade presses against the sea, the handle of the oar, which is inside the ship, advances forward, and the ship, being firmly attached to the thole-pin, advances with it in the same direction as the handle of the oar. For where the blade displaces most water, there necessarily must the ship be propelled [25] most; and it displaces most water where the handle is furthest from the thole-pin. This is why the rowers who are amidships move the ship most; for it is in the middle of the ship that the length of the oar from the thole-pin inside the ship is greatest.

5 · Why is it that the rudder, being small and at the extreme end of the ship, has such power that vessels of great burden can be moved by a small tiller and the [30] strength of one man only gently exerted? Is it because the rudder, too, is a lever and the steersman works it? The fulcrum then is the point at which the rudder is attached to the ship, and the whole rudder is the lever, and the sea is the weight, and [35] the



steersman the moving force. The rudder does not take the sea squarely, as the oar does; for it does not move the ship forward, but diverts it as it moves, taking the sea obliquely. For since, as we saw, the sea is the weight, the rudder pressing in a contrary direction diverts the ship. For the fulcrum turns in a contrary direction to [851<sup>a</sup>1] the sea; when the sea turns inwards, the fulcrum turns outwards; and the ship follows it because it is attached to it. The oar pushing the weight squarely, and being itself thrust in turn by it, impels the ship straight forward; but the rudder, as it has [5] an oblique position, causes an oblique motion one way or the other. It is placed at the stern and not amidships, because it is easiest to move a mass which has to be moved, if it is moved from one extremity. For the fore part travels quickest, because, just as in objects that are travelling along, the movement ceases at the end; so too, in [10] any object which is continuous the movement is weakest towards the end, and if it is weakest in that part it is easy to check it. For this reason, then, the rudder is placed at the stern, and also because, as there is little motion there, the displacement is much greater at the extremity, since the equal angle stands on a longer base in [15] proportion as the enclosing lines are longer. From this it is also plain why the ship advances in the opposite direction more than does the oar-blade; for the same bulk moved by the same force progresses more in air than in water. For let AB be the oar [20] and C the thole-pin, and A the end of the oar inside the ship, and B, that in the sea. Then if A be moved to D, B will not be at E: for BE is equal to AD, and so B, if it were at E, would have changed its position as much as A, whereas it has really, as we saw, traversed a shorter distance. B will therefore be at F. H then cuts AB not at C but below it. For BF is less than AD, so that HF is less than DH, for the triangles are similar. The centre C will also have been displaced; for it moves in a contrary [25] direction to B, the end of the oar in the sea, and in the same direction as A, the end in the ship, and A changes its position to D. So the ship will also change its position, and it advances in the same direction as the handle of the oar. The rudder also acts in the same way, except that, as we saw above, it contributes nothing to the forward [30] motion of the ship, but merely thrusts the stern sideways one way or the other; for then the bow inclines in the contrary direction. The point where the rudder is attached must be considered, as it were, the centre of the mass which is moved, corresponding to the thole-pin in the case of the oar; but the middle of the ship moves in the direction to which the tiller is put over. If the steersman puts it [35] inwards, the stern alters its position in that direction, but the bow inclines in the contrary direction; for while the

bow remains in the same place, the position of the ship as a whole is altered.

6 · Why is it that the higher the yard-arm is raised, the quicker does a vessel travel with the same sail and in the same breeze? Is it because the mast is a lever, and the socket in which it is fixed, the fulcrum, and the weight which it has to move [851<sup>b</sup>1] is the boat, and the motive power is the wind in the sail? If the same power moves the same weight more easily and quickly the further away the fulcrum is, then the yard-arm, being raised higher, brings the sail also further away from the mast-socket, which is the fulcrum. [5]

7 · Why is it that, when sailors wish to keep their course in an unfavourable wind, they draw in the part of the sail which is nearer to the steersman, and, working the sheet, let out the part towards the bows? Is it because the rudder cannot counteract the wind when it is strong, but can do so when there is only a little wind, [10] and so<sup>4</sup> they draw in sail? The wind then bears the ship along, while the rudder turns the wind into a favouring breeze, counteracting it and serving as a lever against the sea. The sailors also at the same time contend with the wind by leaning their weight in the opposite direction.

8 · Why is it that spherical and circular forms are easier to move? A circle [15] can revolve in three different ways: either along its circumference, the centre correspondingly changing its position, as a carriage wheel revolves; or round the centre only, as pulleys move, the centre being at rest; or it can turn, as does the [20] potter's wheel, parallel to the ground, the centre being at rest. Do not circular forms move quickest, firstly because they have a very slight contact with the ground (like a circle in contact at a single point), and secondly, because there is no friction, for the angle is well away from the ground? Further, if they come into collision with [25] another body, they only are in contact with it again to a very small extent. (If it were a question of a rectilinear body, owing to its sides being straight, it would have a considerable contact with the ground.) Further, he who moves circular objects moves them in a direction to which they have an inclination as regards weight. For when the diameter of the circle is perpendicular to the ground, the circle being in [30] contact with the ground only at one

point, the diameter divides the weight equally on either side of it; but as soon as it is set in motion, there is more weight on the side to which it is moved, as though it had an inclination in that direction. Hence, it is easier for one who pushes it forward to move it; for it is easier to move any body in a direction to which it inclines, just as it is difficult to move it contrary to its [35] inclination. Some people further assert that the circumference of a circle keeps up a continual motion, just as bodies which are at rest remain so owing to their resistance. This can be illustrated by a comparison of larger with smaller circles; larger circles can be moved more readily with an exertion of the same amount of force and move other weights with them, because the angle of the larger circle as compared with that of the smaller has an inclination which is in the same proportion [852<sup>a</sup>1] as the diameter of the one is to the diameter of the other. Now if any circle be taken, there is always a lesser circle than which it is greater; for the lesser circles which can be described are infinite in number.

Now if it is the case that one circle has a greater inclination as compared with another circle, and is correspondingly easy to move, then it is also the case that if a [5] circle does not touch the ground with its circumference, but moves either parallel to the ground or with the motion of a pulley, the circle and the bodies moved by the circle will have a further cause of inclination; for circular objects of this kind move most easily and move weights with them. Can it be that this is due to a reason other than that they have only a very slight contact with the ground, and consequently encounter little friction? This reason is that which we have already mentioned, namely, that the circle is made up of two forms of motion—and so one of them [10] always has an inclination—and those who move a circle move it when it has, as it were, a motion of its own, when they move it at any point on its circumference. They are moving the circumference when it is already in motion; for the motive force pushes it in a tangential direction, while the circle itself moves in the motion which takes place along the diameter.

[15] 9 · How is it that we can move objects more easily and quickly when they are lifted or drawn along by circles of large circumference? Why, for example, are large pulleys more effective than small, and similarly large rollers? Is it because the longer the radius is the further the object is moved in the same time, and so it will do [20] the same also with an equal weight upon it? Just as we said that large balances are

more accurate than small; for the cord is the centre and the parts of the beam on either side of the cord are the radii.

**10** · Why is it that a balance moves more easily without a weight upon it [25] than with one? So too with a wheel or anything of that nature, the smaller and lighter is easier to move than the heavier and larger. Is it because that which is heavy is difficult to move not only vertically, but also horizontally? For one can move a weight with difficulty contrary to its inclination, but easily in the direction of its inclination; and it does not incline in a horizontal direction.

**11** · Why is it that it is easier to convey heavy weights on rollers than on [30] carts, though the latter have large wheels and the former a small circumference? Is it because a weight placed upon rollers encounters no friction, whereas when placed upon a cart it has the axle at which it encounters friction? For it presses on the axle from above in addition to the horizontal pressure. But an object on rollers is moved [35] at two points on them, where the ground supports them below and where the weight is imposed above; the circle revolves at both these points and is thrust along as it moves.

**12** · Why is it that a missile travels further from a sling than from the hand, although he who casts it has more control over the missile in his hand than when he [852<sup>b</sup>1] holds the weight suspended? Further, in the latter case he moves two weights, that of the sling and the missile, while in the former case he moves only the missile. Is it because he who casts the missile does so when it is already in motion in the sling (for he swings it round many times before he lets it go), whereas when cast from the [5] hand it starts from a state of rest? Now any object is easier to move when it is already in motion than when it is at rest. Or, while this is one reason, is there a further reason, namely, that in using a sling the hand becomes the centre and the sling the radius, and the longer the radius is the more quickly it moves, and so a cast from the hand is short as compared with a cast from a sling? [10]

**13** · Why is it that longer bars are moved more easily than shorter ones round the same capstan, and similarly lighter windlasses are moved

more easily by the same force than stouter windlasses? Is it because the windlass and the capstan form a centre and the outer masses the radii? For the radii of greater circles are moved more readily and further by the same force than those of lesser circles; for [15] the extremity further from the centre is moved more readily by the same force. Therefore in the case of the capstan they use the bars as a means whereby they turn it more easily; and in the case of the lighter windlasses the part outside the central cylinder is more extended, and this portion forms the radius of the circle. [20]

14 · Why is it that a piece of wood of the same size is more easily broken against the knee, if one breaks it holding the ends at equal distance from the knee, than if it is held close to the knee? And if one leans a piece of wood upon the ground and places one's foot on it, why does one break it more easily if one grasps it at a [25] distance from the foot rather than near it? Is it because in the former case the knee, and in the latter the foot is the centre, and the further an object is from the centre the more easily is it always moved, and that which is to be broken must be moved?

15 · Why is it that the so-called pebbles found on beaches are round, though they are originally formed from stones and shells which are elongated in shape? Is it [30] because objects whose outer surfaces are far removed from their middle point are borne along more quickly by the movements to which they are subjected? The middle of such objects acts as the centre and the distance from there to the exterior becomes the radius, and a longer radius always describes a greater circle than a shorter radius when the force which moves them is equal. An object which traverses [35] a greater space in the same time travels more quickly, and objects which travel more quickly from an equal distance strike harder against other objects, and the more they strike the more they are themselves struck. It follows, therefore, that objects in which the distance from the middle to the exterior is greater always become broken, and in this process they must necessarily become round. So in the case of pebbles, [853a1] because the sea moves and they move with it, the result is that they are always in motion, and, as they roll about, they come into collision with other objects; and it is their extremities which are necessarily most affected.

[5] **16** · Why is it that the longer a plank of wood is, the weaker it is, and the more it bends when lifted up? Why, for example, does a short thin plank about two cubits long bend less than a thick plank a hundred cubits long? Is it because the [10] length of the plank when it is lifted forms a lever, a weight, and a fulcrum? The first part of it, then, which the hand raises becomes, as it were, a fulcrum, and the part towards the end becomes the weight; and so the longer the space is from the fulcrum to the end, the more the plank must bend; for it must necessarily bend more the [15] further away it is from the fulcrum. Therefore the ends of the lever must be subject to pressure. If, then, the lever is bent, it must bend more when it is lifted up. This is exactly what happens in the case of long planks of wood; whereas in the case of shorter planks, the extremity is near the fulcrum which is at rest.

[20] **17** · How is it that great weights and masses can be split and violent pressure be exerted with a wedge, which is a small thing? Is it because the wedge forms two levers working in opposite directions, and each has a weight and fulcrum which presses upwards or downwards? Further, the impetus of the blow causes the weight which strikes the wedge and moves it to be very considerable; and it has all the more [25] force because by reason of its speed it is moving what is already moving. Although the lever is short, great force accompanies it, and so it causes a much more violent movement than we should expect from an estimate of its size. Let ABC be the wedge, and DEGF the object which is acted upon by it; then AB is a lever and the weight is below at B, and the fulcrum is FD. On the opposite side is the lever BC. [30] When AC is struck it brings both of these into use as levers; for it presses upwards at the point B.

**18** · Why is it that if one puts two pulleys on two blocks which are in [35] opposite positions, and places round them a cord with one end attached to one of the blocks and the other supported by or passed over the pulleys, if one pulls at the end of the cord, one can move great weights, even if the force which draws them is small? Is it because the same weight is raised by less force, if a lever is employed, [853<sup>b</sup>1] than by the hand, and the pulley acts in the same way as a lever, so that a single pulley will draw more easily and draw a far heavier weight with a slight pull than the hand alone can? Two pulleys raise this weight with more than double the velocity; for the second pulley draws a still less

weight than if it drew alone by itself, [5] when the rope is passed on to it from the other pulley; for the other pulley makes the weight still less. Thus if the cord is passed through a greater number, the difference is great, even when there are only a few pulleys, so that, if the load under the first weighs four *minae*, much less is drawn by the last. In building operations they easily [10] move great weights; for they transfer them from one pulley to another and thence again to windlasses and levers, and this is equivalent to constructing a number of pulleys.

19 · How is it that, if you place a heavy axe on a piece of wood and put a heavy weight on the top of it, it does not cleave the wood to any considerable extent, [15] whereas, if you lift the axe and strike the wood with it, it does split it, although the axe when it strikes the blow has much less weight upon it than when it is placed on the wood and pressing on it? Is it because the effect is produced entirely by movement, and that which is heavy gets more movement from its weight when it is in motion than when it is at rest? So when it is merely placed on the wood, it does [20] not move with the movement derived from its weight; but when it is put into motion, it moves with the movement derived from its weight and also with that imparted by the striker. Furthermore, the axe works like a wedge; and a wedge, though small, can split large masses because it is made up of two levers working in opposite directions.

20 · Why is it that steelyards weigh great weights of meat with a small [25] counterpoise, the whole forming only a half balance? For a pan is fixed only at the end where the object weighed is placed, and at the other end there is nothing but the steelyard. Is it because the steelyard is at once a beam and a lever? For it is a beam, [30] inasmuch as each position of the cord becomes the centre of the steelyard. Now at one end it has a pan, and at the other instead of a pan the counterpoise which is fixed in the beam, just as if one were to place the other pan with the counterpoise in it at the end of the steelyard; for it is clear that it draws the same weight when it lies in [35] this second pan. But in order that the single beam may act as many beams, many such positions for the cord are situated along a beam of this kind, in each of which the part on the side of the counterpoise forms half the steelyard and acts as the weight,<sup>5</sup> the positions of the cord being moved through equal intervals, so that one can calculate how much weight is drawn by what lies in the pan, and thus know, [854<sup>a</sup>1] when the steelyard is horizontal, how much

weight the pan holds for each of the several positions of the cord, as has been explained. In short, this may be regarded as a balance, having one pan in which the object weighed is placed, and the other in which is the weight of the steelyard, and so the steelyard at the other end is the [5] counterpoise. Hence it acts as an adjustable balance beam, with as many forms as there are positions of the cord. And in all cases, when the cord is nearer the pan and the weight upon it, it draws a greater weight, on account of the whole steelyard [10] being an inverted lever (for the cord in each position is a fulcrum, although it is above, and the weight is what is in the pan), and the greater the length of the lever from the fulcrum, the more easily it produces motion in the case of the lever, and in the case of the balance causes equilibrium and counterbalances the weight of the [15] steelyard near the counterpoise.

21 · How is it that doctors extract teeth more easily by applying the additional weight of a tooth-extractor than with the bare hand only? Is it because [20] the tooth is more inclined to slip in the fingers than from the tooth-extractor? or does not the iron slip more than the hand and fail to grasp the tooth all round, since the flesh of the fingers being soft both adheres to and fits round the tooth better? The truth is that the tooth-extractor consists of two levers opposed to one another, with the same fulcrum at the point where the pincers join; so they use the [25] instrument to draw teeth, in order to move them more easily.

Let A be one extremity of the tooth-extractor and B the other extremity which draws the tooth, and ADF one lever and BCE the other, and CHD the fulcrum, and let the tooth, which is the weight to be lifted, be at the point I, where the two levers [30] meet. The doctor holds and moves the tooth at the same time with B and F; and when he has moved it, he can take it out more easily with his fingers than with the instrument.

22 · Why is it that men easily crack nuts, without striking a blow upon them, in the instruments made for this purpose? For with nut-crackers much power is lost, namely, that of motion and violent impetus. Further, if one crushes them with a [35] hard and heavy instrument, one can crack them much more quickly than with a light wooden instrument. Is it because the nut is crushed on two of its sides by two levers, and weights can easily be divided with a lever? For the nut-cracker consists [854<sup>b</sup>1] of two levers, with the same fulcrum, namely, A, their point of



connexion. As, therefore, E and F would have been easily pushed apart, so they are easily brought together by a small force,<sup>6</sup> the levers being moved at the points D and C. So EC and [5] FD being levers exert the same or even greater force than that which the weight exerted when the nut was cracked by a blow; for when weight is put upon the levers they move in opposite directions and compress and break the object at K. For this very reason, too, the nearer K is to A, the sooner it is subjected to pressure; for the further the lever extends from the fulcrum, the more easily and more powerfully does it move an object with the exercise of the same force. A, then, is the fulcrum, [10] and DAF and CAE are the levers. The nearer, therefore, K is to the angle at A, the nearer it is to the point where the levers are connected, and this is the fulcrum. So with the same force bringing them together, F and E must be subjected to more weight; and so, when weight is exerted from two contrary directions, more compression must take place, and the more an object is compressed, the sooner it [15] breaks.

**23** · Why is it that in a rhombus, when the points at the extremities are moved in two movements, they do not describe equal straight lines, but one of them a much longer line than the other? Further (and this is the same question), why does the point moving along the side describe a resultant line less than the side? For the point describes the diagonal, the shorter distance, and the line moves along the side, [20] the longer distance; and yet the line has but one movement, and the point two movements.

For let A move along AB to B, and B to A with the same velocity; and let the line AB move along AC parallel to CD with the same velocity. Then the point A must move along the diagonal AD, and B along BC; and both must describe these [25] diagonals simultaneously, while AB moves along the side AC.

For let A be moved the distance AE, and the line AB the distance AF, and let FG be drawn parallel to AB, and a line drawn from E to complete the parallelogram. The small parallelogram then thus formed is similar to the whole parallelogram. Thus AF equals AE, so that A has been moved along the side AE, while the [30] line AB would be moved the distance AF. Thus A will be on the diagonal at H, and so must always move along the diagonal; and the side AB will describe the side AC, and the point A the diagonal AD simultaneously. In the same way it may be proved [35] that B moves along the diagonal BC, BE being equal to BG. For, if the

parallelogram be completed by drawing a line from G, the interior parallelogram will be similar to the whole parallelogram; and B will be on the diagonal at the point where the sides meet; and the side will describe the side; and the point B describes [855<sup>a</sup>1] the diagonal BC.

At the same time then B will describe a line which is much longer than AB, and the side will pass along the side which is shorter, though the velocity is the same, in the same time (and the side has moved further than A, though it is moved by only [5] one movement). For as the rhombus becomes more acute, AD becomes the lesser diagonal and BC greater, and the side less than BC. For it is strange, as has been remarked, that in some cases a point moved by two movements travels more slowly than a point moved by one, and that, while both the given points have equal velocity, either one of them describes a greater line. [10]

The reason is that, when a point moves from an obtuse angle, the sides are in almost opposite directions, namely, that in which the point itself is moved and that in which it is moved down by the side; but when it moves from an acute angle, it moves, as it were, in actual fact towards the same position. For the angle of the sides contributes to increase the speed of the diagonal; and in proportion as one makes the one angle more acute and the other more obtuse, the movement is slower or quicker. [15] For the sides are brought into more opposite direction by the angle becoming more obtuse; but they are brought into the same direction by the sides being brought nearer together. For B moves in practically the same direction in virtue of both its movements; thus one contributes to assist the other, and more so, the more acute the [20] angle becomes. And the reverse is the case with A; for it itself moves towards B, while the movement of the side brings it down to D; and the more obtuse the angle is, the more opposite will the movements be; for the two sides become more like a [25] straight line. If they became actually a straight line, the components would be absolutely in opposite directions. But the side, being moved in one direction only, is interfered with by nothing. In that case it naturally moves through a longer distance.

**24** · There is a question why a large circle traces out a path equal to that of a [30] smaller circle, when they are placed about the same centre, but when they are rolled separately, their paths are to one another in the proportion of their dimensions. And, further, the centre of both being one and the same, at one time the path which they trace is of the same length as the smaller traces out alone, and at another time [35] of the length

which the larger circle traces. Now it is manifest that the larger circle traces out the longer path. For by mere observation it is plain that the angle which the circumference of each makes with its own diameter is greater in the case of the larger circle than in the smaller; so that, by observation, the paths along which they [855<sup>b</sup>1] roll will have this same proportion to one another. But, in fact, it is manifest that, when they are situated about the same centre, this is not so, but they trace out an equal path; so that it comes to this, that in the one case the path is equal to that [5] traced by the larger circle, in the other to that traced by the smaller.

Let DFC be the greater circle, EGB the lesser, A the common centre, FI the path along which the greater circle moves by its own motion, and GK the path of the smaller circle by its own motion, equal to FL.

[10] When, then, I move the smaller circle, I move the same centre A; and now let the large circle be fixed to it. Whenever, therefore, AB becomes perpendicular to GK, AC at the same time becomes perpendicular to FL; so that they will always have traversed an equal distance, GK representing the arc GB, and FL representing [15] the arc FC. And if one quadrant traces an equal path, it is plain that the whole circle will trace out a path equal to that of the other whole circle; so that whenever the line GB comes to K, the arc FC will move along FL; and the same is the case with the whole circle after one revolution.

In like manner if I roll the large circle, fastening the smaller circle to it, about [20] the same centre, AB will be perpendicular and vertical at the same time as AC, the latter to FI, the former to GH. So that, whenever the one shall have traversed a distance equal to GH and the other a distance equal to FI, and FA again becomes perpendicular to FL and AG to GK, they will be in their original position at the points H and I. And, since there is no halting of the greater for the lesser, so as to be [25] at rest during an interval at the same point (for in both cases both are moved continuously), nor does the lesser skip any point, it is strange that in one case the greater should traverse a distance equal to that traversed by the lesser, and in the other case the lesser a distance equal to that traversed by the greater. And, further, [30] it is wonderful that, though there is always only one movement, the centre that is moved should be rolled forward in one case a great and in another a less distance. For the same thing moved at the same velocity naturally traverses an equal distance; and to move a thing at the same velocity is to move it an equal distance in both cases.

As to the reason, this may be taken as a principle, that the same, or an equal force, moves one mass more slowly and the other more quickly.

Suppose that there is a body which is not naturally in motion of itself; if [35] another body which is naturally in motion move it and itself as well, it will be moved more slowly than if it were being moved by its own motion alone; and if it be naturally in motion and nothing is moved with it, the same is the case. So it is quite impossible for any body to be moved more than that which moves it; for it is not moved according to any rate of motion of its own, but at the rate of that which moves it. [856<sup>a</sup>1]

Let there be two circles, a greater A and a lesser B. If the lesser were to push along the greater, when the greater is not rolling alone, it is plain that the greater will traverse so much distance as it has been pushed by the lesser. And it has been [5] pushed the same distance as the small circle has moved; so that they have both traversed an equal straight line. Necessarily, therefore, if the lesser be rolling while it pushes the greater, the latter will be rolled, as well as pushed, just so far as the lesser has been rolled, if the greater have no motion of its own; for in the same way and so far as the moving body moves it, so far must the body which is moved be moved thereby. So, indeed, the lesser circle has moved the greater so far and in the [10] same way, viz., in a circle and for the distance of one foot (for let that be the extent of the movement); and consequently the larger circle has moved that distance.

So too, if the large circle move the lesser, the lesser circle will have been moved just as far as the large circle, in whatever way<sup>7</sup> the latter be moved, whether quickly [15] or slowly, by its own motion; and the lesser circle will trace out a line at the same velocity and of the same length as the greater traced out by its natural movement. And this is just what causes the difficulty, that they do not act any longer when they are joined together in the same way as they acted when they were not connected; that is to say, when one is moved by the other not according to its natural motion, nor according to its own motion. For it makes no difference whether one is fixed [20] round the other or fitted inside it, or placed in contact with it; for in all these cases, when one moves and the other is moved by it, the one will be moved just so far as the other moves it.

Now when one moves a circle by means of another circle in contact with it, or suspended from it, one does not revolve it continuously; but if one places them about [25] the same centre, the one must be continuously revolved by the other. But nevertheless, the former is not moved in accordance with its own motion, but just as if it had no proper motion; and if it has a proper motion, but does not make use of it, it comes to the same thing.

Whenever, therefore, the large circle moves the small circle affixed to

it, the small circle moves the same distance as the large, and vice versa. But when they are [30] separate each has its own motion.

If any one raises the difficulty that, when the centre is the same and is moving the two circles with equal velocity, they trace out unequal paths, he is reasoning falsely and sophistically. For the centre is, indeed, the same for both, but only [35] accidentally, just as the same thing may chance to be musical and white; for to be the centre of each of the circles is not the same for it in the two cases.

In conclusion, when it is the smaller circle that moves the greater, the centre and source of motion is to be regarded as belonging to the smaller circle; but when the greater circle moves the lesser, it is to be regarded as belonging to the greater circle. Thus the source of motion is not the same absolutely, though it is in a sense the same.

25 · Why do they construct beds so that one dimension is double the other, [856<sup>b1</sup>] one side being six feet long or a little more, the other three feet? And why do they not stretch bed-ropes diagonally? Do they make them of this size so as to fit the [5] body? Thus they have one side twice the length of the other, being four cubits long and two cubits wide.

The ropes are not stretched diagonally but from side to side, so that the wooden frame may be less likely to break; for wood can be cleft most easily if split thus in the natural way, and when there is a pull upon it, it is subject to a considerable strain. Further, since the ropes have to be able to bear a weight, there will be less of [10] a strain when the weight is put upon them if they are strung crosswise rather than diagonally. Again, less rope is used up by this method.

Let AFGI be a bed, and let FG be divided into two equal parts at B. There is an equal number of holes in FB and BA; for the sides are equal, each to each, for the [15] whole side FG is double the side BA. They stretch the rope on the method already mentioned from A to B, then to C, D, H, and E, and so on until they turn back and reach another angle; for the two ends of the rope come at two different angles.

Now the parts of the rope which form the bends are equal, e.g. AB, BC are [20] equal to CD, DH—and so with other similar pairs of sides, for the same demonstration holds good in all cases. For AB is equal to EH; for the opposite sides of the parallelogram BGKA are equal, and the holes are an equal distance apart from one another. And BG is equal to KA; for the angle at B is equal to the angle at G (for the exterior angle of a parallelogram is equal to the interior opposite angle); [25] and the angle

at B is half a right angle, for FB is equal to FA, and the angle at F is a right angle. And the angle at B is equal to the angle at G; for the angle at F is a right angle, since the bed is a rectangular figure, one side of which is double the other, and divided into two equal parts; so that BC is equal to EG, as also is KH; for it is [30] parallel. So that BC is equal to KH, and CE to DH. In like manner it can be demonstrated that all the other pairs of sides which form the bends of the rope are equal to one another. So that clearly there are four such lengths of rope as AB in the bed; and there is half the number of holes in the half FB that there is in the whole [35] FG. So that in the half of the bed there are lengths of rope, such as AB, and they are of the same number as there are holes in BG, or, what comes to the same thing, in AF, FB together. But if the rope be strung diagonally, as in the bed ABCD, the [857<sup>a</sup>1] halves are not of the same length as the sides of both, AF and FG; but they are of the same number as the holes in FB, FA. But AF, FB, being two, are greater than AB, so that the rope is longer by the amount by which the two sides taken together are greater than the diagonal.

**26** · Why is it more difficult to carry a long plank of wood on the shoulder if [5] one holds it at the end than if it is held in the middle, though the weight is the same? Is it because, as the plank vibrates, the end prevents one from carrying it, because it tends to interrupt one's progress by its vibration? No, for if it does not bend at all [10] and is not very long, it is nevertheless more difficult to carry if it is held at the end. It is easier to carry if one holds it in the middle rather than at the end, for the same reason for which it is easier to lift in that way. The reason is that, if one lifts it in the middle, the two ends always lighten one another, and one side lifts the other side up. For the middle, where the lifter or carrier holds it, forms, as it were, the centre, and [15] each of the two ends inclining downwards raises up and lightens the other end; whereas if it is lifted or carried from one end, this effect is not produced, but all the weight inclines in one direction. Let A be the middle of a plank which is raised or carried, and let B and C be the extremities. When the plank is lifted or carried at the point A, B inclines downwards and raises C up, and C inclines downwards and [20] raises B up; the effect is produced by their being raised up at the same moment.

**27** · Why is a very long object more difficult to carry on the shoulder, even if one carries it in the middle, than a shorter object of the

same weight? In the last case we said that the vibration was not the reason; in this case it is the reason. For [25] the longer an object is, the more its extremities vibrate, and so it would be more difficult for the man to carry it. The reason of the increased vibration is that, though the movement is the same, the extremities change their position more the longer the piece of wood is. Let the shoulder, which is the centre (for it is at rest), be at A, and [30] let AB and AC be the radii; then the longer the radius AB or AC is, the greater is the amplitude of movement. This point has already been demonstrated.

28 · Why do they construct swing-beams by the side of wells by attaching the lead as a weight at the end of the bar, the bucket being itself a weight, whether it [35] is empty or full? Is the reason that, the drawing of water being divided into two operations distinct in time (for the bucket has to be dipped and then drawn up), it is an easy task to let it down when it is empty, but difficult to raise it when it is full? It [857<sup>b</sup>1] is therefore of advantage to lower it rather more slowly with a view to lightening the weight considerably when it is drawn up again. This effect is produced by the lead or stone attached to the end of the swing-beam. In letting it down there is a heavier [5] weight to lift than if one has merely to lower the empty bucket; but when it is full, the lead, or whatever the weight attached is, helps to draw it up; and so the two operations taken together are easier than on the other method.

29 · Why is it that when two men are carrying an equal weight on a piece of wood or something of the kind, the pressure on them is not equal unless the weight is [10] in the middle, but it presses more on the person carrying it to whom it is nearest? is it because the wood, when they hold it in this way, becomes a lever, and the load [15] forms the fulcrum, and the carrier nearer to the load becomes the weight which is to be moved, while the other carrier becomes the mover of the weight? The further the latter is from the weight, the more easily he moves it, and the more he presses down the other man, since the load placed on the wood and acting as a fulcrum, as it were, offers resistance. But if the load is placed in the middle, one carrier does not act as a weight on the other any more than the other on him, or exercise any motive force [20] upon him, but each is equally a weight upon the other.

**30** · Why is it that when people rise from a sitting position, they always do so by making an acute angle between the thigh and the lower leg and between the chest and the thigh, otherwise they cannot rise? Is it because equality is always a cause of rest, and a right angle causes an equality and so causes equilibrium? So in [25] rising a man moves towards a position at equal angles to the earth's circumference; for it is not the case that he will actually be at right angles to the ground. Or is it because when a man rises he tends to become upright, and a man who is standing must be perpendicular to the ground? If, then, he is to be at right angles to the [30] ground, that means that he must have his head in the same line as his feet, and this occurs when he is rising. As long, then, as he is sitting, he keeps his feet and head parallel to one another and not in the same straight line. Let A be the head, AB the line of the chest, BC the thigh, and CD the lower leg. Then AB, the line of the chest, [35] is at right angles to the thigh, and the thigh at right angles to the lower leg, when a man is seated in this way. In this position, then, a man cannot rise; but to do so he must bend the leg and place the feet at a point under the head. This will be the case if CD be moved to CF, and the result will be that he can rise immediately, and he [858<sup>a</sup>1] will have his head and his feet in the same straight line;<sup>8</sup> and CF will form an acute angle with BC.

**31** · Why is it that a body which is already in motion is easier to move than one which is at rest? For example, a wagon which is in motion can be propelled more [5] quickly than one which has to be started. Is it because, in the first place, it is very difficult to move in one direction a weight which is already moving in the opposite direction? For though the motive force may be much quicker, yet some of it is lost; for the propulsion exerted by that which is being pushed in the opposite direction must necessarily become slower. And so, secondly, the propulsion must be slower if the body is at rest; for even that which is at rest offers resistance. When a body is [10] moving in the same direction as that which pushes it, the effect is just as if one increased the force and speed of the motive power; for by moving forward it produces of itself exactly the effect which that power would have upon it.

**32** · Why is it that an object which is thrown eventually comes to a [15] standstill? Does it stop when the force which started it fails, or



because the object is drawn in a contrary direction, or is it due to its downward tendency, which is stronger than the force which threw it? Or is it absurd to discuss such questions, while the principle escapes us?

**33** · How is it that a body is carried along by a motion not its own, if that which started it does not keep following and pushing it along? Is it not clear that in the beginning the impelling force so acted as to push one thing along, and this in its turn pushes along something else? The moving body comes to a standstill when the force which pushes it along can no longer so act as to push it, and when the weight of [20] the moving object has a stronger inclination downwards than the forward force of that which pushes it.

**34** · Why is it that neither small nor large bodies travel far when thrown, but they must have due relation to the person who throws them? Is it because that [25] which is thrown or pushed must offer resistance to that from which it is pushed, and whatever does not yield owing to its mass, or does not resist owing to its weakness, does not admit of being thrown or pushed? A body, then, which is far beyond the force which tries to push it, does not yield at all; while that which is far weaker offers no resistance. Or is it because that which travels along does so only as far as it [30] moves the air to its depths, and that which is not moved cannot itself move anything either? Both these things are the case here; that which is very large and that which [858<sup>b</sup>1] is very small must be looked upon as not moving at all; for the latter does not move anything, while the former is not itself at all moved.

**35** · Why is it that an object which is carried round in whirling water is [5] always eventually carried into the middle? Is it because the object has magnitude, so that it has position in two circles, one of its extremities revolving in a greater and the other in a lesser circle? The greater circle, then, on account of its greater velocity, draws it round and thrusts it sideways into the lesser circle; but since the object has breadth, the lesser circle in its turn does the same thing and thrusts it into [10] the next interior circle, until it reaches the centre. Here the object remains because it stands in the same relation to all the circles, being in the middle; for the middle is equidistant from the circumference in the case of each of the circles. Or is it because an object which, owing to its

magnitude, the motion of the whirling water cannot [15] overcome, but which by its weight prevails over the velocity of the revolving circle, must necessarily be left behind and travel along more slowly? Now the lesser circle travels more slowly—for the greater and the lesser circle do not<sup>9</sup> revolve over the same space in an equal time when they move round the same centre—and so the object must be left revolving in a lesser and lesser circle until it reaches the middle. [20] If the force of the whirling water prevails at first, it will go on doing so to the end; for one circle must prevail and then the next over the weight of the object owing to their velocity, so that the whole object is continually being left behind in the next circle towards the centre. For an object over which the water does not prevail must be carried either inwards or outwards. Such an object cannot then be carried along in [25] its original position; still less can it be carried along in the outer circle, for the velocity of the outer circle is greater. The only alternative is that the object over which the water does not prevail is transferred to the inner circle. Now every object [30] has a tendency to resist force; but since the arrival at the middle puts an end to motion, and the centre alone is at rest, all objects must necessarily collect there.

<sup>1</sup>Reading τὸ μὲν A.

<sup>2</sup>Omitting κατ' εὐθεΐαν.

<sup>3</sup>Placing a comma after, not before, ἐπὶ τὸ μέσον.

<sup>4</sup>Reading διό for ὅ.

<sup>5</sup>Placing a comma after, not before, καὶ ὁ σταθμός.

<sup>6</sup>Omitting ὕφ' ὧν.

<sup>7</sup>Placing a comma after καὶ ὁ μείζων, and reading ὁποτέρωσοῦν.

<sup>8</sup>Reading εὐθείας.

<sup>9</sup>Reading οὐ τὸ αὐτό.

# PROBLEMS\*\*

*E. S. Forster*

## BOOK I

### PROBLEMS CONNECTED WITH MEDICINE

1 · Why is it that great excesses cause disease? Is it because they engender [859<sup>a</sup>1] excess or defect, and it is in these after all that disease consists?

2 · But why is it that diseases can often be cured if the patient indulges in excess of some kind? And this is the treatment used by some doctors; for they cure [5] by the excessive use of wine or water or salt, or by over-feeding or starving the patient. Is it because the causes of the disease are opposites of one another, so that each reduces the other to the mean?

3 · Why is it that the changes of the seasons and the winds intensify or stop [10] diseases and bring them to a crisis and engender them? Is it because the seasons are hot and cold and moist and dry, while diseases are due to excess of these qualities and health to their equality? In that case, if the disease is due to moisture or cold, a season which has the opposite characteristics stops it; but if a season of the opposite kind follows, the same admixture of qualities being caused as before intensifies the disease and kills the patient. For this reason the seasons even cause disease in [15] healthy persons, because by their changes they destroy the proper admixture of qualities; for it is at the same time improved by suitable seasons, times of life, and localities. The health therefore requires careful management at times of change. And what has been said generally

as to the effect of the seasons applies also in detail; for changes of winds and of age and of locality are to some extent changes of [20] season. These also therefore intensify and stop diseases and bring them to a crisis and engender them, as do the seasons and the risings of certain constellations, such as Orion and Arcturus and the Pleiads and the Dogstar, since they cause<sup>1</sup> wind and rain and fine weather and storms and sunshine.

[25] **4** · Why ought emetics to be avoided at the changes of the seasons? Is it in order that there may be no disturbance when the excretions are being altered by such changes?

[859<sup>b</sup>1] **5** · Why is it that the feet swell both of those who are bilious and of those who are suffering from starvation? Is it in both cases the effect of wasting? For those who are starving waste because they do not receive any nourishment at all, while the bilious waste because they do not derive any benefit from the nourishment which they take.

[5] **6** · Why is it that, though the diseases due to bile occur in the summer (the season when fevers are at their height), acute diseases due to bile occur rather in the winter? Is it because, being accompanied by fever, they are acute because they are violent, and violence is unnatural? For fervent inflammation is set up when certain parts of the body are moist, and inflammation, being due to an excess of heat, [10] engenders fevers. In the summer, therefore, diseases are dry and hot, but in the winter they are moist and hot and consequently acute (for they soon kill the patient), for concoction will not take place because of the abundance of the excretion.

[15] **7** · Why is it that the plague alone among diseases infects particularly persons who come into contact with those who are under treatment for it? Is it because it is the only disease to which all men alike are liable, and so the plague affects any one who is already in a low state of health? For they quickly become infected by the inflammatory matter caused by the disease which is communicated [20] by the patient.

**8** · Why is it that, when north winds have been prevalent in the

winter, if the spring is rainy and characterized by south winds the summer is unhealthy with fever and ophthalmia? Is it because the summer finds the body full of alien humours, and [25] the earth, and any place in which men dwell, becomes moist and resembles localities which are regarded as permanently unhealthy? The result is that, first, ophthalmia occurs when the excretion in the region of the head liquefies, and, secondly, fever [860<sup>a</sup>1] ensues. For it is noticeable that anything which admits of extreme cold also admits of extreme heat,—water, for example, and a stone, of which the former boils quicker than other things, the latter burns more.<sup>2</sup> As, therefore, in the air a stifling heat occurs when it grows warm owing to its density, so likewise in the body stifling [5] and heat are engendered, and heat in the body is fever and in the eyes ophthalmia. Generally speaking the change which occurs when a warm, dry summer follows immediately on a wet spring, being violent has a deleterious effect upon the body. The effect is still worse if the summer is rainy; for then the sun finds material, which [10] it will cause to boil in the body as in the earth and air; the result is fever and ophthalmia.

9 · Why is it that, if the winter is characterized by south winds and rainy and if the spring is dry with the wind in the north, both the spring and the summer are unhealthy? Is it because in the winter owing to the heat and moisture the body assimilates its condition to that of the season, since it must necessarily be moist and [15] relaxed? When the body is in this state, the spring being cool congeals and hardens it owing to its dryness. The result is that women who are pregnant run a risk of abortion in the spring because of the inflammation and mortification caused by the dry cold, since the necessary moisture is not secreted, and the foetus in the womb [20] becomes weakly and defective owing to the excess of cold; for children who are born at this season in fine weather become strong and receive nourishment in the womb. In the case of other persons—because in the spring the phlegm is not purged away owing to its excess (as happens when the weather is warm), but congeals owing to [25] the cold—when the summer and warmth succeeds, setting up violent liquefaction, humours form in those who are bilious and dry because their bodies lack moisture and are naturally parched; but these humours are slight and so such people suffer from dry ophthalmia. Those on the other hand who are phlegmatic are afflicted [30] with sore throats and catarrh of the lungs. Women suffer from dysentery owing to their natural moisture and cold; while elderly persons are afflicted with apoplexy, when moisture being all set free at once overcomes them and solidifies

owing to the weakness of their natural heat.

**10** · Why is it that, when the summer is dry and northerly winds prevail and [35] the autumn on the contrary is wet and characterized by south winds, headaches and sore throats and coughs occur in the ensuing winter and then terminate in phthisis? Is it because the winter finds a considerable amount of matter in the body and so it [860<sup>b</sup>1] is a difficult task for it to solidify the moisture and form phlegm? Consequently, when moisture is engendered in the head, it causes a feeling of heaviness, and if it is plenteous and cold, it causes mortification; but if, owing to its abundance, it does [5] not solidify, it flows into the nearest region of the body, and thus coughs are caused and sore throats and wasting.

**11** · But why is it that if the summer and autumn are dry and northerly winds prevail, this weather suits those who are phlegmatic, and women? Is it because in both cases nature tends to an excess in one direction, and so the season [10] exerting its influence in the opposite direction establishes an equable temperament, and they are healthy at the time, unless they themselves do anything which harms them, and, when the winter comes on, they are not in a moist condition, having heat in them with which to resist the cold?

**12** · Why is it that a dry summer and autumn in which northerly winds [15] prevail is unhealthy for those who are bilious? Is it because their bodily condition and the season have the same tendency and it is like adding fire to fire? For the body becoming dry (the freshest element in it becoming evaporated) and being [20] overheated, dry ophthalmia must necessarily ensue owing to solidification;<sup>3</sup> but because the remaining humours are full of bile<sup>4</sup> and these become overheated, acute fevers must ensue caused by the bile, which is undiluted, and in some cases madness, where black bile is naturally present; for the black bile comes to the [25] surface as the contrary humours are dried up.

**13** · Why do they say that a change of drinking-water is unhealthy, but not a change of air? Is it because water becomes nutriment, with the result that it gets into one's system and has an effect upon one, which is not the case with air? Further there are many kinds of water differing

intrinsically from one another, but not of [30] air; this then may also be a reason. For even when we change our place of dwelling we continue to breathe practically the same air, but we drink different waters. It is, therefore, probably a right opinion that change of drinking-water is unhealthy.

[35] **14** · Why is it that a change of drinking-water is more unhealthy than a change of food? Is it because we consume more water than anything else? For water is found in farinaceous and other foods and whatever we drink consists mainly of water.

[861<sup>a</sup>1] **15** · But why is a change unhealthy? Is it because every change both of season and of age is liable to disturbance? For extremities, such as beginnings and ends, are particularly liable to disturbance. So too foods, when they are different, corrupt one another; for some have only just entered the system, while others have [5] not yet done so. Further, just as a varied diet is unhealthy (for the concoction is then disturbed and not uniform), so those who change their drinking-water are using a varied diet in what they drink; and liquid nourishment has more effect than dry food because it is greater in bulk and because the moisture from the foods themselves forms nourishment.

[10] **16** · Why does a change of drinking-water cause an increase of lice in those who suffer from lice? Is it because, owing to the disturbance set up by the different water in those who frequently change their drinking-water, the unconcocted state of the liquid causes a moist condition, especially in that part where the conditions are suitable? Now the brain is moist, and therefore the head is always the moistest part [15] of the body (as is shown by the fact that hair grows there more than elsewhere), and it is the moisture of this part which generates lice. This is clear in the case of children; for their heads are moist and they frequently have either runny noses or discharge of blood, and persons of this age suffer particularly from lice.

[20] **17** · Why is it that from the rising of the Pleiads until the west wind blows those who suffer from chronic diseases are most likely to die, and the old rather than the young? Is it because two things are fatal to



life, excess and cold? For life is heat, whereas this season has both the above characteristics, for it is cold, and winter is then at its height, the subsequent season being spring. Or is it because those who [25] suffer from chronic diseases are in a similar condition to the old? For the occurrence of a long illness is like premature old age, since in both the body is dry and cold,—in the one case owing to the time of life, in the other from disease. Now winter and frosts constitute an excess of coldness and dryness; therefore to those who are in a [30] condition where a very little will turn the scale, winter is like fire added to fire and so causes death.

18 · Why is it that in marshy districts sores on the head are quickly cured, but those on the legs only with difficulty? Is it because the moisture, owing to the fact that it contains an earthy element, is heavy, and heavy things are carried [35] downwards? Thus the upper parts of the body are cleared out because the impurities are carried to the lower parts, and these become full of excretions which easily putrefy.

19 · Why is it that, when a very dry summer follows after northerly winds [861<sup>b1</sup>] have prevailed in the winter and the spring has been damp and rainy, the autumn is universally fatal, especially to children, while in other people dysentery and prolonged quartan fevers occur then? Is it because, when there is a moderate [5] amount of rain in the summer, the moisture boiling within us, which collected in the damp spring, is cooled and becomes quiescent? If on the other hand this does not happen, children, because they are moist and hot, are in a state of excessive boiling, because they are not cooled; and anything which does not as it were<sup>5</sup> boil out in the summer, does so in the autumn. If the excretions do not cause death immediately, [10] but settle round the lungs and windpipe—for they collect first in the upper part of the body, because we are warmed by the air, for it is owing to this that ophthalmia occurs before fever in an unhealthy summer—if then, as I have said, the excretions in the upper parts of the body do not immediately kill the patient, they descend in an [15] unconcocted condition into the stomach; and thus dysentery is caused, because the moisture owing to its abundance is not discharged. If the dysentery ceases, quartan fevers arise in those patients who survive; for the sediment of the unconcocted moisture remains very persistently in the body and becomes active, just like black bile. [20]

**20** · Why is it that, if the summer and the autumn have been rainy and damp, the ensuing winter is unhealthy? Is it because the winter finds the body in a very moist state, and also the change from great heat is violent and not gradual, because the autumn as well as the summer has been hot, and so acute diseases are [25] caused in some persons, if they have no rarity in their bodies (for in such persons the moist excretions tend to collect in the upper part of the body, because these parts provide room for them, whereas the lower parts differ in this respect)? Those then whose flesh is solid do not allow of much excretion. When therefore the excretion in [30] the upper parts of the body cools (as happens in drunken persons when they grow cold), the above-mentioned diseases are engendered. On the other hand when fevers are set up in persons in whose bodies there is more rarity, the fevers caused by a large quantity of unconcocted moisture become burning fevers, because in such [35] people the humours are distributed more through the whole body than in solid-fleshed people, and, when the flesh is contracted by the winter-cold, the humours being heated cause fever. For excessive heat in the whole body is fever, and, when it [862<sup>a</sup>1] is intensified by the abundance of moisture already present there, it turns into a burning fever.

**21** · Why is it that when a large amount of vapour is drawn out of the earth [5] by the sun, the year is pestilential? Is it because it is necessarily a sign that the year is damp and rainy and the ground is necessarily damp? The conditions of life will then resemble those under which people live in a marshy district, and these are unhealthy. The body must then have in it an abundance of excretion and so contain unhealthy matter in the summer.

[10] **22** · Why is it that those years are unhealthy in which small toad-like frogs are produced in abundance? Is it because everything flourishes in its natural environment, and these frogs are naturally moist and so signify that the year is moist and damp? Now such years are unhealthy; for then the body being moist [15] contains abundant excretion, which is a cause of diseases.

**23** · Why is it that south winds which are dry and do not bring rain cause fever? Is it because they cause alien moisture and heat (for they are naturally moist [20] and hot), and this is what causes fever, for it is due

to the combined excess of moisture and heat? When therefore south winds blow without bringing rain, they engender this condition in us, whereas, when they bring rain with them, the rain cools us. Now south winds from the sea are also beneficial to plants, for they are [25] cooled by the sea before they reach them; whereas blight is due to alien moisture and heat.

**24** · Why is it that men feel heavier and weaker when the wind is in the south? Is it because moisture becomes abundant instead of scanty, being melted by [30] the heat, and moisture, which is heavy, takes the place of breath, which is light? Further, our strength is in our joints, and they are relaxed by south winds (as is shown by the fact that things which have been glued together creak); for the viscous matter in the joints, if it hardens, prevents us from moving, whereas, if it is too moist, it prevents us from exerting ourselves.

[35] **25** · Why are people more liable to fall ill in the summer while those who are ill are more liable to die in the winter? Is it because in the winter, owing to the fact that the hot matter from its density becomes collected within the body and we suffer more through the excretions which solidify in us, if we cannot concoct them, the [862<sup>b</sup>1] commencement of the disease must necessarily be violent, and being of this character it is likely to prove fatal? In the summer on the other hand, because the whole body is in a state of rarity and cool and too much relaxed for great exertion, there must necessarily be many commencements of disease owing to fatigue and to the fact that we do not concoct all that we swallow (for summer is the season of [5] fresh fruit); but such diseases are not so violent, and therefore yield easily to treatment.

**26** · Why is it that deaths are particularly likely to occur during the hundred days following each solstice? Is it because in each case the excess of heat or cold extends over this period, and excess causes disease and death in the weakly? [10]

**27** · Why is it that the spring and the autumn are unhealthy? Is it because changes are unhealthy? The autumn is more unhealthy than the

spring, because we are more apt to contract disease when heat turns to cold than when cold turns to heat, and it is in spring that cold turns to heat and in autumn that heat turns to [15] cold.

28 · Why is it that illnesses are rarer in the winter than in the summer, but more often fatal? Is it because illnesses arise from slight causes in the summer but not in the winter? For in winter we are in a better condition for concoction and at the very height of our health, so that naturally illnesses which arise from more [20] serious causes are themselves more serious and more likely to prove fatal. We see the same thing in athletes and generally among those who are in a healthy condition; for they either are not afflicted with disease, or, if they are, they rapidly succumb, for they only become ill from some serious cause.

29 · Why is it that in the autumn and winter burning fevers are more likely [25] to occur when the weather is cold, while in the summer chills are most troublesome when it is hot? Is it due to the fact that of the humours in man the bile is hot and the phlegm cold? As a result, in summer the cold matter is set free, and being diffused in the body gives rise to chill and shivering; in the winter, on the other hand, the hot [30] matter is overpowered by the weather and cooled. Burning fevers are more troublesome in the winter and autumn, because, owing to the cold, the hot matter collects within, and the fever is within and not on the surface; it is natural therefore that burning fevers should occur during this part of the year. This can be well illustrated by contrasting those who bathe in cold water and those who use warm [35] water in the winter; those who wash in cold water, though they feel chilled for a short time while they are actually washing, suffer no ill effects from the cold during the rest of the day, while those who use hot water continue to be less able to resist [863<sup>a</sup>1] the cold. For the flesh of those who wash in cold water becomes solid, and the hot matter collects within; but the flesh of those who use warm water becomes rare, and the hot matter is diverted to the outside of the body. [5]

30 · In what does the virtue of a poultice consist? Would it, owing to its dissolvent action, set up perspiration and evaporation?

**31** · How can the presence of an abscess be diagnosed? Is it true that, if, when hot water is poured over it, a change takes place, there is an abscess, but none if there is no change?

[10] **32** · In what cases ought cauterization to be employed, and in what cases the surgeon's knife? Is it true that wounds which have large openings and do not close up quickly ought to be cauterized, so that a scab may form? If this is done, there will be no festering.

**33** · In what does the virtue of a remedy for stanching blood consist? Is it because it has a drying effect and stops the discharge of excretions without making [15] a scab or causing decay of the flesh? If so, the wound must be free from inflammation and likely to heal up. For if there is no discharge, it will be free from inflammation, and being dry it will close up; whereas it will not close up as long as it is discharging moisture. Most remedies, therefore, for stanching blood are pungent, so as to cause contraction.

[20] **34** · When ought drugs to be employed and not the knife or cauterization? Ought drugs to be used for the armpits and groin? For sores in these parts are sometimes painful and sometimes dangerous after they are cut open. Flat growths and those which project considerably and are situated in parts which are venous and not fleshy, should be cauterized; but those which collect at an acute point and are not situated in solid parts of the body should be treated with the knife.

[25] **35** · Why is it that, if one is cut with a bronze instrument, the wound heals more quickly than if the cut is made with iron? Is it because bronze is smoother and so tears the flesh and bruises the body less? Or must we reject this explanation, since, if iron takes a better edge, the cleavage is easier and less painful? Yet even so bronze has a medicinal power of its own, and it is the beginning that is important, and so the drug, by its immediate action as soon as the cut is made, causes the [30] wound to close up.

**36** · Why is it that burns inflicted by bronze heal more quickly than

others? Is it because bronze contains more rarity and is less substantial, and the more solid a thing is the more heat it contains?

**37** · Is barley-gruel lighter and better for use in sickness than that made from wheat? For the latter commends itself to some people who argue from the fact [863<sup>b</sup>1] that among bakers those who handle wheaten flour have a much better colour than those who employ barley meal, and furthermore that barley is moister and that which is moister requires more concoction. But is there any reason why barley should not have some qualities which make it more difficult of concoction and [5] others which make it more serviceable because of its lightness? For barley is not only moister than wheat, but it is also colder, and porridge and any other food which is served to one who is in a fever ought to be such that it will provide him with a little nourishment and also cool him. Now barley-gruel has these qualities; for, because it is moist rather than substantial, it gives nourishment which is small in bulk and at the same time has a cooling effect. [10]

**38** · Why do purslane and salt stop inflammation of the gums? Is it because purslane contains some moisture? This is seen if one chews it or if it is crushed together for some time; for the moisture is then drawn out of it. This glutinous matter sinks into the gum and drives out the acidity. For that there is an affinity between the disease and the remedy is shown by the acidity; for the juice of purslane [15] has a certain acidity. Salt on the other hand dissolves and draws out the acidity. Why then do lye and soda not have this effect? Is it because they have an astringent instead of a dissolvent action?

**39** · Why is it that fatigue must be cured in summer by baths, in winter by anointing? Is anointing employed in the latter case because of the cold and the [20] changes which it causes in the body? For the fatigue must be got rid of by heat which will warm the body, and olive-oil contains heat. In summer, on the other hand, the body requires moisture, because the season is then dry and chills are not to be feared, because the natural inclination is towards heat. A sparing diet of solid food and a liberal indulgence in liquid nourishment are appropriate to the summer, [25] the latter being peculiar to summer, while the former is commoner then than at other seasons; for indulgence in drinking is peculiar to the

summer because of the dryness of the season, but a sparing diet is found at all seasons but is more general in the summer; for then, owing to the weather, heat is engendered by food.

**40** · Why do some drugs relax the stomach and not the bladder, others the [30] bladder and not the stomach? Is it true that anything which is naturally moist and full of water, if it has medicinal properties, relaxes the bladder? For it is there that the unconcocted moisture settles; for the bladder is a receptacle for any moisture which is not concocted in the stomach; and such moisture does not remain there, but passes away without undergoing or causing any change. But anything which partakes of the nature of earth, if it has medicinal properties, relaxes the stomach; [864<sup>a</sup>1] for it is to the stomach that anything of an earthy nature is carried, so that, if it has any motive power, it causes a disturbance in the stomach.

**41** · Why is it that some things affect the upper part of the stomach, hellebore for example, others the lower part, for instance scammony, while others like elaterium and the juice of thapsia affect both parts? Is it because some of the [5] drugs which affect the stomach are hot and others cold, so that some of them, owing to their heat, as soon as they reach the upper part of the stomach are carried thence to the upper region of the body, melting in particular anything there which is most alien to them and least substantial; and if the drug be powerful or has been administered in a dose stronger than nature can withstand, it carries these [10] liquefactions and any excretions that there may be down into the upper part of the stomach, and by its heat stirring up the breath, which it engenders in great quantity, checks their progress and causes vomiting? Drugs of a cold nature, on the other hand, owing to their weight are carried downwards before undergoing or causing [15] any change and, borne thence, have the same action as those which affect the upper part of the body; for passing thence upwards through the ducts and setting in motion any excretions or liquefactions over which they prevail, they carry them with them in the same direction. Drugs which partake of both these kinds and are a [20] mixture of hot and cold, possessing both qualities, have both these effects, and are the composite drugs which doctors now make up.

42 · Why is it that drugs have a purgative effect, while other things, though they surpass them in bitterness and astringency and other such qualities, do not [25] have this effect? Is it because the purgative effect is not due to these qualities but to the fact that they are unconcocted? For anything which, though small in bulk, owing to its excessive heat or cold is unconcocted and of such a nature as to overcome, and not be overcome by, animal heat, if it is easily dissolved in the two [30] stomachs, is a drug. For when such drugs enter the stomach and become dissolved, they are carried into the vein by the ducts through which the food passes, and, not being concocted but themselves prevailing, they make their way out, carrying with them anything which gets in their way; and this is called purging. Bronze and silver [35] and the like, although they are not concocted by animal heat, are not easily dissolved in the stomach. Oil and honey and milk and other such foods have a [864<sup>b</sup>1] purgative effect; but this depends, not on any quality which they possess, but on quantity; for, if they act as a purge, they only do so when they are unconcocted owing to their quantity. For things can be unconcocted for two reasons, either because of their quality or because of their quantity. So none of the above-mentioned [5] foods are drugs, because they do not purge owing to their quality. Astringency and bitterness and unpleasant odour are characteristic of drugs, because a drug is the opposite of a food; for that which is concocted by a natural process amalgamates with the body and is called a food; but that whose nature it is to refuse to be overcome and which enters into the veins and causes disturbance [10] there owing to its excess of heat or cold, this is of the nature of a drug.

43 · Why is it that pepper if taken in large quantities relaxes the bladder, but if taken in small quantities affects the stomach, whereas scammony if taken in large quantities relaxes the stomach, but if taken in small quantities and when it is [15] old affects the bladder? Is it because each has more effect on one part of the body? For pepper promotes urine, while scammony is purgative. Pepper therefore if taken in large quantities is carried into the bladder and does not dissolve in the stomach, but if taken in small quantities it is overcome and relaxes the stomach and acts upon it as a drug. Scammony, on the other hand, if it is taken in large quantities, is [20] overcome to such an extent that it is dissolved, and being dissolved it becomes a drug for the reason mentioned above; but, if it is taken in small quantities, it is swallowed with what is drunk and passes into the ducts and is quickly carried into the bladder before it can



cause any disturbance, and there by its own force it carries off all the [25] excretions and liquefactions which are on the surface. When it is taken in large quantities, as has already been remarked, owing to its strength it remains a long time in the stomach and effects an extensive purgation of the earthy element.

44 · Why do some cure by cooling the same inflammations which others bring to a head by heating them? Surely it is because the latter collect the inflammation by applying external heat, the former by cooling the heat already [30] present in the body.

45 · Why is it necessary to change poultices? Is it in order that<sup>6</sup> they may be more felt? For as, in things which we eat, that to which we have grown accustomed no longer acts as a drug but becomes a food, so poultices lose their effect. [35]

46 · Why does it promote health to reduce one's diet and increase one's exercise? Is it because an excess of excretion causes disease, and this occurs when [865<sup>a</sup>1] we take too much nourishment or too little exercise?

47 · Why is it that drugs, and bitter and evil-smelling substances generally, have a purgative effect? Is it because anything which is evil-smelling and bitter does not admit of concoction? Drugs therefore are bitter and evil-smelling; for they are [5] drugs because, in addition to being bitter, they do not admit of concoction and can cause motion; and if they are administered in too large doses, they are destructive of life. But substances which are destructive of life even if given in small quantities are not drugs but deadly poisons. Nor again do we give the name of drugs to those substances which are not purgative through their natural qualities; for indeed many [10] foods have the effect of drugs, if taken in sufficient quantity—milk, for example, and olive oil and unfermented wine; all these things, because they are not easily concocted, have a purgative effect on those by whom they are not easily concocted. For different things are easy or difficult of concoction to different people; and so the same things do not act upon every one as drugs, but particular things act upon certain people. For, generally speaking, a drug ought not

only to be difficult of [15] concoction, but also ought to have the power to produce movement; just as also exercises, whether external or internal, expel alien matter.

**48** · Why is it that sweet-smelling seeds or plants promote the flow of urine? Is it because they contain heat and are easily concocted, and such things have this [20] effect? For the heat in them causes quick digestion, and their odour has no corporeal existence; for even strong-smelling plants, such as garlic, promote the flow of urine owing to their heat, though their wasting effect is a still more marked characteristic; but sweet-smelling seeds contain heat.

**49** · Why is it that unclean and foul sores require to be treated with dry, [25] pungent, and astringent drugs, while clean, healthy sores require moist, porous<sup>7</sup> remedies? Is it because something must be drawn out from unclean sores, and it is foreign moisture which must be extracted? Now biting, pungent, and astringent [30] substances have this effect, and the dry rather than the moist. Clean sores, on the other hand, only require to skin over.

**50** · Why is it that sexual excess is beneficial to diseases caused by phlegm? Is it because the semen is the secretion of an excrement and in its nature resembles phlegm, and so sexual intercourse is beneficial because it draws off a quantity of phlegm-like matter?

[35] Is it better to give the patient nourishment at first or later? Ought nourishment to be given at the beginning, so that the inflammation, when it sets in, may not find the patient already weak? Or ought the patient to be reduced at once? Or ought the following to be the treatment, namely, that the patient should first take nourishment [865<sup>b</sup>1] in the form of draughts, since food of this kind is milder and more readily swallowed and dissolved, and it is easier for a sick person to receive nourishment from this sort of food? For where<sup>8</sup> the food has first to be acted upon in the stomach,—namely, both dissolved and heated—these processes cause pain to the [5] body.

**51** · Why is it that, in order to examine urine to see if it is concocted, one must stop the flow of urine rather than continue to pass

it? Is it because it is a sign of concoction if it is reddish in colour, and this is better detected if the flow is stopped? [10] Or is it because anything that is liquid forms as it were a better mirror of its colour in a small than in a large quantity? For form is better discerned in a large quantity, but colour in a small quantity, in dew, for example, and drops of rain and tears on the eyelids. If urine, therefore, is allowed to flow it becomes greater in quantity, but, [15] if it is checked, it takes on colour more readily; and so if it has already taken on this character by concoction, this can be better observed if the flow of urine is stopped and light thus refracted and a mirror formed.

**52** · Why should the flesh be made rare rather than dense in order to promote health?<sup>9</sup> For just as a city or locality is healthy which is open to the breezes [20] (and this is why the sea too is healthy), so a body is healthier in which the air can circulate. For either there ought to be no excrement present in the body or else the body ought to get rid of it as soon as possible and ought always to be in such a condition that it can reject the excrement as soon as it receives it, and be in a state of motion and never at rest. For that which remains stationary putrefies (standing [25] water, for example), and that which putrefies causes disease; but that which is rejected passes away before it becomes corrupt. This then does not occur if the flesh is dense, the ducts being as it were blocked up, but it does happen if the flesh is rare. One ought not therefore to walk naked in the sun; for the flesh thereby solidifies and [30] acquires an absolutely fleshy consistency, and the body becomes moister; for the internal moisture remains, but the surface moisture is expelled, a process which also takes place in meat when it is roasted rather than boiled. Nor ought one to walk about with the chest bare; for then the sun draws the moisture out of the best constructed parts of the body, which least of all require to be deprived of it. It is rather the inner parts of the body which should be submitted to this process; [35] because they are remote, it is impossible to produce perspiration from them except by violent effort, but it is easy to produce it from the chest because it is near the surface.

**53** · Why is it that both cold and hot water are beneficial to chilblains? Is it [866<sup>a</sup>1] because chilblains are caused by an excess of moisture? If so, the cold water thickens and hardens the moisture, while the hot water causes it to evaporate and enables the vapour to escape by rarefying the flesh.

**54** · Why is it that cold both causes and stops chilblains, and heat both [5] causes and stops burns? Is the cause the same in both cases, namely, that they cause them by setting up liquefaction and stop them by drying them up?

**55** · In fevers liquid nourishment ought to be administered often and in small quantities. For a large quantity flows away and is wasted, but a small quantity taken frequently sinks in and penetrates into the flesh. For as the rain, if it comes [10] down upon the earth in torrents, runs to waste, but, if it comes down in small quantities, merely moistens the ground; so the same thing occurs in fever patients. In irrigation, if the water is allowed to flow gradually, the channel sucks it up; whereas, if the same amount of water is allowed to flow all at once, it makes its way wherever it is directed.

Next the patient ought to lie as still as possible, because fire also obviously dies [15] down if one does not stir it. And he ought not to lie in a draught, because the wind stirs up the fire, and, being fanned, it becomes great instead of small. For this reason the patient ought to be well wrapped up, because fire is extinguished if it is not [20] allowed to draw in air; and the garments ought not to be removed until damp heat is present, for the fire if exposed to the air dries up the moisture—just as happens also in nature.

In the case of intermittent fevers one must make preparations beforehand by washing<sup>10</sup> the patient and applying fomentations to his feet, and he must rest well [25] wrapped up, in order that there may be as much heat as possible in him before the attack begins. For a flame will not be able to burn where there is a great fire; for the great fire will absorb the little fire. Consequently a great fire must be prepared beforehand in the body; for fever has but little fire in it, and so the great fire will absorb the little fire. [30]

**56** · In quartan fevers the patient must not be allowed to get thin, and heat must be introduced and engendered in his body. Exercises must also be employed. On the day on which the attack is expected he must bathe himself and avoid sleep. A heating diet is beneficial, because a quartan fever is weak; for if it were not so, it [35] would not occur only every fourth day. For, mark you, where there is a great fire, a flame cannot burn; for the great fire attracts and absorbs the little fire. For this

[866<sup>b</sup>1] reason it is necessary to engender great heat in the body, because fever has but little fire in it. The daily treatment consists in introducing at one time heat and at another time moisture into the body. Some diseases are caused by heat, others by moisture; those which are caused by heat are cured by moisture, and those which are due to [5] moisture are cured by heat, for heat dries up moisture.

## BOOK II

### PROBLEMS CONNECTED WITH PERSPIRATION

[10] 1 · Why is it that perspiration is caused neither when the breath is expanded nor when it is held in, but rather when it is relaxed? Is it because, when it is held in, the breath fills out the veins and so does not allow the perspiration to escape, just as the water in a water clock cannot escape if you turn it off when the clock is full? But when the perspiration does come out, it does so in great abundance, because it has gradually collected during the actual period that it has been checked.

[15] 2 · Why is it that the parts of the body that are immersed in hot water do not perspire, even though they are themselves hot? Is it because the water prevents liquefaction, while perspiration is formed when matter which is not properly attached to the flesh<sup>1</sup> is expelled by heat?

3 · Why is perspiration salty? It is because it is caused by movement and [20] heat which rejects any foreign matter in the process by which nourishment passes into blood and flesh? For such matter quickly separates, because it has no affinity with the body, and evaporates externally. It is salty because the sweetest and lightest part of the food is taken up by the body, while the unsuitable and [25] unconcocted part is discharged. This when it is excreted below is called urine, in the flesh it is sweat; both of these are salty for the same reason.

4 · Why is it that the upper parts of the body perspire more freely than the lower? It is because heat rises upwards and remains there, and this carries the [30] moisture upwards? Or is it because breath causes sweat, and the breath is in the upper parts of the body? Or is it because sweat is unconcocted moisture, and such moisture resides in the upper parts because the process of its composition takes place there?

5 · Why is it that sweat is produced most copiously if we exercise the

arms while we keep the other parts of the body in the same position? Is it because we have most strength in this region of the body? For it is in this region, which is nearest to [35] the strongest part of us, that we hold our breath; and we gain strength by violent exertion, and, having gained strength, we can hold the breath more easily. Furthermore, we feel the effect of friction more in the arm than when any other part [867<sup>a</sup>1] of the body is rubbed; for it is by holding the breath that we get exercise, both when we are rubbed and when we rub.

6 · Why is it that sweat given off from the head either has no odour or less than that from the body? Is it because air circulates freely in the region of the head? [5] That the head possesses rarity is shown by the fact that it produces hair. And it is those regions of the body and the substances of which they are composed through which the air does not circulate that are malodorous.

7 · Why is it that those who take athletic exercise, if they wrestle after a period of rest, perspire more freely than if they wrestle continuously? Is it because the sweat collects while they are resting, and then the wrestling afterwards brings [10] out this sweat? Continuous exercise, on the other hand, dries up the sweat, just as does the heat of the sun.

8 · Why is it that one sweats more freely if one has not for a long time employed means to induce perspiration? Is it because sweat is not caused by moisture alone, but is also due to the fact that the pores are opened wider and the [15] body becomes porous? In those, therefore, who take no measures to induce perspiration the pores become closed up, whereas if they do take such measures the pores are kept open.

9 · Why is it that, although the sun warms those who are naked more than those who are clothed, the latter perspire more freely? Is it because the sun by burning causes the pores to close up? Or is it because it dries up the moisture? [20] These processes are less likely to happen in those who are clothed.

10 · Why is it that the face gives off the most perspiration? Is it

because the sweat can find a way out through parts which are particularly porous and moist? Now the head seems to be the source of moisture, and it is owing to the presence of [25] copious moisture that the hair grows; and the region of the head is rare and porous, and so the sweat naturally finds a way out.

**11** · Why is it that one perspires most freely, not when the heat is applied all at once or when it is gradually diminished, but when it is gradually increased? For those who are in vapour baths perspire under these conditions more freely than if all [30] the heat be applied at once. Is it because it is the presence of anything in proper proportions which produces each required effect, and so, if it produces this effect, its presence in greater quantity will not produce a greater effect, or will rather produce the contrary effect, for it is because a thing is proportionate that it produces a certain effect? For this reason then increased perspiration is not induced as the result of greater heat; but because to each increment of heat there answers a [35] different proportion, and that which has already produced its effect produces no greater effect, increased perspiration is rather the result of successive additions of heat. For it is not the same cause which prepares the way and creates a favourable condition for a series of effects and then begins to produce the effect, but a different cause. So a small quantity of heat prepares the way and predisposes the body to [867<sup>b</sup>1] perspire better than a large quantity; but another and a greater proportion is required actually to produce the perspiration, but this does not continue to produce the effect which it originally produced, but must be followed by another application of heat different again in its proportions.

**12** · Why does the sweat flow more freely if a scraper be used than if it be [5] allowed to remain on the body? Is it because the presence of external sweat induces cooling? Or is it because the external sweat forms as it were a lid over the pores and so prevents the movement of the internal sweat?

**13** · Why is it that rue and certain unguents give the perspiration an evil [10] odour? Is it because things which have a heavy scent, mixing with the excretory fluids, make the odour of these still more unpleasant?



**14** · Why do we perspire more on the back than on the front of the body? Is it because in the front of the body there is an interior region into which the moisture is drained, but this is not the case with the back, but there the excretion of moisture [15] must be external? (It is for the same reason that we perspire less on the stomach than on the chest.) A further reason is the fact that the back and hinder parts hold the perspiration more than the front, because the latter become more cooled than the former. (This is the reason too why the armpits perspire most readily and freely; [20] for they are least subject to cooling.) Further, the regions about the back are fleshier than those in front and therefore moister; and there is more moisture in the hinder parts, because the marrow in the spine causes considerable humidity.

[25] **15** · Why is it that we do not perspire in those parts of the body on which we are lying? Is it because the area with which we come into contact with anything is hot and therefore prevents the perspiration from passing forth, for it dries it up? Furthermore it is compressed, and pressure causes the blood to disperse, and, when this happens, the part tends to become cool. This can be illustrated from numbness, [30] which is a condition due to cooling and is caused by pressure or by a blow.

**16** · Why do those who are asleep perspire more freely? Is it due to the heat being driven inwards? For the heat collects inside and expels the moisture.

**17** · Why is it that one perspires most freely on the face, though it is far from [35] being fleshy? Is it because parts which are rather moist and rare perspire freely, and the head has these characteristics? For it possesses an abundance of natural moisture; this is shown by the veins which extend from it and the discharges which it produces and the brain-fluid and the numerous pores. That there are numerous pores extending outwards is shown by the presence of the hair. The perspiration then comes not from the lower parts of the body but from the head; and so one [868<sup>a</sup>1] perspires most readily and freely on the forehead, for it is the first thing below the top of the head, and moisture flows down and not up.

18 · Why is it that those who are perspiring are apt to vomit if they are [5] cooled either by water or by air? Is it because the moisture when cooled ceases to move and collects together, whereas before it was not at rest because it was in a state of flux? Or is it because the breath which turns into perspiration by being cooled as it passes out, being cooled internally before passing out turns into moisture and, attacking the body, causes vomiting?

19 · Why is it that sweat is given off from the head and feet of those who are [10] heated more freely than from any other part of the body? Is it because the part which is heated attracts the moisture to itself, and the moisture has nowhere where it can expend itself in these regions of the body, because they are bony, and therefore it finds its way out?

20 · Why do those who exert themselves perspire when they cease to exert [15] themselves? For since the exertion is the cause, they ought to perspire while they are exerting themselves. Is it because during their exertion the veins, being inflated with breath, cause the pores to close up, whereas, when they stop, the veins contract, and so the pores become wider and the moisture finds an easier outlet? Or is it because during the exertion the motion expels air from the solidified moisture and, [20] owing to the heat caused by the motion, the moisture becomes breath on the surface of the body; while on the other hand, when the exertion ceases, the heat also stops at the same time, and then the moisture, which we call perspiration, is generated from the condensation of the breath? [25]

21 · Is it more necessary to induce perspiration in the summer or in the winter? Is it not more necessary to do so at a time when, unless care be taken, the body would become too moist and in a dangerous condition? If so, it would be more necessary to perspire in the summer,<sup>2</sup> when a violent change takes place in the body and the excretions are not thoroughly concocted. Again in the winter, since the body [30] is cool, it is also unnatural to perspire. It is clearly, therefore, more necessary to induce perspiration in the summer; for moisture of all kinds is then more apt to putrefy and should therefore be drawn off. This was the opinion of all the ancients and for the above reason.

22 · Why is it that, although the body is in a state of continual flux, and [35] effluvia are given off from the excrements, the body is only lightened if it perspires? Is it because the excretion in the form of effluvia is too little? For when liquid is transformed into air, much air is formed out of little liquid; for what is excreted in [868<sup>b</sup>1] liquid form is more abundant. The process of excretion, therefore, takes longer to begin, both for the above reason and because the excretion takes place through smaller pores. Further, the viscous and adhesive matter is expelled with the moisture, because it mingles with it, but it cannot be expelled with the breath; and it [5] is this thick matter in particular that causes pain. Therefore also vomiting lightens the body more than sweating, because that which is vomited, being thicker and more substantial, carries away this viscous matter with it. Or is there a further reason, namely, that the region in which the viscous and the adhesive matter is, is situated at a distance in relation to the flesh (and so it is difficult to make it change [10] its position), but near the stomach? For it is engendered either in or close to it; and therefore it is difficult to get rid of it in any other way.

23 · Why is it that one perspires less during actual exertion than when one ceases? Is it because while one is exerting oneself one is engendering perspiration, but the process of engendering it is only complete when the exertion is ended? This then is naturally the time when it is expelled from the body in greater quantities; for during exertion it is coming into being, but, when the exertion is finished, it actually [15] exists. Or is it because during exertion the pores of the flesh are closed, because the breath is held, but when the pressure of the breath is relaxed the pores open again? Consequently one perspires less when one is holding the breath.

24 · Why is it that perspiration is more copious not when one is running and the body is in motion, but when one stops? Is it because the same thing happens as [20] when flowing water is checked by the hand or by some other means and collects from every direction, and, when it is released, flows in greater volume than before; so perspiration can be stopped by the breath—like water in a water clock—and also [25] in the bladder, which keeps the moisture within. So too, while there is considerable movement, the breath is cut off inside the body, and so the veins are distended, the moisture being unable to find its way out. The

moisture then, being cut off, collects, and when the breath is relaxed comes all out at once.

**25** · Why is it that, when one is drinking, one perspires less if one eats [30] something as well? Is it because the food sucks up the moisture, as though a sponge were applied, and, just as a stream can be stopped by blocking up its channels, so by stopping<sup>3</sup> the pores through administering food it is possible to a large extent to prevent the flowing of moisture?

**26** · Why is that the feet of those who are nervous perspire and not the face? [35] For it would be more natural that the feet should perspire only when the whole body perspires; for the feet are the coldest region of the body and therefore least liable to perspire. Also in sickness physicians order the feet in particular to be wrapped up, because they are especially susceptible to cold and so readily give rise to cold in the rest of the body also. Is it because nervousness does not cause a displacement of [869<sup>a</sup>1] heat—such as takes place from the upper to the lower parts of the body under the influence of fear (hence the relaxation of the bowels in those who are alarmed)—but an increase of heat such as is caused by anger? For anger causes the heat round the heart to boil up; and one who is nervous is affected not by fear or cold, but by an [5] increase of heat.<sup>4</sup>

**27** · How is it that one can become red in the face without perspiring? Is it due to excessive warmth which results in the heat on the surface drying up the [10] moisture in the face, while it liquefies the moisture in the feet because, though less than the heat on the surface, it is more powerful than the natural heat already existent in the feet?

**28** · Why is it that we perspire more when asleep than when awake? Is it because perspiration originates internally, and the interior parts of the body are hotter, and so the internal heat melts and expels the internal moisture? Or<sup>5</sup> is it [15] because in all probability there is always something given off from the body, but it is not apparent because there is nothing with which it can come into contact and by which its escape can be arrested? That this is so is shown by the fact that the hollow parts of the body perspire continually.

29 · Why is it that persons in vapour baths perspire more freely when it is cold? Is it because the heat does not find a way out, because it is surrounded by the [20] cold, which prevents its exit, but collects internally, and, remaining there, dissolves the moisture in our body and engenders perspiration from it?

30 · Why is it that perspiration, even though it be less profuse, is more beneficial if it be induced by running naked rather than clothed? Is it because [25] exertion in general is better than non-exertion, and perspiration which is induced by exertion is better than that which is produced without exertion, and that which is due in a greater degree to exertion is better than that which is due in a less degree? Now perspiration involves more exertion if induced by running about naked: for a naked man cannot perspire at all unless he runs with considerable energy; whereas, [30] if he be clothed, owing to the heat produced by his garments, he soon perspires although he runs only moderately fast. Those too who run naked in the summer have a healthier colour than those who wear garments; for just as those who live in regions open to the air have a better colour than those who live in a stifling [35] atmosphere, so too a man, when he is as it were in a well-aired condition, acquires a better colour than when he is stifled and surrounded by considerable heat, as he is more likely to be when he runs clothed. For this reason too those who sleep much [869<sup>b</sup>1] have a less healthy colour than those who sleep a moderate amount; for a man who is asleep is in a stifled condition.

31 · Why is it that our feet perspire, but not our faces, when we are in a state [5] of nervousness, whereas under ordinary conditions our faces perspire most and our feet least? Is it because nervousness is a kind of fear connected with the beginning of an action, and fear causes a cooling in the upper part of the body; this is also why those who are nervous are pale-faced. On the other hand they move and dance their [10] feet about, thus resembling those who are taking exercise; therefore they naturally perspire in those parts which they are exercising. Also they rub their hands together and bend and stretch themselves and keep jumping up and can never remain still; for they are eager for action, because the heat within them is collected in the region of the chest, which is one of the more substantial parts of the body, and this heat and [15] the blood rushing thence through their whole body results in frequent and varied

movement. But they perspire most in the feet, because these are being continually exerted, whereas the other parts of the body obtain rest in the changes of position and movement.

[20] **32** · Why is it that in a vapour bath one perspires most freely not when the heat is applied all at once nor when it is gradually diminished, but when it is gradually increased? For if the heat is gradually introduced into the vapour bath, one perspires more freely than if the full amount were admitted at first. Is it because heat which is great from the beginning, finding the flesh on the surface dry, burns [25] the skin and bakes it hard, and the flesh when it is in this condition holds the perspiration within?<sup>6</sup> Less heat on the other hand tends to relax and rarefy the flesh and as it were stimulates the internal moisture to separate itself and come forth. This condition being established, when more heat is gradually introduced and [30] penetrates deep into the flesh owing to its rarity, it vaporizes the already softened humours and separating those which are light expels them with the breath.

**33** · Is it more necessary to induce perspiration in the summer or in the winter? In winter does not the heat collecting within the body concoct and vaporize [35] our internal humours, and so, because all or most of them are expended, there is no need to supply an appropriate method of expelling them? In the summer, on the other hand, because the flesh is in a state of rarity, the heat escapes and our internal humours become less concocted and therefore need to be drawn off. For if they are [870<sup>a</sup>1] allowed to remain, they putrefy owing to the season and cause disease; for anything that putrefies does so owing to heat that is not its own, whereas its own natural heat causes concoction. Consequently in the summer the external heat prevails, and so everything within the body tends to putrefy; but in the winter the natural heat [5] predominates, and so the winter does not cause putrefaction.

**34** · Why is it that, whereas perspiration is due to internal heat or else to heat attacking the body from without, yet we sometimes shiver while we perspire? Is it because, when owing to the internal heat the perspiration is expelled from a large area into a small space, it collects<sup>7</sup> on the surface of the body and entirely blocks up the channels through which the heat circulates, and so shivering ensues? [10] Another reason is

that the flesh becomes saturated and the heat escapes. On the other hand the external heat attacking the flesh at first rarefies it, and then the internal natural heat as it is given off causes the shivering.

**35** · Why are hot sweats considered to be better than cold? Is it because all [15] perspiration is the rejection of some excretion, and it is natural that a small excretion should become heated, whereas a more abundant excretion is less likely to do so, and so a cold sweat would be an indication of a copious excretion; consequently the disease, the presence of which it indicates, is likely to last longer? [20]

**36** · Why is it that, although perspiration is caused by heat, we perspire less in front of a large fire? Is it because, when the body is subjected to considerable heat, the humours are dissolved into vapour; or else we do not feel the moisture, because it makes its way out and quickly dries on the surface? [25]

**37** · Why is it that, though the sun heats us more if we wear no clothing, yet we perspire<sup>8</sup> more freely when we are clothed? To this we shall give the same answer as to the last problem.

**38** · Why is it that, though brisk movements are generally regarded as more heating than slow movements, walking up a steep hill, which is a slower movement, [30] induces more perspiration and obstructs the breathing, as though it were more heating than walking down hill? Is it because it is natural for heavy things to be carried downwards and unnatural for them to be carried upwards? Consequently the nature of the heat which carries us along does not undergo any strain when we [35] are going down hill, but has to bear a continual burden when we are walking up hill; and so it grows exceedingly hot by movement of this kind and causes more profuse perspiration and obstructs the breath. The bending, too, of the body involved in walking up hill contributes to prevent the free passage of the breath by obstructing [870<sup>b</sup>1] it.

**39** · Why is it that, although more perspiration is induced by additional clothing, it is not those who wear most clothing that perspire most? To this question we shall give the same answer as we gave above.

40 · Why is it that, although our bodies are drier in the summer than in the winter, we are more disposed to perspire in the summer? Is it because, our bodies being in a condition of rarity in the summer, not much natural heat is contained in them? This, therefore, dissolves the humours into vapour. In the winter on the [10] contrary, our bodies being externally in a dense condition, the considerable amount of natural heat enclosed within does not dissolve the humours into vapour. Moreover, in the summer we swallow liquid in large quantities, but in small quantities in the winter.

41 · Why is it that in healthy persons spontaneous perspiration is not [15] considered to be as good as that produced by exertion? Is it because exertion continually drains off the superfluous moisture and makes the flesh drier, so that the hollows of the pores are healthy and there is no obstruction to the straining off of [20] the heat? On the other hand the so-called spontaneous perspiration (which really occurs of necessity when the natural pores are disturbed by excessive moisture, and the heat is not completely retained, but can still resist and expel the moisture) is rightly regarded as a sign of disease. For then, owing to the presence of a more than [25] proportionate amount of moisture, a natural process of cooling takes place, and the flesh becoming saturated assumes a most unhealthy condition.

42 · Why is it that in the winter perspiration is given off less freely and we do not feel the same desire to induce it, although our bodies are moister in the winter? [30] Do we perspire less, because in winter our humours are congealed and solidified to a considerable extent, and are consequently less easily dissolved? The reason why we do not think it necessary to induce perspiration in the winter is because the condition in which we are is a healthy one, and any one who induces perspiration dissolves and upsets that condition; moreover, by creating in the body a condition of [35] greater rarity than it ought to have, he expels and reduces the natural heat, so that it cannot so effectively resist the surrounding cold; also external moisture will more easily burst its way into the body when the pores are rarefied by process of perspiration.



# BOOK III

## PROBLEMS CONNECTED WITH THE DRINKING OF WINE AND DRUNKENNESS

[871<sup>a</sup>1] **1** · Why is it that, though wine is hot, the drunken are unable to endure cold and are very readily attacked by pleurisy and similar diseases? Is it because a large quantity of moisture, if it be cooled, forms a mass of cold and so overpowers the [5] natural heat? For this is similar to what happens when, if a garment is soaked in cold water, the flesh beneath it also becomes cold.

**2** · Why is it that it is not those who are very drunk that are most troublesome in their cups, but those who are only half blotto? Is it because they have neither drunk so little that they still resemble the sober nor so much that they are in the incapacitated state of those who have drunk deep? Further, those who are [10] sober have more power of judgement, while those who are very drunk make no attempt to exercise their judgement; but those who are only half blotto can still exercise their judgement because they are not very drunk, but they exercise it badly because they are not sober, and they are ready to despise some of their neighbours and imagine that they are being slighted by others. [15]

**3** · Why is it that those who drink slightly diluted wine have worse hangovers than those who drink wine absolutely unmixed? Is it because owing to its lightness diluted wine penetrates better into more numerous and narrower parts of the body than unmixed wine, and so is less easy to get rid of? Or is it because those who drink [20] unmixed wine drink a less quantity, because it is impossible to drink more, and vomit more readily? Furthermore unmixed wine, being hotter, causes concoction in other things and in itself; whereas watery wine has the opposite effect.

**4** · Why is the semen of drunkards generally infertile? Is it because the composition of their body has become full of moisture, and the semen is fertile not [25] when it is liquid but when it has body and consistency?

5 · Why do drunkards tremble, and more so the more they drink unmixed wine? Now wine is heating; but trembling is chiefly due to cold, and so those who are chilled tremble very much. Yet many people before now, who have taken [30] unmixed wine as their only form of nourishment, have been seized with such violent trembling as to throw off those who were trying to hold them down; and when they wash in hot water, they have no perception of it. Is it because trembling is due to cooling, and cooling takes place either when the heat is driven within by external cold, as happens in winter, or when the natural heat is extinguished either by its [35] opposite or by lapse of time, as in old age, or by the excess of extraneous heat which is caused in that which is exposed to the sun or to a blazing fire? This occurs also in those who take unmixed wine. The wine, being hot, when on mingling with the proper heat of the body it exceeds it in power,<sup>1</sup> quenches the bodily heat; and the [871<sup>b</sup>1] heat being thus extinguished and the body cooled, trembling ensues. But there is also another process of cooling differing from all those described above; namely, when the matter whereby the heat in anything is fed is removed, and, as a result, [5] the heat dies down. This can be illustrated in the inanimate world from the lamp; for when the oil is expended, the light goes out; and in living beings old age and long, wasting diseases have a similar effect. For when that which feeds the heat is [10] removed or diminished, the result is that the heat fails;<sup>2</sup> for heat is fed by moisture, not, however, by any kind of moisture but by that which is smooth and fat.<sup>3</sup> In those, therefore, who are suffering from the diseases mentioned above and in those who are growing old, when moisture of this kind becomes corrupted and changed [15] (becoming harsh and dry instead of smooth and oily), as a result the heat fails. A proof of the above is afforded by the treatment applied to those who are wasting to death; for, whenever they have any nourishing liquid administered to them, the result is that their vitality<sup>4</sup> is revived, which implies that their bodily dissolution is [20] due to the lack of such a substance. The same cause seems to operate in those who drink unmixed wine. For the wine, being warm, co-operating with the heat already naturally present in the body, tends to use up the supply already present in the body [25] for the natural heat; consequently some drunkards become dropsical, others rheumatic, while in others the stomach is affected. For the other humours in them are harsh, and what they imbibe, being soft, does not acquire consistency owing to the weakness of the natural heat. Their heat is weak because the matter in which it [30] is still contained is itself weak; like a fire fed by reeds, which, because its

material is weak, is weaker than a wood-fire.

6 · Why is it that, though wine is hot, the drunken are unable to endure cold and are very readily attacked by pleurisy and similar diseases? Is it because a large [35] quantity of moisture, if it be cooled, forms a mass of cold, and so overpowers the natural heat? Now the moister anything is the hotter it is by nature, as is shown by the fact that external agencies cause heat but do not cause liquefaction; but where there is less heat, it is clear that either the heat or the moisture is failing too quickly, [872<sup>a</sup>1] and so, cold humours only being left, it is natural that the drunken should be colder and show the proper symptoms of chill.

7 · Why is it that children, who have a hot temperament, are not fond of wine, although the Scythians and all who are courageous are fond of wine because [5] they have a hot temperament? Is it because the latter, though they are hot, are also dry (for this is the natural condition of a man), whereas children are hot and moist? Now fondness for drink is due to a desire for moisture; and so their moist condition prevents children from being thirsty, for desire is a lack of something.

[10] 8 · Why is it that men are more sensitive to salty and bad water when they are drunk than when they are sober? Is it because that which is like and similarly constituted is unaffected by its like, but opposites are very sensitive to opposites? A drunken man then has sweet liquids in him (for such seems to be the nature of [15] wine), and so is more sensitive to bad liquids; but the sober man has harsh and salty liquids in him, and so, when his food becomes concocted, the excretory humours come to the surface and these are unaffected by their like and cause the man in whose body they are to be similarly unaffected.

9 · Why is it that to those who are very drunk everything seems to revolve in [20] a circle, and as soon as the wine takes hold of them they cannot see objects at a distance, and so this is used by some as a test of drunkenness? Is it because the vision is continually disturbed by the heat of the wine? It makes no difference then whether it is the vision that is disturbed or the object seen; for the result is the same in producing the above-mentioned phenomenon. And since the vision of drunken persons

is often mistaken about objects near at hand, it is only natural that it should [25] be even more so in looking at distant objects. So the latter are not visible to them at all, while objects near at hand are not seen in their proper places, but appear to revolve in a circle and not to be near or far, because the circular motion makes it less possible for the sight to be directed towards distant objects; for it is difficult to do [30] two contrary things at the same time. Now distant vision is movement in a straight line,<sup>5</sup> but circular vision is restricted to the area implied by its name. For the above-mentioned reasons then the vision does not travel to a distance. Secondly, if it could travel to both near and distant objects, it would not see them, for that which was seen in the same place would fail at the next moment, and, if it did so,<sup>6</sup> the eye [35] could not see it. The circular movement is due to the present constitution of his sight; for it is a cone, the base of which is a circle, and, moving in this circle, the sight always sees the same thing,<sup>7</sup> because it never fails, but it is deceived as to its [872<sup>b</sup>1] position, because it never directs the same glance upon it; for just the same thing would happen whether the object moved in relation to the eye or the eye in relation to the object.

10 · Why is it that to those who are drunk one thing at which they are looking sometimes appears to be many? Is it because, as has already been [5] remarked, the vision is disturbed, with the result that the same glance does not rest on the same object for any length of time? Now that which is seen differently at the same time appears to exist later in time; for that which is seen is seen by contact with the vision, and it is impossible for several objects to be in contact with the same thing at the same time. But because the intervening time, during which the vision [10] comes into contact with and passes away from the object seen, is imperceptible, the moment during which it has been in contact and passed away seems to be one; and so when several glances come into contact with the same object at the same time, the objects seen appear to be several, because it is impossible for the glances to be in contact with the same<sup>8</sup> thing at the same time.<sup>9</sup>

11 · Why is it that those who are drunk are incapable of having sexual [15] intercourse? Is it because to do so a certain part of the body must be in a state of greater heat than the rest, and this is impossible in the drunken owing to the large quantity of heat present in the whole body; for the heat set up by the movement is extinguished by the greater

surrounding heat, because they have in them a considerable quantity of unconcocted moisture? Furthermore the semen is derived [20] from food and all food is concocted, and those who are satiated with food are more inclined for sexual intercourse. This is why some people say that with a view to the sexual act one ought to take a plenteous midday meal but a light supper, so that [25] there may be less unconcocted than concocted matter in the body.

**12** · Why is it that sweet wine and unmixed wine and mead if drunk from time to time during a drinking bout make men sober? And why do those who drink from large vessels become less drunk? Is the reason in all cases the same, namely [30] the repression of heat on the surface of the body? For drunkenness takes place when the heat is in the region of the head.

**13** · Why is it that, though that which is sweet tends to rise to the surface, if any one who is already drunk takes a sweet draught the wine which he has drunk before is concocted and causes less discomfort? Is it because that which is sweet is [35] both soothing and adhesive (which is the reason why it blocks up the pores), while that which is bitter has a roughening effect? The latter makes it easy for the heat to rise, but the sweet draught keeps it in by blocking up the pores; and it has already [873<sup>a</sup>1] been remarked that drunkenness is due to the upper parts of the body becoming heated. Furthermore sweet wine is odourless, but bitter wine is not, and any odour oppresses the head.

**14** · Why is it that wine which is mixed but tends towards the unmixed [5] causes a worse headache the next morning than entirely unmixed wine? Is it because unmixed wine is composed of heavy particles and so does not find its way into the pores of the head, which are narrow, but only its power, namely its odour and heat, reaches the head? Diluted wine on the other hand, being mixed with water, which is light, itself penetrates to the head and having body, as well as much [10] of the power of unmixed wine, is much less easily concocted; for moist things are most difficult of all to concoct, and actual substances are more difficult of concoction than their powers.

15 · Why is it that those who do not take physical exercise are better able to drink themselves into a condition of drunkenness, and throw it off more easily, than [15] those who take such exercise? Is it because those who have excretions and moisture in their bodies are more inclined to pass urine? This enables them to drink and afterwards to be relieved of the effects, because much vinous moisture does not remain in them. Those who take no exercise are moist and full of excretions; but those who do take exercise are dry, and so the vinous moisture penetrates into their [20] body, and its impetus immediately checks the flow of urine, and the moisture remaining afterwards behind forms a weight in the body.

16 · Why has wine the effect both of stupefying and of driving to frenzy those who drink it? For these are contrary states, the frenzied being in a state of excessive movement and the stupefied in a condition of too little movement. Is it [25] true, as Chaeremon says, that It therefore has the opposite effect not on the same but upon the unlike, just as fire dries up some things but liquefies others, but does not have both these effects on the same things—for instance it melts ice, but hardens salt. So wine, being in its nature moist, excites the slow and makes them quicker, while it enervates [30] the quick. Therefore some of those who are naturally of a melancholic temperament become entirely enervated as the result of a drunken debauch. For just as a bath makes supple those who have a well-knit and hard frame, while it relaxes those who are supple and moist, so wine has this effect, acting [35] as an internal bath.

Wine mingles with the temper of the drinker?

17 · Why is it that cabbage stops hangovers? Is it because its juice is sweet and has a cleansing effect (and so doctors use it to purge the bowels), while in itself [873<sup>b1</sup>] it is cold? This is shown by the fact that doctors use it in cases of acute diarrhoea, boiling it thoroughly and draining off the juice<sup>10</sup> and letting it cool. In those with hangovers the effect of the juice of cabbage is to draw off the internal humours, [5] which are vinous and unconcocted, into the stomach, while the cabbage itself remains in the upper part of the stomach and cools the body. As the body cools, the light humours are carried into the bladder. Thus since the humours throughout the body are expelled by these two methods and it becomes cool, hangovers naturally [10] vanish; for wine is moist and hot.

A further result of the humours being drawn downwards and expelled is that breath is thereby carried down into the body, and it is only from there that breath can be carried from the wine into the head and cause stupor and hangovers. But if the breath is carried downwards and the body cooled in [15] the manner mentioned above, the pain of the hangover is relieved. For the hangover is due to a seething and to inflammation as it dies down; but it is more painful than drunkenness, because the latter drives men out of their senses, but the hangover causes them pain when they are in full possession of their wits. Just as those who are [20] in a fever are delirious rather than in pain, but feel pain when they are relieved of the fever and recover their senses; for just the same thing happens with hangovers and drunkenness.

**18** · Why is it that watery wine is more apt to cause vomiting than water and than unmixed wine? Is it because anything that tends to rise to the surface and is [25] unpleasant to the taste is most likely to cause vomiting? Now wine has the effect of repression; while water is light and not unpleasant, and, therefore, being light<sup>11</sup> it quickly penetrates downwards, but, not being unpleasant, it does not cause heartburn. Now excessively diluted wine is not light enough to percolate through [30] quickly, and because it has a little wine in it, it is unpleasant; for it disturbs the sense of taste by setting up two kinds of movement, one produced by the wine and the other by the water, both of which make themselves felt. But the proper mixing of wine does away with the taste of water and gives the wine a soft taste, which makes [35] it pleasant to drink. But watery wine, being unpleasant to the taste, has a tendency to rise, and anything which does this is apt to cause vomiting.

**19** · Why is it that men are more sensitive to salty and bad water when they [874<sup>a</sup>1] are drunk than when they are sober? Is it because anything which has an unpleasant taste is more perceptible to those who feel no desire, but is not noticed by those who feel desire? A man therefore who is in a state of lacking something<sup>12</sup> resembles one who feels a desire, and the sober man is in this condition; whereas the drunken man is satiated.

[5] **20** · Why is it that to those who are very drunk everything seems to revolve in a circle, and as soon as the wine takes hold of them

they cannot count objects at a distance, and so this is used by some as a test of drunkenness? Is it because the vision is continually disturbed by the heat of the wine? The same thing then [10] happens to those who are drunk as when an object appears double if one puts it close to the eye. For it makes no difference if you move the eye instead of<sup>13</sup> putting the object close to it, and whether the movement is within the eye or outside it; for the effect on the vision is the same in both cases. The result will be that the object seen appears not to be at rest, and more so if it is at a distance (for it has less hold upon [15] the vision when the latter is extended to a distance); and this near movement causes a still greater variation at the farthest point to which the eye reaches; and if the vision is moved violently and regularly up and down, it has still less hold upon the distant object. Now anything which is extended to a distance moves in a circle, arrows, for example, and objects suspended; and so the same thing happens to the vision owing to its weakness, as though it were actually projected to a distance. It [20] makes no difference whether it is the vision which moves or the object seen; for the effect on the appearance of the object is the same.

**21** · Why is it that, when a quantity of wine is drunk at once, the stomach becomes drier, whereas it ought to be rendered moister by the additional liquid? Is it because the stomach has no action upon a large amount of liquid swallowed at [25] once, but it goes unaltered to its proper place (and the proper place for unconcocted liquid is the bladder), whereas the stomach acts upon a small quantity and concocts it, so that it remains in the stomach and makes it moist?

**22** · Why is it that those who drink wine properly diluted suffer more from hangovers than those who drink unmixed wine? Is it because diluted wine, being [30] light, finds its way into more parts of the body (just as it penetrates into clothing), and is more difficult to expel (water by itself being of a thinner consistency but easier to expel)? Or is it because the amount of unmixed wine which is drunk is less because of the impossibility of drinking a large quantity, and there is more liability to vomiting? Moreover unmixed wine concocts everything else as well as itself. This is the same problem.

**23** · Why is it that death ensues from the drinking of unmixed wine



in large [35] quantities by one who is already in a lean condition? On the other hand, those who are addicted to drinking, if they are not in a lean condition, often become dry from drinking a large quantity at a time; for both wine and life seem to be of the nature of hot things, whereas death is a process of cooling. Is it because death by drinking [874<sup>b</sup>1] resembles death by hemlock, the natural heat being gradually extinguished? But the process is different in the two cases; for hemlock by its coldness congeals the moisture and heat, whereas wine by its own heat parches up the natural heat. So just as a small fire is extinguished by a large blaze and by the heat of the sun, so too [5] the heat in the body is extinguished by that in the wine, if the latter surpasses it in strength.

**24** · Why are the drunken more easily moved to tears? Is it because they become hot and moist, and so they have no command over themselves and are affected by trifling causes? [10]

**25<sup>a</sup>** · Why do those who drink from large vessels become less drunk? Is the reason in all cases the same, namely the repression of heat; that is to say, on the surface of the body? For drunkenness takes place in the region of the head.

**25<sup>b</sup>** · Why do those who are drunk not go to sleep? Is it because to induce sleep warm moisture must be present, for it is easily concocted? But if no moisture is present, or<sup>14</sup> only a little, or moisture which is difficult of concoction, sleep does not [15] come on. Therefore men become sleepest when they are fatigued and after meat and drink, owing to the heat. But sleeplessness afflicts the melancholic and those who are in a high fever,<sup>15</sup> the former because the moisture in them is cooled, the latter because there is little or no moisture in them; these facts must clearly be [20] looked to as the causes of sleeplessness in these two<sup>16</sup> cases.

**26** · Why do drunkards tremble, and the more so the more they drink unmixed wine? Now wine is heating, and trembling is chiefly due to cold; and so it is principally those who are chilled that tremble. Yet many people before now who [25] have taken unmixed wine as their only form of nourishment, have been seized with such violent trembling as to

throw off those who were trying to hold them down, and when they wash with hot water they have no perception of it. Others who live in this way, but also undergo massage and take meat as part of their diet, have been stricken with apoplectic seizures; these are less subject to trembling, because they [30] are unable to move, but they suffer from violent pain and an inability to rest. Trembling is due to cooling; for, as has been remarked, it is those who are chilled who suffer from it and the very old, the cause being in the former their cold [35] condition, in the latter their age. Wine, on the other hand, is very heating; so that it ought to have the opposite effect. Is there any reason why the same effect should not be produced by contraries working in a different manner? For example, burning is caused both by frost and by heat, when the frost collects the heat in one place. Thus [875<sup>a</sup>1] there is a sense in which the same condition is produced both by contrary causes and by the same cause. Now trembling is due to lack of heat,—not, however, of any kind of heat, but of natural heat. Heat perishes either by dying down or by being [5] extinguished; it is extinguished by its contraries, cold and moisture, and it dies down either through lack of material, as lamps do when they have no more fuel or oil, or under the influence of external heat, as the fire goes out in the sunlight and lamps when they are exposed to the fire. Those then who are chilled tremble because the heat in them is extinguished by the cold. This is why the pouring of hot water over a [10] person makes his hair bristle; for the cold being enclosed within and being compressed causes the hair to stand on end. The coldness of one who is beginning to suffer from fever is due to a like cause. In old age the heat dies down because the material which feeds it fails; for moisture is the food of heat, and old age is dry. Now [15] it is because their own heat dies down that drunkards tremble and any others in whom this effect is produced by wine; but they do not do so in the same way as those who tremble from old age, but there is, as we saw, a third way in which the heat is destroyed. For when too much wine is taken, the heat being considerable in the body [20] extinguishes or weakens our own heat, in which our strength consists; for trembling arises when the motive power loses control over that which it moves, just as the extremity of a long and large piece of wood trembles if one has not a good hold<sup>17</sup> upon it, and this happens because either that which is being held is too large or that [25] which is moving it is too weak. So, when the heat is extinguished (for heat appears to be the cause of motion in animals), the natural control of the body is lost. That this condition is induced in drunkards and the aged by a process of cooling is proved by the fact that the trembling is

unaccompanied by chill.

**27** · Why is it that one who is tipsy is more troublesome in his cups than one [30] who is more drunk and than the sober man? Is it because the sober man exercises his judgment properly, whereas one who is quite drunk, because his senses are blocked up, being unable to resist the heaviness which oppresses him, cannot exercise his judgement at all, and, this being so, is not troublesome in his cups? But he who is tipsy uses his judgement, but, owing to the wine which he has drunk, he uses it amiss, and so is troublesome in his cups. He is like Satyrus of Clazomenae, [35] who was given to abuse, and so when he was defendant in a lawsuit, in order that he might speak to the point and not abuse his adversary, they stopped up his ears, so that he might not hear anything and become abusive; but as his adversary was finishing his speech, they uncovered his ears, and he, hearing a few words at the end of the speech, could not restrain himself and began to revile him, because he could use his senses but could not use his judgement aright.

**28** · Why is it that men do not become drunkards by being addicted to sweet [875<sup>b</sup>1] wine, which is pleasanter to the taste? Is it because sweet wine possesses a flavour other than that of wine? He then who is addicted to sweet wine will be a lover of what is sweet rather than of wine.

**29** · Why is it that drunkards take a particular delight in the warmth of the [5] sun? Is it because they need concoction? Another reason is the fact that they are cooled by the wine; which is also a reason why apoplectic seizures and torpidity very readily occur after drinking.

**30** · Why is it that drunkards when looking at a single object sometimes see several objects? Is it because the sources of vision (like the whole head) are [10] disturbed internally by the wine, and, this being so, the vision of the two eyes cannot meet at the same point, but as it were moves to different parts of the object seen; consequently the object appears to be two? The same thing happens if one presses one eye from below; for this disturbs the source of its vision, so that it no longer falls [15] upon the same point as the other eye. This then is an external

disturbance, while that caused by wine is internal; but there is no real difference, the effect being the same whatever the cause of the disturbance.

**31** · Why is it that the tongue of those who are drunk stumbles? Is it because, just as the whole body staggers in drunkenness, so also the tongue staggers [20] and stumbles and cannot articulate clearly? Or is it because the flesh of the tongue is spongy? It therefore becomes saturated and swells up, and when this happens it is more difficult to move, owing to the thickness caused by its increased bulk, and it cannot articulate distinctly. Or is it because, just as we cannot speak under water [25] through lack of air, so we cannot speak when we take liquid into the mouth? So in a state of drunkenness we cannot articulate because the tongue is surrounded by a large quantity of moisture; for a stumbling speech is due to inability to articulate. Or is it because in drunkenness the soul is affected and stumbles? If the soul is in this condition, it is only natural that the tongue should suffer likewise; for the soul is [30] the source of speech. This is why, apart from drunkenness, if the soul is affected, the tongue is affected also, as for example in those who are frightened.

**32** · Why is it that drunkards and those who have to do with the sea delight in the sun? Is it because drunkards require concoction and at the same time certain [35] parts of their bodies have become cooled? This is why apoplectic seizures and torpor follow after drinking. Those who have to do with the sea like the sun because they live always amid moisture.

**33** · Why is it that those who are drunk are incapable of having sexual intercourse? Is it because to do so a certain part of the body ought to be in a state of [876<sup>a</sup>1] greater heat than the rest, and this is impossible in the drunken owing to the large quantity of heat in them; the heat therefore caused by the movement is extinguished, being heated by the surrounding heat? Or is it because for sexual intercourse the lower parts of the body must be heated, whereas wine naturally rises upwards and so creates heat in the upper parts and withdraws it from the lower [5] parts? Also people are least inclined for sexual intercourse after food and are recommended to take a heavy midday meal and a light supper with a view to it, for the heat and moisture move upwards when the food

is unconcocted and downwards when it is concocted; and the semen is formed from concocted food. Those who are fatigued emit semen during sleep, because fatigue is a moist and hot condition; if [10] therefore the excretion takes place in this part of the body, the result is that semen is emitted during sleep. This also occurs for the same reason in certain forms of illness, and likewise in those who are frightened and in the dying.

[15] **34** · Why is it that the young wet their beds more, when they are drunk, than the old? Is it because they are hot and moist, and so the excretion which collects is abundant, because the body does not expend the moisture, and so it overflows; but as they become older, the body owing to its dryness absorbs the excess of moisture? [20] Or is it because the young are more inclined to sleep than the old? Consequently, without their being aware of it, the flow of urine finds its way out while they are asleep, before they can wake up, whereas the old are aware of it, just as they are more alive to any external movement than the young. This is confirmed by the fact [25] that the young themselves wet their beds most when they are most sound asleep.

**35** · Why is it that oil is beneficial against drunkenness and sipping it enables one to continue drinking? Is it because it promotes the flow of urine and so prepares a way for the liquor?

## BOOK IV

### PROBLEMS CONNECTED WITH SEXUAL INTERCOURSE

[30] 1 · Why is it that one who is having sexual intercourse, and also a dying person, casts his eyes upwards, while a sleeper casts them downwards? It is because the heat going out in an upward direction makes the eyes turn in the direction in which it is itself travelling, whereas during sleep the heat collects in the lower part of the body and so inclines the eyes downwards? The eyes close because there is no [35] moisture left in them.

2 · Why do the eyes and buttocks of those who indulge too frequently in sexual intercourse sink very noticeably, though the latter are near and the former far from the sexual organs? Is it because these parts co-operate very noticeably in the effort made in the act of coition, contracting at the time of the emission of the [876<sup>b</sup>1] semen? It is from these parts then in particular that any easily liquefied nourishment which is present there is squeezed out by the pressure. Or is it because these parts become overheated and waste away most, and sexual intercourse operates through heat, and those parts are most heated which are moved in the act of [5] coition? Now the eyes and the parts about the buttocks noticeably co-operate in the sexual act; for it is impossible to emit the semen without drawing the buttocks together and closing the eyes, for the buttocks by their contraction press out the semen (just as the liquid can be expelled from the bladder by the pressure of the hand), while the bringing together of the eyelids presses out the moisture in the [10] brain. That the eyes and the region near them have considerable influence in procreation is shown by the fact that childless and fruitful women alike try the experiment of anointing them, thinking that strength must pass by this way into the semen. These two parts, the fundament and the eyes, are always in all persons full of fatness; and, because they co-operate in the act of coition, they share in the heat [15] which it engenders and are made lean thereby, and much of their substance is excreted into the semen. For unless a part of the body is fat, the heat will not melt it properly, nor will it do so if the part is fat but does not co-operate in the

sexual act, as is the case with the stomach. (The kidneys, however, have more sensation in sexual intercourse than other parts of the body because of their nearness to the organs employed.) Moreover, the mere passage of the semen through these parts, [20] which is quite perceptible by these parts, is sufficient to make them lean; for its proximity takes away something without adding anything to them.

3 · Why is it that both those who indulge in sexual excess and eunuchs, who never do so, alike lose their sharpness of vision? Is it because in the former owing to [25] their desire, and in the latter owing to their mutilation, the upper parts of the body become drier than they ought to be, and this is most noticeable in those organs which have delicate work to do, such as the eye? So when the moisture is drawn away downwards, the upper parts become dry. It is quite obvious that sexual [30] intercourse has this effect. In eunuchs the legs swell and the bowels are easily relaxed, which shows that the moisture has moved downwards.

4 · Why is it that man alone grows hair when he begins to be capable of sexual intercourse, whereas this does not happen in the other animals which have hair? Is it because on coming to maturity the characteristics of animals change to [35] their opposites? For the voice becomes deep instead of shrill, and they become hairy instead of bare; it is clear therefore that animals which are hirsute from birth ought to become bare and not continue to be hirsute when they begin to secrete semen. But this is not so, because animals which emit semen become drier and rarer, conditions which are favourable to the growth of hair. This is shown by the fact that hair does [877<sup>a</sup>1] not grow on scars, for scars are of a close texture and not rare; nor does hair grow upon women and children, both of whom are moist and not dry.

[5] 5 · Why is it that having the feet bare is prejudicial to sexual intercourse? Is it because the body, when it is about to have sexual intercourse, ought to be warm and moist internally? This condition is attained during sleep rather than when one is awake; and so emission of semen takes place readily and without effort during [10] sleep, but requires exertion in those who are awake. When the body is moist and warm, the feet are even more so; as is shown by the fact that the feet of

those who are asleep are warm, being in this condition simultaneously with the interior of the body. But bareness of the feet has the opposite effect of causing dryness and cold. So since it is either difficult or impossible to have sexual intercourse when the feet are [15] not warm, bareness of the feet must necessarily be prejudicial to the performance of the sexual act.

6 · Why is it that man is more languid after sexual intercourse than any other animal? Is it because in proportion to his bulk he emits more semen than any other animal? But why does he do so? Is it because man digests his food with less effort and is naturally moister and hotter than all the other animals? His moistness [20] then creates an abundance of semen, while his heat creates a natural condition favourable to it; for the semen must be moist and hot as long as it is kept in the body.

7 · Why is it that, whereas sexual intercourse takes place by means of heat, [25] and fear and death have a cooling effect, yet semen is sometimes emitted by those who are frightened and by the dying? Is it because, though some parts are cooled, others become somewhat warmed, since they already have their own heat and receive additional heat from the parts which are cooling? So that, though such persons are growing cold, the emission of semen is due not to cooling but to the [30] simultaneous heating. Observation proves this to be so in those who are frightened; for the blood leaves the upper parts of the body, and the lower parts become moist, and the bowels and bladder are relaxed. Thus under the influence of fright the heat makes its way downwards, and at death it travels upwards from below, and, because it creates a state of moisture by its warmth, it causes the emission of semen.

[35] 8 · Why is it that one ought not to have sexual intercourse or vomit or sneeze or emit a deep breath, unless one is aroused? Is it because if we are not aroused, we are in the condition of plants torn up from the earth with which something which does not belong to them is torn up also, or of which some part is torn off and left in [877<sup>b</sup>1] the ground? Now anything which ought to be removed, but of which a part is detached and remains behind, will cause trouble for a long while. And if one disturbs something external to oneself, this will cause trouble, because it is not in its proper place; and this is what will happen if we do



any of the above-mentioned things when we are not aroused.

[5] **9** · Why is it that one can have sexual intercourse more readily when fasting? Is it because the ducts of the body are emptier in those who are fasting and full in those who are full? In the latter case they prevent the moisture from passing through into the semen. This is seen to be the case with the bladder; for when it is full it is impossible to have sexual intercourse readily.

**10** · Why is it that the young, when they first begin to have sexual [10] intercourse, feel loathing after the act for those with whom they have had intercourse? Is it due to the fact that the change caused in them is great? For they are only conscious of the ensuing feeling of discomfort, and so avoid those with whom they have had intercourse as being the cause of this feeling.

**11** · Why is it that those who are continually on horseback are more inclined [15] for sexual intercourse? Is it because owing to the heat and movement they are in the same condition as during sexual intercourse? So as growth takes place with increasing age in the region of the genital organs, these parts become enlarged. Since then they are always in this state of movement, their bodies become open-pored and in a condition which disposes them for sexual intercourse. [20]

**12** · Why is it that when sexual powers begin to be present the flesh has an unpleasant odour which is not present in men or women before puberty? Is it because unconcocted matter always has a worse taste—being more acid or salty or bitter—and a more unpleasant odour, while concocted matter has a pleasant, or less unpleasant, taste and a more agreeable, or less disagreeable, odour? This is clear [25] from an observation of the whole vegetable and animal world. If the properly concocted matter is removed, that which is left is unconcocted,—for instance in ashes, the sweet portion having been consumed, the dust which remains is bitter, and similarly perspiration is salty. Now the natural heat concocts the semen, which [30] though small in amount is very strong, being a large quantity in a concentrated form. When, therefore, it leaves the body, the latter usually becomes languid and cold;

and so the juices in it are subject to less concoction, since the pores are opened owing to the excretion of the semen. Consequently the perspiration of adults is saltier and has a more unpleasant odour than that of children, because it is [35] unconcocted; and if their natural condition is such that the residue of their perspiration has an unpleasant odour, it is still more evident in such persons, and particularly in those parts, such as the armpit, in which it is especially evident in other people also.

13 · Why is it that we regard the creature which is born from our own semen [878<sup>a</sup>1] as our offspring, while that which is produced from any other part of us or from any other excretion is not looked upon as our own? For many things are produced by putrefaction, even from semen. Why then is that which resembles us claimed as our own, while that which is alien to us is not so considered? For either all or none ought [5] to belong to us. Is the reason that, in the first place, what is produced from the semen is born from what is our own, but that which is produced otherwise originates from something which is not ours, namely, from what is purged or excreted from us? In a word, nothing in a creature procreates another creature except the semen; [10] and that which is harmful and evil, and also that which is alien, is not claimed by anything as its own; for it is not the same thing to be part of a thing and to be alien to it and other than it and evil. Now our excretions and putrefactions are not our own but are other than us and alien to our nature. For all things that grow in the body must not be considered as belonging to the body, for even boils grow on it and these [15] are removed and got rid of. In a word, all things that are contrary to nature are alien to the body, and many of the things that grow there are contrary to nature. If therefore the semen is the only thing in us from which a creature can be born, we should be right in regarding as our own offspring that only which is produced from the semen. Moreover anything else which is produced from the semen, as for instance, when it putrefies, a worm, or the so-called monstrosities, when there is [20] corruption in the womb, are not to be reckoned as offspring. In a word, anything which is produced from corruption is no longer produced from that which is our own but from that which is alien to us, like that which is generated from excretions such as ordure. That all such things are produced from corruption is proved by the fact [25] that what is generated from uncorrupted semen is of such a nature as to resemble that from which the semen came, a horse being born from a horse and a man from a man. And we do not value the semen in itself or everything that is being completed in the process of

coming into being (for it is sometimes moisture and a mere mass [30] and flesh which is coming into being),<sup>1</sup> because it has not yet its true nature but only so much of its nature as is implied in the fact that it is so disposed as to produce something resembling ourselves; and nothing even of this kind can be produced from corrupted semen. For these reasons we do not regard as our offspring that which is produced either from anything else in us except the semen, or from the semen when it is corrupted or fails to achieve perfection.

[35] **14** · Why are people less able to have sexual intercourse in the water? Is it because in water none of those things liquefy which liquefy with heat—lead, for example, or wax? Now the semen obviously liquefies with heat, for it does not liquefy until it is warmed by the friction. Fishes, however, have sexual intercourse without friction.

[878<sup>b</sup>1] **15** · Why is it that sexual intercourse is the most pleasant of all things to animals, and is it so of necessity or with some purpose in view? Is it pleasant because the semen comes either from the whole body, as some declare, or not from the whole [5] body but only from the area over which all the ducts of the veins extend? The pleasure then of the friction being similar in both cases, the sensation extends as it were over the whole body. Now the friction is pleasant, since it involves the emission of vaporous moisture enclosed unnaturally in the body; but the act of generation is [10] an emission of similar matter for its natural purpose. It is pleasant both of necessity and for the sake of something,—of necessity, because the way to a natural result is pleasant, if it is realized by the senses; and for the sake of something, namely, the procreation of animal life. For it is the pleasure more than anything else which incites animals to sexual intercourse.

**16** · Why is it that sexual excess is beneficial in some diseases caused by phlegm? Is it because it involves the emission of an excretion, and so a considerable [15] amount of excreted matter is rejected with it, and phlegm is an excretion?

**17** · Why does sexual intercourse cool and dry the stomach? Does it cool it because the heat is expelled in coition? Coition causes dryness,

because, as the heat goes out, the moisture is vaporized and finds its way out as the body cools, while at [20] the same time the heat caused by the act of copulation has a drying effect.

**18** · Why are those whose eyelashes fall off accounted lustful? Is it for the same reason as that for which the bald also are so accounted? For the eyelashes and the hair of the head really belong together. The reason is that all the congenital hair [25] which does not increase as a man gets older, falls off owing to lustfulness. For the hair of the head and the eyebrows and eyelashes are congenital hair; and of these the eyebrows alone sometimes grow thicker with advancing years (the reason for this has been stated elsewhere), while the hair of the head and the eyelashes both fail from the same cause, viz., that lustfulness cools the upper parts of the body [30] which are deficient in blood, and so this portion of the body does not concoct any of the nourishment, and the hair not receiving any nourishment drops off.

**19** · Why is it that those who wish to pass urine cannot have sexual intercourse? Is it because the ducts become full? Now that which is full of moisture cannot admit any more moisture. [35]

**20** · Why is it that varicose veins prevent both man and any other animals which suffer from them from procreating? Is it because varicose veins are due to a displacement of breath, and this is why they are beneficial to melancholic diseases? Now sexual intercourse also is accompanied by an emission of breath. If therefore a [879<sup>a</sup>1] rush of breath makes its way along when sexual intercourse is taking place, it fails to impart movement to the semen and the latter becomes cold; consequently it enfeebles the erection of the penis.

**21** · Why do those who have sexual intercourse usually become languid and weaker? Is it because the semen is an excretion from the whole body, and so the [5] composition of the body, like the harmony of a building, is disturbed by the loss of any portion of it—if, for example, all the blood or any other component part of it is removed? So important is that which the body loses in sexual intercourse, being indeed formed from a large amount of nourishment though itself small in quantity, just

as a cake is made from wheaten flour. [10]

**22** · Why is it that the penis is greatly distended in those who have sexual intercourse at a time when they desire to pass urine? Is it because, owing to the ducts being full of moisture, the semen, passing out through a narrower space, swells the bulk of the penis and lifts it up, for it is situated close to the ducts.

[15] **23** · What is the cause of the erection and swelling of the penis? Are there two reasons, first, that it is raised by a weight applied behind the testicles, the latter acting as the fulcrum, and, secondly, that the pores become full of breath? Or does its bulk become greater from the increase of the moisture and its change of position, [20] or from the formation of moisture? Now very large objects are less easily moved, because the weight is farther away from the fulcrum.

**24** · Why is it that those who have sexual intercourse or are capable of it have an evil odour and what is called a goat smell, whereas children do not? Is it because, as has already been said, in children the breath concocts the moisture and [25] perspiration, whereas the perspiration of grown men remains unconcocted?

**25** · Why is it that in summer men are less capable of sexual intercourse and women more so? As the poet says,

Men, when the artichoke blooms, are weaker and women more wanton.<sup>2</sup>

[30] Is it because the testicles hang down lower than in the winter, and they must be drawn up if sexual intercourse is to take place? Or is it because hot natures collapse in summer when the heat is excessive, but cold natures are invigorated by it? Now a man is dry and hot, but a woman is cold and moist; consequently a man's strength is impaired, but a woman's is invigorated, its deficiency being compensated by its [35] opposite.

**26** · Why is it that some persons find pleasure in submitting to sexual intercourse, and some take pleasure in performing the active part,

and others do [879<sup>b</sup>1] not? Is it because each form of excretion has a region in which it is naturally secreted and, when an effort is made, the breath in finding its way out causes the excretion to swell and expels it; for example, urine collects in the bladder, food from which the moisture has been extracted in the bowels, tears in the eyes, mucous [5] matter in the nostrils, and blood in the veins? Similarly the semen collects in the testicles and penis. In those whose ducts are not in a natural condition, owing either to the blocking up of the ducts leading to the sexual organs (as in the case of eunuchs or other victims of sexual disablement) or to some other cause, all such moisture collects in the region of the fundament; for it is by this way that it passes [10] out of the body. That this is so is proved by the contraction of that part in sexual intercourse and the wasting of that region of the body. If therefore through wantonness a man has a superfluity of semen, it all collects there; and so, when desire comes upon him, the part in which it is collected desires friction. This desire may be due to diet or to thought. When desire is stirred from any cause, the breath collects and secretion of this kind flows to its natural place. If the secretion be thin [15] and full of air, when the breath finds its way out the desire ceases (just as the erection in boys and older persons sometimes ceases without the discharge of any moisture); but when the moisture dries up . . .<sup>3</sup> And if neither of these things occurs, the desire continues till the one or the other of them takes place. But those who are [20] effeminate by nature are so constituted that little or no semen is secreted where it is secreted by those who are in a natural state, but it collects in this part of the body. The reason for this is that they are unnaturally constituted; for, though male, they are in a condition in which this part of them is necessarily incapacitated. Now incapacity may involve either complete destruction or else perversion; the former, [25] however, is impossible, for it would involve a man becoming a woman. They must therefore become perverted and aim at something other than the discharge of semen. The result is that they suffer from unsatisfied desires, like women; for the moisture is scanty and has not enough force to find its way out and quickly cools. [30] When it finds its way to the fundament only, there is a desire to submit to sexual intercourse; but if it settles both there and in the sexual organs, there is a desire both for performing and submitting to the sexual act, and the desire for one or other is greater as more semen is present in either part. This condition is sometimes the result of habit; for men take a pleasure in whatever they are accustomed to do and emit the semen accordingly. They therefore desire to do the acts by which pleasure [35] and the

emission of semen are produced, and habit becomes more and more a second nature. For this reason those who have been accustomed to submit to sexual intercourse about the age of puberty and not before, because recollection of the past [880<sup>a</sup>1] presents itself to them during the act of copulation and with the recollection the idea of pleasure, desire to take a passive part owing to habit, as though it were natural to them to do so; frequent repetition, however, and habit become a second nature. All this is more likely to occur in the case of one who is both lustful and effeminate. [5]

**27** · Why is it that those who desire to submit to sexual intercourse feel a great shame about confessing it, which they do not feel in confessing a desire for meat or drink or anything of that kind? Is it because the desire for most things is necessary and its non-satisfaction is sometimes fatal to life, but sexual desires proceed from something beyond mere necessity? [10]

**28** · Why is it that men are more inclined for sexual intercourse in the winter and women in the summer? Is it because men are hotter and drier in their nature, and women moister and cooler? In men therefore during the winter the moisture and heat are sufficient to cause the impulse (and it is moisture and heat which give [15] rise to the production of the semen), whereas in women the heat is less and the moisture is congealed owing to the lack of fire. But in summer in women<sup>4</sup> the heat is well proportioned, whereas in men it is more than sufficient; for the excess dissolves much of their strength. For this reason also children are thinner during the summer; [20] for it is a case of 'fire added to fire'.

**29** · Why is it that those who are hot by nature, when they are strong and well nourished, if they do not have sexual intercourse are often oppressed by bile, which makes its way down in a very bitter condition, and a salty phlegm is [25] engendered, and their complexion changes? Is it because some excretion always comes away with the semen? (That is why also the semen of some men who emit a large quantity of excretion<sup>5</sup> is said to smell of the water in which fish have been washed.) So when they have sexual intercourse, this excretion comes away with the semen and so causes no inconvenience; but if they

abstain from copulation, the excretion becomes bitter or salty.

[30] **30** · Why are the melancholic particularly inclined for sexual intercourse? Is it because they are full of breath, and the semen is a discharge of breath? If so, those whose semen is full of breath must necessarily often desire to purge themselves of it; for thus they are relieved of it.

**31** · Why are birds, and men with thick hair, lustful? Is it because they have [35] a large amount of moisture? Or is this not true (for the female sex is moist and not hairy), but is the real reason that the natures both of birds and of thickhaired men are able owing to their heat to concoct a large quantity of moisture? This is indicated by the presence of hair and feathers. Or is it because the moisture is plentiful and is overpowered by the heat? For if the moisture were not plentiful or [880<sup>b</sup>1] were not overpowered, hair would not grow on human beings nor feathers on birds. Now the semen is formed most plentifully under conditions of locality and at seasons that have these characteristics, in spring for example, which is naturally moist and hot. Birds and lame men are lustful for the same reason, namely, that in [5] both, owing to the deficiencies of their legs, the nourishment is carried downwards in small quantities only, while the rest travels into the upper region of the body and is converted into semen.

**32** · Why is it that when a man has sexual intercourse his eyes grow very weak? Is it not clear that this happens because the moisture leaves them? This is [10] proved by the fact that the semen is cold; for it does not become moist unless the heat warms it thoroughly. Nor does it require melting, for it is dispersed about the body like blood.



# BOOK V

## PROBLEMS CONNECTED WITH FATIGUE

[15] 1 · Why is it that long walks are more fatiguing and short walks less fatiguing over level ground than over uneven country? Is it because much movement and violent movement causes fatigue, and spasmodic movement is violent, and continuous and monotonous movement is much movement? In walking therefore on hilly ground, if the distance be long, the change provides a rest, and the [20] same movement is not continued for long, even in the case of horses, owing to the change. On even ground, on the other hand, the similarity of position continues uninterruptedly and gives the limbs no rest, but helps to make the movement continuous. Now if the distance is short, no fatigue is caused on flat ground by long-continued motion; whereas over hilly ground the violent change to an opposite [25] kind of movement, sometimes uphill and sometimes down, gives rise to fatigue. Such, in our opinion, is movement over hill country, and that over level ground is the contrary.

2 · Why is it that those who faint and those who collapse after physical [30] exertion are generally held to become smaller in bulk and their voices shriller? Is it because their voices, appearing to be less, seem shriller (this can be illustrated by the fact that those who imitate distant voices make shrill sounds), while their bulk appears less?

3 · Why is it that only the stomach becomes thinner in those who take physical exercise? Is it because the greatest quantity of fat is found round the stomach? [35]

4 · Why is it that the fat is consumed in those who exert themselves? Is it because fat melts when heated, and the movement causes heat, whereas flesh does not melt?

5 · Why is it that the parts round the belly are fattest? Is it because

they are near to the nourishment? While then the other parts of the body receive something [881<sup>a</sup>1] from the belly, the belly itself often receives something. Or is it because the belly is exerted less than the other parts, because it has no joints?

6 · Why is it that fatigue ceases more readily if one mixes water with the oil with which one rubs oneself? Is it because the oil sinks in farther when mixed with [5] water, whereas by itself it does not penetrate so well, because it has a tendency to remain on the surface? If, therefore, it sinks in, the body is more softened; for oil is naturally hot, and hot things have a drying and hardening effect, and dryness and hardness are inexpedient in fatigue; but when applied with water the oil has a less [10] drying effect.

7 · Why is it that vomiting is prescribed for those who are suffering from fatigue, although vomiting is itself fatiguing? Is it because fatigue is caused by the crushing and pressure and weariness of the bones, and this can be caused either by some external or by some internal agency, and in the latter case from one of two [15] causes, either because the flesh overreaches its own strength, or because one bodily constituent mingles in a large quantity with the rest of the body and does not keep to its proper place, as happens with the excretions? For any burdens which are put upon us externally cause more fatigue than our own members, even though they are [20] lighter than these in weight. This can be illustrated by the fact that those who have eaten or drunk somewhat freely, though they have exerted themselves less than when they were fasting, yet feel more fatigue, because the food, being unconcocted, is not in its proper place. And since fatigue causes liquefaction, and liquefaction is [25] an excretion, it is the latter which produces fatigue in us, wandering about at random and attacking the bones and sinews and the interior parts of the flesh, which are rare and open. Consequently vomiting, by dislodging the excretion which is the cause of fatigue, naturally makes us less fatigued; for it leaves the body in the state [30] in which it was when the exertion began. Vomiting is fatiguing, not because of the excess of movement caused while it is taking place, but when it does not happen to be thoroughly carried out; for fatigue caused by vomiting occurs when a considerable amount of food is left behind and this contains excretions, which, as we have already said, happens in those who have eaten largely. If, therefore, in the latter it is [35] not exertion which causes fatigue, but

they feel fatigue because of the condition in which they are, so vomiting could not be the cause of fatigue in those who do not get rid of all the food which is in them; for in that case every one who vomited would feel fatigue, whereas many through vomiting become less fatigued.

8 · Why is it more fatiguing to the arm if one casts with the hand empty than [881<sup>b</sup>1] with a stone in it? Is it because the movement is more spasmodic if the hand be empty, for the hand has nothing to rest upon, such as the thrower finds in the missile which he holds in his hand? Similarly the competitor in the pentathlon finds resistance in the weights which he holds, and the runner in his arms which he [5] swings; so the former jumps farther if he holds weights than if he does not, and the latter runs more quickly if he swings his arms than if he does not do so.

9 · Why is it that quick running causes a tendency to disease in the head both in man and in the other animals? Yet generally speaking running appears to draw [10] the excretions downwards, as does walking; for which reason also those who walk much grow fat in the legs, because both the nourishment and the excretions settle down from the upper into the lower parts. Is it true that while motion has the same effect, yet quick motion, owing to the strain and the holding of the breath which it involves, causes heat in the head and inflates the veins in it and renders them liable [15] to be affected by external influences, such as cold and heat, and by the contents of the trunk; and that if these can enter the head, disease is necessarily engendered in that region?

10 · Why is it more fatiguing to walk on level than on uneven ground, whereas one can walk more quickly on an even than on an uneven road? Is it [20] because it is less fatiguing if one does not move continually in the same position, and this is the case rather in traversing uneven ground? On the other hand one progresses more quickly the less one's movement is contrary to nature. On even ground, therefore, the raising and planting of the foot is a slight but frequent movement, while the opposite occurs on uneven ground. Now to raise the foot is unnatural (for raising anything requires an effort); and the slight movement of [25] raising the foot at each step becomes considerable when repeated many times.

11 · Why is it more fatiguing to lie down on a flat than on a concave surface? Is it for the same reason that it is more fatiguing to lie on a convex than on a flat surface? For the weight being concentrated in one place in the sitting or [30] reclining position causes pain owing to the pressure. This is more the case on a convex than on a straight surface, and more on a straight than on a concave; for our body assumes curved rather than straight lines, and in such circumstances concave surfaces give more points of contact than flat surfaces. For this reason also couches and seats which yield to pressure are less fatiguing than those which do not do so. [35]

12 · Why are short walks fatiguing? Is it because they involve abrupt change, for they necessitate coming often to a standstill? Now frequent change from one extreme to another is fatiguing, for it does not allow one to become accustomed to either extreme, and this is tiring; and one cannot become accustomed [882<sup>a</sup>1] to both things at once.

13 · Why is it that those who ride on horseback water more freely at the eyes the quicker the horse goes? Is it because the stream of air which meets them is colder according as it is for a shorter time in contact with the body (as happens in [5] the case of naked runners), and it is the cold which makes the eyes water? Or is the reason the contrary of this, namely, that heat makes the eyes water (the sun, for instance), and movement engenders heat? Or is it due to the impact of the air? For as blasts of wind coming from an opposite direction trouble the eyes, so the air all [10] the more deals a gentle blow the quicker the horse is driven.

14 · Why is it that the other parts of the body become more fleshy when subjected to friction, but the stomach becomes leaner? Or is it true that the stomach does not become gradually leaner but solider? The flesh, however, is not similarly [15] affected, and this is the point of the problem; for, speaking generally, the stomach does become leaner as the result of exercise and exertion. The reason is that the fat parts, and those which naturally admit of more expansion, liquefy when heated. Now the skin naturally admits of expansion; but, because it very quickly fattens, it [20] always contains some fat, unless any disease is present. The reason for this is that it is near the nourishment. Since, therefore, generally speaking, fat is not natural but adventitious, and is not one of the

necessary constituents of the body, as is the flesh, the movements set up by exercise and friction warm and melt it and distribute the [25] superfluous nourishment in the other portions of the body. It is for this reason that sitting still makes the stomach fat and the rest of the body thin; whereas movement and friction make the stomach thin and fill out the rest of the body.

**15** · Why is it that after long and violent walking or running, if one stands on [30] tiptoe, the heels quiver and are hastily drawn<sup>1</sup> down again? Is it because, owing to the continuity and violence of the movement, the quivering of the muscles in the man does not cease? For the mind often controls the body as a whole, but does not control certain parts of it, when they have been set in motion in a certain way, the [35] heart, for example, and the sexual organ. The reason is that a considerable quantity of breath is consumed by heat round the muscles, which does not cool off immediately a man comes to a standstill. This breath, therefore, is drawn down, making him quiver, as it were dragging him down by its movement, and leaves him little control over the most distant part of his body—in this case over his heels. A similar phenomenon occurs in the trembling of the lower lip in those who are angry.

[882<sup>b</sup>1] **16** · Why is it that those who are not running very hard respire rhythmically? Is it because every rhythm is measured by a definite movement, and the movement at regular intervals which occurs in running is of this nature? As soon, therefore, as they begin to run they respire; and so the respiration taking place at [5] equal intervals, because it is measured out by a uniform movement, creates a rhythm. Or is it because all respiration without exception takes place at intervals in those who respire naturally and do not hold their breath? The rhythm then is not obvious in those who are sitting or walking, because the movement of the body is [10] slight; and in those who are running vigorously we cannot get a complete view of the rhythm of the respiration, because our senses cannot follow the movement. But in those who are running moderately fast the movement allows the measure observed by the breathing to be perceptible, and so shows the rhythm.

**17** · Why is it that, when we are running, the air seems to turn into

breath? [15] Is it because, while we are moving in the act of running, we set in motion a stream of air continuous with our bodies, and this is breath? That is why the air not only seems to turn into breath, but actually does so. Or is it because in running we come into collision with the air, and, when this happens, we have a more acute perception of the air owing to the movement? It is only natural, therefore, that it should seem [20] to us to turn into breath; for the phenomenon occurs through the rush of our movement.

**18** · Why is it that one is more liable to fall when running than when walking? Is it because in the former case one raises oneself higher before moving? For this is the difference between running and walking.

[25] **19** · Why is it that in ascending a slope our knees feel the strain, and in descending our thighs? Is it because when we ascend we throw the body upwards and the jerk of the body<sup>2</sup> from the knees is considerable, and so we feel the strain in the knees? But in going downhill, because the weight is carried by the legs, we are supported by our thighs, and so they feel the strain. Furthermore, whatever is [30] unnatural causes strain and pain. Now it is natural for the knees to bend forwards and the thighs to bend backwards. In going uphill then the knees are bent backwards owing to one's desire to support oneself, but in going downhill the thighs [35] are bent forwards because the body has a tendency to fall forwards.

**20** · Why is it that on journeys the middle of the thigh is the part which feels the strain most? Is it because in anything that is prolonged and continuous and fixed the strain falls most upon the centre, and so it is most likely to break at that point? Now the thigh is of this nature, and so it is in the middle of it that we feel the strain [883<sup>a</sup>1] most.

**21** · Why is it that persons of a moist temperament easily choke as a result of exertion and through heat? Is it because their moisture when heated becomes air and the excess of it burns more fiercely? When, therefore, it cannot find its way out [5] owing to its abundance, the process of cooling does not take place; and so it quickly catches fire owing to the natural and adventitious heat. It is for this reason that

perspiration induced by taking physical exercise, and by exerting oneself generally, and the emission of breath are beneficial; for breath is formed by the separation and rarefaction of moisture. [10]

**22** · Why is it that bodies of an equable temperament often feel weariness but throw it off more easily? Is the cause the same in both cases? For that which is equable is uniform, and that which is uniform is the more subject to similar influences; so if any part suffers, the whole straightaway suffers in sympathy. But that which is not equable, being more disunited, is not sympathetically affected by [15] its parts. A body of equable temperament therefore often feels weariness, but throws it off more easily, because the whole body shares it; for the suffering, being distributed over a larger area, is weaker and therefore more easily got rid of. But a body which is not of an equable temperament, inasmuch as it has no communion with its members, is less often afflicted with weariness, but has greater difficulty in [20] shaking it off; for its suffering is acute.

**23** · Why is it more fatiguing to walk on level than on uneven ground, whereas one can walk more quickly on an even than on an uneven road? Is it because it is least fatiguing if one does not move continually in the same position, and this is the case rather in traversing uneven ground?<sup>3</sup> But one travels more [25] quickly when the foot has to be lifted less in any equal period of time. On level ground the raising of the foot is a slight but frequent movement, on uneven ground the reverse; but the slight<sup>4</sup> movement of raising the foot at each step becomes considerable when repeated many times.

**24** · Why is it that in descending a slope we feel the strain most in the thighs, [30] and in ascending in the legs? Is it because in ascending the strain is due to the raising of the body? For the whole body becomes a burden; and so the part upon which it all rests and with which we raise it (that is, the legs) feels the strain most. For the leg is an extremity, having length but not having width, as the foot has; consequently it is shaken. So we may cite in illustration the fact that we move [35] weights with the shoulder and rest them upon it, and therefore feel the strain most in the shoulder. But when we are descending, the strain is caused by the body falling downwards and thrusting us forward unnaturally, so that we feel

the strain most in the part on which it falls most and which it shakes. Now the leg remains unaffected, and the trunk forms the weight; but it is the thigh which receives the weight and is [883<sup>b</sup>1] shaken, because it has extension and is forced from above into a bent position where the trunk presses on it.

25 · Why is it that a journey seems longer when we traverse it without [5] knowing its length than when we do know it, all other conditions equal? Is it because to know its length is to be able to connect a number with it, and the indeterminate is always more than the determinate? Just as, therefore, if one knows that a journey is a certain length, it must necessarily be finite, so, if one does not know, as though the proposition was convertible, the mind draws a false conclusion, and the distance appears infinite. Furthermore, a quantity is determinate, and that which is [10] determinate is a quantity; therefore when a thing appears not to be determinate, it appears to be as it were infinite, because that which is of a nature to be determined, if it is not so, is infinite; so that what appears not to be determined necessarily appears in a sense unlimited.

26 · Why is it that the thighs feel fatigue more than the legs? Is it because [15] they are nearer to the part of the body which contains the excrement, so that, when that part overflows with heat owing to the movement, the thighs contract more readily and to a greater extent? Or is it because the thighs are more closely connected by growth with one another, for they suffer considerably owing to the separation of what is really continuous? For indeed, if one feels fatigue when there [20] is no excrement in the body, even so it is the thighs and loins which suffer more than the other parts. Or is it because, just as swellings in the groin are caused, if one receives a blow, owing to the close connexion of the veins and sinews, so the thigh is similarly affected? For the thigh is nearer than the leg to the source of the veins. Or is it because the thigh remains more in the same position than the legs, and this is [25] more fatiguing? Or is it because the thigh is fleshy, and therefore the natural heat<sup>5</sup> there is considerable?

27 · Why is it that in some people sores are formed as the result of exertion? Is it because, when the body contains impurities, movement



heats it and causes other excretions to exude with the perspiration? These excretions, being thick and containing harmful humours of an acid, bitter, and salty nature, cannot be expelled [30] owing to their thickness, but swell up through the flesh and cause sores owing to the bitterness of the humour which they contain.

**28** · Why is it that food is not given immediately after exercise and after medicine has been administered? It is because the body is still being purged and has not yet rested from its toil, and the excretions have not yet been expelled? [35]

**29** · Why is it more difficult to run than to walk? Is it because the runner has a heavier burden, since, when he is raised in the air, he has his whole weight to support? But a man who is walking continues to put his weight on the part of him which is at rest, like a man leaning against a wall.

**30** · Why is it that one does not feel hungry immediately after exercise? Is it [884<sup>a</sup>1] because liquefaction still remains until the concoction of anything is complete? Or is it owing to the breath which the exertion engenders from the moisture? Or is it owing to the thirst which is due to the heat caused by the exertion? All these possible causes are present. [5]

**31** · Why is it that those who are fatigued and those who are suffering from phthisis are apt to emit semen during sleep? Is it because generally speaking those who are warm and moist are inclined to do so, since the semen naturally has these characteristics? Now such a thing is most likely to happen in persons in these conditions, when the heat engendered by sleep is added; for the body requires a [10] slight impulse only, which must be internal and not external. This condition is fulfilled in those who are suffering from phthisis and in those who are fatigued; the latter being full of hot liquid owing to their fatigue and movement, and the former owing to their state of flux and the heat engendered by their inflamed condition. [15]

**32** · Why is it more difficult to apply prolonged friction oneself to

the left leg than to the right? Is it because, though our right is the side which is capable of exertion, yet the rubbing of the left leg, since it involves a distorted attitude, is unnatural, and anything which is unnatural is difficult? The difficulty of rubbing the right side with the left hand is not obvious, because the left hand has no strength [20] whichever side it is applied to.

**33** · Why is it healthy to reduce the amount of nourishment and to increase the amount of exercise? Is it because abundance of excretion is the cause of disease? Now this is due either to excess of nourishment or to lack of exercise. [25]

**34** · Why should the flesh be made rare rather than dense in order to promote health? For just as a city or locality is healthy which is open to the breezes (and that is why the sea too is healthy), so a body is healthier in which the air can circulate. For either there ought to be no excrement present in the body, or else the [30] body ought to get rid of it as soon as possible and ought to be in such a condition that it can reject the excrement as soon as it receives it and be always in a state of motion and never at rest. For that which remains stationary putrefies (water, for example), and that which putrefies and does not move causes disease; but that which is [35] rejected passes away before it becomes corrupt. This then does not occur if the flesh is dense, the ducts being as it were blocked up, but it does happen if the flesh is rare. One ought not, therefore, to walk naked in the sun; for the flesh thereby solidifies and acquires an absolutely fleshy consistency, and the body becomes moister, for the internal moisture remains, but the surface moisture is expelled, a process which [884<sup>b</sup>1] also takes place in meat when it is roasted rather than boiled.<sup>6</sup> Nor ought one to walk about with the chest bare; for then the sun draws the moisture out of the best constructed parts of the body, which least of all require to be deprived of it. It is rather the inner parts of the body which should be submitted to this process; for, because they are remote, it is impossible to produce perspiration from them except [5] by violent effort, but it is easy to produce it from the chest because it is near the surface.

**35** · Why is it that short walks are fatiguing? Is it because one often comes to a standstill and there is no uniform movement in the joints, and

this is [10] fatiguing?

**36** · Why do those who stand still in the sun become warmer than those who move, and this although movement is productive of heat? Is it true that every kind of movement does not produce heat, but some kinds have a cooling effect, as happens, for example, when one blows upon or keeps in motion kitchen-pots which [15] have boiled up? If then the heat remains when one stands still and, doing so, heats us more than if it were in motion (for our own body always gives off a warm steam, which heats the neighbouring air, as though there were a burning brand there), then, if we remain motionless, the air surrounding us becomes warm for the reasons [20] already stated; whereas, if we move, a wind is set up which cools us, for wind always has a cooling effect.

**37** · Why is it that those who ride on horseback water more freely at the eyes the quicker the horse goes, and those on foot the quicker they run? Is it due to the [25] fact that the air which meets them is cold? For cold causes the eyes to water; for by contracting and solidifying the flesh it purges out the moisture. Or is the reason the contrary of this, namely, that the heat causes perspiration, and watering at the eyes is a form of perspiration? Therefore both perspiration and watering at the eyes are [30] due to heat and are alike salty; and it is movement which causes heat. Or is it due to the impact of the air? For as blasts of wind coming from an opposite direction trouble the eyes, so too the quicker a man drives or runs the more does the air deal a gentle blow, and this causes the eyes to water, because the ducts of the eye are [35] rarefied by the blow; for every blow has the effect either of cleaving or crushing.

**38** · Why is it that fatigue must be cured in the summer by baths, in the winter by anointing? Is it because the latter, owing to the cold and the changes which it causes in the body, must be got rid of by heat, which will cause warmth, and olive-oil contains heat? In summer, on the other hand, the body requires moisture; for the season is dry and chills are not engendered, because it is warm. A [885<sup>a</sup>1] sparing diet of solid food and a liberal indulgence in liquid nourishment are characteristic of the summer, the latter being peculiar to the summer, while the former is commoner than at other seasons; for indulgence in drinking is peculiar to the summer because of the dryness of the season, but a sparing diet is

found at all seasons, but is more general in the summer; for then owing to the season more heat is engendered by food. [5]

**39** · Why is it that those who are running vigorously experience the greatest shock, if any one impedes them in their course? Is it because a thing is being drawn apart most vigorously when it is being dragged or moved violently in a contrary direction? If therefore any one impedes one who is running and whose limbs are being vigorously thrust forward, the result is that he wrenches him back at the same [10] time as his limbs are still moving forward, and so the more vigorously he is running the more violent is the shock which he receives.

**40** · Why is it that walking along roads over uneven ground is less fatiguing than along a flat, straight surface? Is it because an upright carriage is natural to [15] everybody, but walking over even surfaces is more fatiguing than over uneven ground, since walking over even ground causes a continuous strain on the same members, whereas walking over uneven ground distributes the strain over the whole body? Now walking in warm weather tends more to make the body thin than in cold weather; for it causes more strain upon the outer parts, and so causes thinness by [20] engendering perspiration. Walking in cold weather makes the flesh more solid and causes a great desire for food; for it engenders an increase of heat in the inner parts and, since they become less liable to be affected by the cold, it cleans the inner [25] region by increasing the heat there, while it makes the flesh firm, since it cannot prevail over the whole of it. In like manner walking uphill is a greater exertion and tends more to cause thinness than walking downhill. For walking uphill causes most strain to the loins (whereas walking downhill is most trying to the thighs, for the whole weight falls upon them and so usually causes fatigue in them); for as they are [30] forcibly carried<sup>7</sup> upwards in an unnatural manner, heat is engendered. Walking uphill therefore induces perspiration and causes thinness by heightening the respiration and engenders pain in the loins; for the legs, being lifted with difficulty, cause the loins to bend and draw them up, which naturally causes a very great [35] strain. Walking on hard, resisting ground causes fatigue to the muscles and tendons of the legs; for it causes tension in the sinews and muscles, because the pressure upon them is violent. Walking on soft ground is fatiguing to the joints; for it causes [885<sup>b</sup>1] frequent bending of the joints, because the surface trodden gives way. This is the same

problem.

[5] **41** · Why do we walk with difficulty up a steep slope? Is it because all progression is made up of raising the feet and putting them down again? Now raising the foot is unnatural and putting it down is natural, while putting the foot forward is a mean between the two. Now in walking up a steep slope the unnatural motion preponderates.

[10] **42** · Why are riders on horseback less likely to fall? Is it because owing to their fear they are more careful?

# BOOK VI

## PROBLEMS CONNECTED WITH THE POSITIONS ASSUMED IN LYING DOWN AND IN OTHER POSTURES

[15] 1 · Why is it that sitting down makes some persons fat and others lean? Is it because bodily conditions differ, some men being hot, others cold? Those therefore who are hot grow fat (for the body owing to its heat prevails over the nourishment); but those who are cold, owing to the fact that their body requires heat introduced [20] from without and derives it chiefly from movement, cannot concoct their food while they are at rest. Or is it because the hot are full of superfluities and require movement to expend them, while the cold are not so?

2 · Why is it necessary that the parts of the body should be distended, as happens when a man takes athletic exercise? Is it because the ducts must be purged [25] by their own breath?

3 · Why is it better to lie in a curved position and why do many physicians prescribe this? Is it because the stomach concocts food more quickly when it is kept warm, and it keeps warmer in this position? Furthermore it is necessary to give the vapours a place where they can settle; for then there is less likely to be pain from [30] flatulence. (It is on this account that swollen veins and abscesses of all kinds help to restore a healthy condition, because they form hollows in which they receive the vapours.) When the body then is extended no hollow is formed (for the internal organs occupy all the space); but a hollow is formed when the body is curved.

[35] 4 · Why is dizziness more likely to occur in those who are standing than in those who are sitting? Is it because, when one is still, the moisture all inclines to one part of the body? This is why raw eggs cannot be spun round and round but fall over. The same thing occurs when the moisture in the body is put in motion. So one [886<sup>a</sup>1] stands up after having been at rest, when one is in this condition; but one sits down after having been in motion, when the moisture is evenly and uniformly

distributed.

5 · Why is it that sleep comes more readily if one lies on the right side? Is it because the conditions when we are awake and when we are asleep are the contrary of one another? Since, therefore, when we are awake we recline on the left side, the [5] contrary will occur when another principle, namely, the contrary, is at work. Or is it because sleep is the absence of movement? The parts then of the body which are most active must be at rest; and the parts of the body on the right are most active. So, if one is lying on this side, a waking principle is as it were enchained.

6 · Why does one feel numbness? And why more in the hands and feet than [10] elsewhere? Is it because numbness is a process of cooling, being due to deprivation of blood and its transference elsewhere? Now these parts, especially the feet, are least fleshy and most muscular, and so they are naturally disposed to cool quickly.

7 · Why do we find it comfortable to recline on the left side, but sleep better [15] on the right side? Is it because by turning away we avoid looking towards the light, since in the dark sleep comes on more readily? Or is it because we keep awake when reclining on the left side, and in this position we can easily employ ourselves in any particular function; and so for the contrary purpose the contrary position<sup>1</sup> is advantageous; for each position invites to a particular function. [20]

# BOOK VII

## PROBLEMS CONNECTED WITH SYMPATHETIC ACTION

1 · Why do men generally themselves yawn when they see others yawn? Is it [25] because, if they are reminded of it when they feel a desire to perform any function, they then put it into execution, particularly where the desire is easily stirred, for example, that of passing urine? Now a yawn is a breath and a movement of moisture; it is therefore easy of performance, if only one sees some one else yawning; for the yawn is always ready to come.

2 · Why is it that, although we do not imitate the action if we see a man stretching out his hand or foot or doing anything else of the kind, yet we ourselves [30] yawn if we see some one else doing so? Or does this not always occur, but only when the body happens to feel a desire and is in such a condition that its moisture becomes heated? For then it is recollection which gives the impulse, as also in sexual desire and hunger; for it is that which causes recollection to exist that provides the stimulus towards the condition observed in another person. [35]

3 · Why is it that if we stand by a fire we desire to pass urine, and if men stand near water (for example, near a river) they actually pass urine? Is it because [886<sup>b</sup>1] water in general reminds us of the water in our own bodies, and the neighbourhood of water incites our internal moisture to come out? Fire of itself dissolves anything which is solidified in the body, just as the sun melts the snow.

4 · Why is it that those who come into contact with certain diseases become [5] affected by them, but no one ever becomes healthy through contact with health? Is it because disease is a state of movement, while health is a state of rest? If so, disease can set up movement, but health cannot. Or is it because disease comes to us against our will, while health comes by our own wish? Things then which occur against our will are different from those which occur by our wish and deliberate choice.



5 · Why is it that not only do some unpleasant sounds make us shudder—for [10] example, when a saw is being sharpened, or pumice-stone cut, or a stone ground—but the signs of effects produced in others conveyed by the sight cause those very effects in ourselves? For our teeth are set on edge when we see others eating anything bitter, and some people faint when they see any one being [15] strangled. Is it because every sound or noise is a breath, and this penetrating into us naturally causes disturbance? Now it will cause greater disturbance if it comes either in great quantity or with an unusually violent impact, setting up a new condition or causing some alteration within us. Therefore breaths which, though large in bulk, are yet soft, stir the actual seat of sensation, and such have a pleasant [20] effect; but those which are rough, causing a violent impact, shake the seat of sensation and affect a wide area owing to the force of their impact. Now things which are cold also affect a wide area, for coldness is a kind of force; therefore, as has been already said, it causes shuddering. But things which are rough, because they cause a series of frequent impacts, striking on the base of the hair thrust it in [25] the opposite direction; for when the hair is thrust out, its ends must necessarily assume a contrary position, with the result that it stands upright; for hair always naturally lies flat. The direction taken by the breath which is conveyed to the body by the hearing is downwards from above. The sounds, therefore, which we have mentioned being harsh, the hair bristles for the reasons stated. The bristling occurs [30] more on the rest of the body than on the head, because the hair there is weaker and the effect produced is weaker. The sensation produced by hearing being blunter than that produced by sight, the effects produced by it are confined to the surface of the body; the bristling of the hair is an effect of this kind, so it occurs from many dissimilar causes. The sensation produced by sight being very distinct, its results too are correspondingly more distinct; therefore the same effects are produced by it as [887<sup>a1</sup>] occur in reality, but more mildly than in reality. But as a result of hearing our hair stands on end for fear, not of the actual sounds, but of the anticipation which they arouse; for it is an anticipation of grievous ill.

6 · Why is yawning caused by the sight of others yawning, and so also the passing of urine, particularly in beasts of burden? Is it due to recollection? For [5] when recollection occurs the part of the body concerned is stimulated. In men then, because their sensations are finer, when they see something stimulation and recollection occur

simultaneously. But in the beasts the sight is not sufficient by itself, but they require another sense to be called into activity; so the sense of smell must also be employed, this being a more easily stimulated sense in unreasoning [10] animals. So the other animals always pass urine in the same spot as the first one; for the stimulus is most acute when the sense of smell is employed; and the sense of smell is called into play when they are near the spot.

7 · Why is it that when we see any one cut or burned or tortured or [15] undergoing any other painful suffering, we share mentally in his pain? Is it because nature is common to us all, and it is this which shares in the sufferer's pain, when we see any of these things happening to him, through kinship with him? Or is it because, just as the nose and hearing according to their particular faculties receive certain emanations, so also the sight does the same as the result of things pleasant [20] and painful?

8 · Why is it that those who come into contact with phthisis or ophthalmia or scurvy become affected by them, but there is no contagion from dropsy or fevers or apoplexy and the rest? In ophthalmia is contagion due to the fact that the eye is very easily affected and more than the other senses assimilates itself to that which it [25] sees—for example, it moves when it sees something else moved—and so it very readily becomes disordered when it sees another eye in that condition? In phthisis is the contagion due to the fact that phthisis makes the breath weak and laboured, and those diseases are most quickly contracted which are due to the corruption of the breath, as is seen in plagues? He therefore who comes into contact with the sufferer [30] inhales this corrupted breath, and so himself becomes ill, because the breath is unhealthy; and he catches the disease from one person only, because that person exhales this particular breath, which is different from that which others exhale; and he catches the same disease, because, in inhaling the breath by which he becomes infected, he is inhaling just such breath as he would if he were already suffering from the disease. Scurvy is more catching than the other diseases, such as leprosy and the like, because it affects the surface of the body and causes a glutinous discharge (for this is the nature of itching diseases), and so this disease, being on the [35] surface of the body and glutinous, can be conveyed by contact. Other similar diseases are not so conveyed, because either they are not on the surface, or else, being on the surface, they do not remain there, because

they are dry.

9 · Why do purslane and salt stop inflammation of the gums? Is it because [887<sup>b</sup>1] purslane contains some moisture? This is seen to be so if one chews it or if it be crushed together<sup>1</sup> for some time; for the moisture is then drawn out of it. The glutinous matter sinks into the gum and draws out the acidity. For that there is an affinity between the disease and the remedy is shown by the acidity; for the juice of [5] the purslane has a certain acidity. Salt, on the other hand, dissolves and draws out the acidity. Why then do lye and soda not have this effect? Is it because they have an astringent instead of a dissolvent effect?

## BOOK VIII

### PROBLEMS CONNECTED WITH CHILL AND SHIVERING

[10] 1 · Why is it that those who are chilled become livid? Is it because the blood is congealed by the cold and, as it congeals, becomes black through the absence of heat? (A white colour, on the other hand, is to be attributed to fire.) For this reason also the flesh of the aged is particularly livid, because it contains very little heat.

[15] 2 · Why is it that those who are chilled cannot sleep? Is it because any one who is chilled tends to hold his breath, but a sleeper exhales rather than inhales, so that it is difficult for one who is cold to sleep, since it is impossible to do contrary things simultaneously?

[20] 3 · Why is it that those who are ill or in pain or angry become more active under the influence of cold? Is it because a cold condition makes a man stronger?

4 · Why is it that athletes in good training do not bear the cold well? Is it because their condition is clean and airy and free from fat? Such a condition is easily accessible to the air, since it is permeable and does not contain any heat; fat, [25] on the other hand, is hot, unless it is saturated with moisture.

5 · Why are the extremities most affected by cold? Is it due to their narrow shape? Also the ducts in them, being narrow, hold little blood, and therefore little heat; for the blood is hot.

6 · Why are the feet more liable to become chilled when they are suspended [30] in mid air? Is it because the wind blows more underneath then? Or is it because the blood is contracted into a narrower space below, and so the rest of the foot is more easily chilled, because the heat

leaves it?

7 · Why is it that stout persons are especially liable to chill, although fat is warm? Is it because, owing to the greatness of their bulk, their extreme parts are far from the internal heat, while their near parts are far from the external cold?

[35] 8 · Why do people shiver after sneezing and after passing urine? Is it because in both processes the veins are emptied, and when they are empty the cold air enters, and this causes shivering?

9 · Why is it that ravenous hunger is felt in cold weather and in winter rather than in summer? Is it because ravenous hunger is brought on through lack of dry [888<sup>a</sup>1] nourishment, and in the cold and winter the internal heat contracts into a narrower space and its internal nourishment soon fails, and when this happens ravenous hunger is more likely to occur? The faintness and weakness due to ravenous hunger occur when liquefaction takes place in the body owing to the collection of heat in [5] one place. This liquefied matter flows into the region usually occupied by the nourishment and itself becomes nourishment for the body; if it attacks the seat of respiration, loss of voice and weakness ensue, the loss of voice being due to the obstruction of the passage of the breath, while the weakness is caused by the lack of nourishment in the body and internal liquefaction. Treatment in such cases can be [10] quickly and simply applied, because the cause of the trouble is external; for it is the external<sup>1</sup> cold making our heat contract which causes the ravenous hunger. So just as one trembles and turns pale from fear, but, when freed from the danger, one recovers immediately; so too those who are suffering from ravenous hunger, after [15] taking a little bread, quickly recover, having undergone a violent and unnatural disturbance, but not having been permanently injured thereby; for the same thing which resists the tendency of nature also restores us to our natural course. Once relax the force which is straining against nature, and the body slips back into its natural state as suddenly as children who are playing at tug-of-war with a rope, if [20] the rope is let go, fall on their backs.

10 · Why is it that those who have undergone athletic training do

not bear the cold so well as those who have not done so? Is it because the fat is got rid of by [25] their exercises, and it is the fat which gives warmth, since that which is oily is hot? Or is it because the body is in a more airy and rare condition, because the fat and the excretions have been got rid of, so that there is nothing to keep out the cold? Or is it because through the opening of the pores by perspiration a number of doors are as it were removed? It is clear that the same condition does not conduce both to health and to strength; for obviously a condition of health is one of fatness, while a [30] condition of strength is a state of rarity.

**11** · Why do we shiver both when hot and when cold water is poured over us? For it is strange that contraries should produce the same result. Is it because, when cold water is poured over us, the extinguishing of the internal heat causes shivering, whereas, as the effect of warm water, the superficial cold is enclosed in [35] one place and massed together by its inward rush? So both effects are due to the same cause, but in one case it operates from within and in the other from without.

**12** · Why do the hairs bristle upon the skin? Is it because they naturally stand erect when the skin is contracted, and this contraction occurs owing to cold and certain other conditions?

[888<sup>b</sup>1] **13** · Why is it that one shivers at the last emission of urine? Is it because, whilst the warm liquid is still within, the bladder and the passages round it are full, but when it has passed out they fill up again with cold air, for nothing can be empty, [5] but must be full either of something corporeal or of air? Inasmuch then as cold air enters, shivering is a natural result.

**14** · Why is it that the tongue of those who are chilled, like that of the drunken, stumbles? Is it because, as it stiffens and hardens with the cold, it becomes [10] difficult to move, and, when this happens, it cannot speak plainly? Or is it because, the outer parts of the body being solidified by the cold, the moisture flows together within and saturates the tongue, and so it cannot perform its function, as has been already described in the case of the drunken? Or is it because owing to the

trembling produced by chill, the movement of the tongue is irregular and it cannot [15] articulate the words which it utters, and consequently it stumbles?

15 · Why do the hairs stand erect on the bodies of those who are chilled? Is it because as a result of cooling the heat collects in the inner region of the body, and the flesh, as the heat leaves it, contracts more and more, and, as it is drawn together, [20] the hairs become more upright? Or is it because . . .

16 · Why in the winter are we more likely to become chilled through running than through standing still? Is it because the air surrounding the body, when we stand still, no longer causes discomfort when once the body is thoroughly warm, but on the other hand, when we are running, we are continually encountering more and more cold air, and so are more liable to become chilled? Moreover also air [25] is cold when it is in motion, and it is for the most part such air that meets us in running.

17 · Why is it that it is colder at dawn, although the sun is nearer to us? Is it because the period of the sun's absence is then at its longest, so that the earth has become more cooled? Or is it because towards daybreak the dew falls, as does the [30] hoar-frost, and both of these are cold? Or do they too fall because the heat which rises from the earth is overpowered, the reason that it is overpowered being the absence of the sun? So that they do not fall when the sun is farther away, but when it is nearer they fall and become congealed, because the longer the sun is absent the [35] cooler the ground becomes. Or is it because the nocturnal breezes tend to cause cold towards daybreak? Or do we only imagine that it is colder because then the food within us is concocted and, the stomach being emptier, we are more liable to feel the cold? This can be illustrated by the fact that we feel very cold after vomiting.

18 · Why is it that those who are chilled feel pain if they are taken straight to the fire, whereas they do not do so if they are warmed gradually? Is it because one [889<sup>a</sup>1] contrary immediately succeeding another contrary always sets up a violent change? We may compare the fact that if one bends a tree by degrees, it does not suffer, but if one

bends it with greater violence and not gradually, it breaks off. If therefore like is unaffected by like, and the heat of a man who is chilled collects and concentrates [5] within him and the moisture and cold are left behind, and a contrary is destructive of its contrary, it follows that, if one is warmed by degrees, the heat comes out gradually and less pain is caused, but, if the warming is not gradual, the heat is rather drawn out.

**19** · Why is it that when we are chilled the same heat causes more burning [10] and pain? Is it because owing to its density the flesh holds the heat which comes into contact with it? This is the reason why lead becomes hotter than wool. Or is the passage of the heat violent because the pores are congealed by the cold?

**20** · Why is it that those who are angry do not become cold? Is it because [15] anger and wrath are the opposite of cowardice? Now anger is the result of fiery heat, for by retaining a large quantity of fiery heat within us we become warm. This is particularly noticeable in children. For grown-up men when angry become distracted, but children first of all take in breath in large quantities and then blush; [20] for the amount of heat in them being very great and causing liquefaction makes them blush, since, if one were to pour a quantity of cold water on them, they would cease from their wrath, for their heat would be quenched. The opposite occurs in cowards and those who are afraid; for they are chilled and become cold and pale; for the heat leaves the superficial region of their bodies. [25]

**21** · Why is it that when we shiver, the hairs stand erect? Do they lie down<sup>2</sup> because they grow in moisture? For the weight<sup>3</sup> of the hair prevails over the moisture. Now shivering is caused by the cold, for the cold naturally congeals the moisture. When therefore the moisture, out of which the hair grows, undergoes a [30] change and congeals, it is natural that the hair should undergo a change also. If therefore it changes into a contrary condition, it either remains permanently in that condition, or else the hair will again prevail over the moisture. It is not, however, likely that the hair can by its weight overpower the moisture when it is congealed and condensed; and if it is impossible for the hair to lie down anywhere because the [35] moisture is congealed, the only thing left for it to do is to stand erect. Or is it because, as a result of cooling, the heat



collects in the interior region of the body, and the flesh, as the heat leaves it, contracts more and more, and, as it draws together, the hair grows more upright, just as when one fixes a twig or some other object in the ground and fills the space round it and collects the soil on every side, it [889<sup>b</sup>1] is more likely to remain erect than if one leaves the soil loose round it?

22 · Why is it that those who are chilled find it particularly difficult to go to sleep? Is it because one who is chilled holds his breath rather than exhales, and a [5] sleeper exhales rather than inhales? Chill therefore induces a condition which is directly opposed to sleep.

# BOOK IX

## PROBLEMS CONNECTED WITH BRUISES, SCARS, AND WEALS

[10] **1** · Why is it that weals can be prevented by the application of newly flayed hides, particularly those of rams, and by breaking eggs over the part affected? Is it because both these things prevent the collection of moisture and the consequent swelling? For the wounded place swells owing to the heat. Now eggs owing to their glutinous consistency cause adhesion and prevent swelling (their effect resembling [15] that of cautery), acting as a kind of glue. The hide owing to its glutinous condition adheres and at the same time by its heat sets up concoction and stops the inflammation, for they do not remove it for several days. Rubbing with salt and vinegar is also employed with the object of drawing out the inflammation.

[20] **2** · Why is it that scars are black on the rest of the body but white on the eye? Is it because a scar, like everything else which is diseased, takes on the contrary of its original colour, and it is in the black part of the eye that wounds are inflicted? However, scars on the body do not become black immediately, but are white at first; [25] nor are scars in the eye always white,<sup>1</sup> but it is only after a while that they become absolutely or comparatively so.

**3** · Why does a fennel-stalk make the parts round the place which is struck red and the centre of it white? Is it because it presses the blood away from the middle, at the point where, being round, it strikes deepest? Or would one not expect [30] the blood for this reason to return there again, the redness being due to the rush of blood and such a rush taking place towards the part which is struck?

**4** · Why is it that, when a violent blow is struck with a fennel-stalk, the middle of the flesh which is struck turns white and the surrounding parts red, whereas, if an ordinary stick is used, the middle is the reddest part? Is it because the [35] fennel-stalk owing to its lightness, if it strikes

a hard blow, disperses the blood on the surface, and so the part from which the blood has retired has a white appearance, but the parts to which it flows in greater quantities become redder? When the part struck swells up, the dispersed blood does not readily return to its place, because it is scanty and the course which it must follow is upwards; for it needs the force [890<sup>a</sup>1] imparted by mass to make it follow an unnatural course. But blows dealt with hard objects owing to their weight and strength cause compression and crushing. The compression, therefore, produces a hollow, while the crushing causes rarity; for crushing is a mild form of cutting and cleaving. The middle of the part struck [5] becoming hollow and rare, the blood flows into it from the surrounding surface; for it naturally flows downwards and into the rare parts, because they give way before it. The blood collecting there naturally makes this part red, while the surrounding regions, from which the blood retires, turn white.

5 · Why do those who are splenetic have black scars? Is it because their [10] blood is corrupted by the admixture of vitiated and watery blood from the spleen? Now the scar occupies only a small depth of the skin on the surface, but the blood, which is black because it is watery and hot, shows through the skin and gives the scar also a black appearance. Moreover, very often the scar meanwhile becomes [15] blacker and blacker; this is due to the same cause, for owing to the weakness of the skin the blood cools, and as the heat evaporates, turns blacker. Similarly in the aged the flesh becomes blacker, and their congenital scars are blacker than those of the young; for their whole body assumes as it were the condition of a bruise owing not to [20] the thinness of their skin but to the fact that their heat fails.

6 · Do things which cause the same effect possess the same power for the production of that effect, or not? For example, seeing that bronze and radishes and mashed beans and sea-lungs and clay and various other things take away bruises, do [25] they do so in virtue of the same power? Or does bronze produce this effect because of its rust, which has a medicinal value, and beans and sea-lungs and clay because they have an attractive force owing to their rarity, and other things for various other reasons? Or is the ultimate effect the same in all these cases (for many of them [30] possess contrary qualities, for example heat and cold), while the earlier effects may nevertheless be different?

7 · Why do all other scars turn black, while those in the eye are white? Is it because they cause a change in respect of colour in the parts in which they occur, and so scars which occur in the eye, which is black, must necessarily be white? [35]

8 · Why is the blow of a fennel-stalk more painful than that of some much harder instruments, if in dealing the blow one considers their comparative effects? For it would be much more natural to suppose that the stroke of a harder instrument would be more painful, for it deals a heavier blow. Is it because the flesh is pained [890<sup>b</sup>1] not only by receiving a blow but also by dealing one? When it is struck by hard substances, it only receives a blow (for it yields to them because they are hard); but when it is struck by a fennel-stalk, two effects are produced—it receives a blow and it also deals one, because it does not yield owing to the lightness of the weight [5] imposed upon it; and so the blow is of a double nature.

9 · Why are thapsia and metal ladles used to stop bruises (the former being applied immediately, the latter at a later stage), containing as they do opposite qualities? For a ladle is cold, as the poet says,

Between his teeth the chilly bronze he bit;<sup>2</sup> [10]

whilst thapsia is hot and burning. Does the ladle have the same effect that water has upon the fainting? For its coldness encounters the heat and prevents it from escaping out of the blood, which collects on the surface owing to the blow and congeals when the heat passes out. For just as would happen if it congealed outside, [15] so the blood congeals near the outer surface while it is still under the skin; but<sup>3</sup> if the heat is prevented from escaping by the coldness of the bronze, the blood does not congeal, but disperses again and returns to the area from which it was collected. Thapsia being hot has the same effect; for by its heat it prevents congelation.

[20] 10 · Why are bruises dispersed by the application of copper objects such as ladles and the like? Is it because copper is cold? It therefore prevents the escape of the heat from the blood which collects as the result of the blow, and it is the loss of heat from the surface which

causes the bruise. The ladle must therefore be applied quickly before congelation takes place. Thapsia, too, mixed with honey is a good [25] remedy for the same reason; for being hot it prevents the blood from becoming cold.

**11** · Why is it that if a wound occurs several times in the same place, the scar turns black? Is it because, whenever a wound is dealt, the part affected is always [30] weak and becomes weaker the more often it is wounded? Now that which is weak is chilled and full of moisture; therefore it has a black appearance. Again<sup>4</sup> large and inveterate wounds form black scars, and to receive frequent wounds is equivalent to having one wound for a long time.

**12** · Why do we apply metal ladles to bruises? Is it because, when we are [35] struck, the part affected is cooled and the heat leaves it? So the application of the ladle, the material of which, being copper, is cold, prevents the heat from escaping.

**13** · Why is it that hairs do not grow on scars? Is it because the pores, from which the hairs grow, become blocked up and displaced?

[891<sup>a</sup>1] **14** · Why do blows cause swelling and discoloration? Is it because the moisture in the part affected is dispersed and, after breaking its way into the adjoining regions, recoils again and collects owing to the conglutination of the moisture? Also if any small veins are burst, a collection of bloodshot matter is [5] formed.

# BOOK X

## A SUMMARY OF PHYSICAL PROBLEMS

1 · Why is it that some animals cough, while others do not, for example a man coughs, but an ox does not? Is it because in most animals the excretion is [10] directed to some other part, but in man to this part? Or is it because in man the brain is very copious and liquid, and coughing occurs when phlegm flows down?

2 · Why is it that in man alone of the animals blood flows from the nostrils? Is it because his brain is very copious and liquid, whence the veins, becoming full of [15] excretion, send forth a stream through the ducts? For unhealthy blood (that is, blood which is mixed with excretions from the brain) is thinner than pure blood and resembles lymph.

3 · Why is it that some animals are fat under the flesh, others in the flesh, and others in both these places? Is it because in those whose flesh is dense the [20] moisture collects between the skin and the flesh, because the skin there is naturally loose,<sup>1</sup> and this moisture being concocted turns into fat? Those, on the other hand, who have rare flesh and a tightly fitting<sup>2</sup> skin, become fat in the flesh; while those who have both these characteristics are fat both in and under the flesh. [25]

4 · Why are boys and women less liable to white leprosy than men, and old women more than young? Is it because white leprosy is due to the escape of breath, and the bodies of boys are dense and do not allow the passage of breath, and those of women do so less than those of men, for the breath is diverted into the menstrual [30] fluids? The density of their flesh is shown by its smoothness. But the bodies of middle-aged and old women allow the passage of breath; for they alone, like old buildings, have a loose structure of their component parts.

5 · Why is it that man alone has white leprosy? Is it because he is the

[35] thinnest-skinned and at the same time the fullest of breath amongst the animals? An indication of this is the fact that leprosy appears most abundantly and soonest on the parts of the body where the skin is thinnest. Or, while this is true, is there a further reason, namely, that in man alone of the animals the hair turns grey? For in [891<sup>b</sup>1] leprosy the hair becomes grey, and so it is impossible for leprosy to occur in those in whom the hair does not turn grey.

6 · Why is it that goats and sheep yield the most milk, although their bodies are not the largest, whereas women and cows produce proportionately less? Is it [5] because in the latter two cases the available material is used up to form bulk, while in the other animals it goes into excretions, and in sheep and goats the residue of the excretion all becomes milk? Or is it because sheep and goats are more prolific than [10] the large animals, and so draw off more excretion, because they have more offspring to nourish? Or is it because owing to the weakness of their bodies more excretion is formed during the period of gestation, and the milk comes from the excretion?

7 · Why is it that in some animals (goats, for example) a change of water causes a change in their colour, which assimilates to that of other animals in the new locality, whereas with other animals (man, for example) this is not so? Or, to put [15] the question generally, why do some animals change and others not (the crow, for example)? Do those animals not change in whom the element of moisture does not predominate, birds, for example, which consequently have no bladder? Why is it that while such creatures do not themselves change, yet their offspring do so? Is it [20] because the offspring is weaker than its parents?

8 · Why are males usually larger than females? Is it because they are hotter, and heat is productive of growth? Or is it because the male is complete in all its parts, whereas the female is defective? Or is it because the male takes a long time to attain perfection, the female a short time?

[25] 9 · Why is it that some animals bear their young quickly, but in others the period of gestation is a long one? Is it because the longer-lived

animals come to perfection more slowly? It is the longer-lived animals that take a long time to bear their young. This is not, however, true of the longest-lived of all animals; for example, the horse is slower in bearing its young but shorter-lived than man. The [30] reason for this is the hardness of the uterus; for the uterus of a mare may be compared to a dry soil which does not readily bring the crops to maturity.

**10** · Why is it that the young of all other animals resemble their parents in nature more closely than do those of man? Is it because man's mental condition is more varied at the moment of sexual intercourse, and so the offspring varies [35] according to the condition of the male and female parents? The other animals, or most of them, are wholly absorbed in the sexual act; further, owing to this avidity, impregnation does not usually take place.

[892<sup>a</sup>1] **11** · Why is it that fair men and white horses usually have grey eyes? Is it because there are three colors in eyes, black, greenish, and grey, and the colour of [5] the eyes follows that of the body, resulting in this case in greyness?

**12** · For what reason are there dwarfs? Or to put the question more generally, why are some creatures quite large, others small? Let us examine the latter question. The causes of smallness are two, either space or nourishment-space, if it be narrow, and nourishment, if it be scanty; as happens when attempts [10] are made to make animals small after their birth, for example by keeping puppies in quail-cages. Those who suffer from lack of space become pygmies; for they have width and depth corresponding to the dimensions of their parents, but they are quite [15] small in stature. The reason for this is that owing to the narrowness of the space in which they are confined the straight lines become crushed and bent. So pygmies are like figures painted on shops which are short in stature but are seen to be of ordinary width and depth. Those who fail to come to perfection from lack of nourishment [20] clearly have the limbs of children, and one sometimes sees persons who are very small and yet perfectly proportioned, like Maltese lap-dogs. The reason is that the process of growth has a different effect from that of space.



13 · Why is it that some animals come into being from the sexual intercourse of animals with one another, others from the compounding of certain elements—a process resembling the original production of their species? Just as the [25] writers on natural phenomena explain the first origin of animals as being due to powerful changes and movements in the world and universe; so now, if it is to happen again, some similar movements must take place. For the beginning of anything is the most important part, being indeed half of the whole; and in this case [30] the seed is the beginning. The reason then why small animals which are not produced by sexual intercourse resemble the species as it originally came into being, is the smallness of the seed; for the smaller a thing is, the smaller is its first beginning. So the changes even of this are sufficient to produce a seed for it. And this is what actually happens; for it is under conditions of change that such [35] creatures usually come into being. In the larger animals a greater change is necessary for their production.

14 · Why is it that some animals are prolific, such as the pig, the dog, and the hare, whilst others are not so, for instance man and the lion? Is it because the [892<sup>b</sup>1] former class has a number of wombs which they desire to fill and moulds into which the semen is distributed, while with the latter the opposite is the case?

15 · Why has man a smaller distance between his eyes in proportion to his size than any other animal? Is it because man is the most natural of creatures and [5] perception is naturally of that which is in front, since it is necessary to see beforehand that to which the movement is directed? Now the greater the distance between the eyes, the more will the sight incline sideways. So if the sight is to accord with nature, the distance between the eyes ought to be as small as possible, for then [10] it will travel most directly forward. Further, the other animals must necessarily turn their gaze sideways, since they do not possess hands; their eyes therefore are farther apart, especially those of sheep, because they generally advance bending their heads downwards.

16 · Why is it that the other animals seldom or never emit semen during [15] sleep? Is it because no animal except man sleeps on its back and no emission of semen takes place except in that position? Or is it because the other animals dream less than man, and the emission of

semen only takes place when the imagination is stirred?

**17** · Why is it that some animals move their heads and others not? Is it [20] because some have no necks and so cannot move their heads?

**18** · Why does man sneeze more than the other animals? Is it because in him the ducts are wide through which the breath and smells pass in? For it is with these, when they fill with breath, that he sneezes. That these ducts are wide is shown by the fact that man has a weaker sense of smell than any other animal; and the [25] narrower the ducts, the keener is the sense of smell. Since, therefore, the moisture, the evaporation of which causes sneezing, enters in larger quantities and more often into wide ducts, and man more than any other animal has such ducts, he might [30] naturally be expected to sneeze most often. Or is it because his nostrils are particularly short and so the heated moisture can quickly turn into breath, whereas in the other animals, owing to the length of their nostrils, it cools before it can evaporate?

**19** · Why is it that in no animal is the tongue of a fatty consistency? Is it because that which is fat is dense, whereas the tongue is naturally rare in order that [35] it may recognize different flavours?

**20** · Why is it that females pass urine with an effort, but males without an effort? Is it because in the female the bladder is farther away both in depth of position and in distance, since the womb is situated between the fundament and the [893a1] bladder? It therefore requires a greater effort to drive the urine owing to the distance of the womb; and the requisite force is exercised by an effort of the breath.

**21** · Why is it that all such animals as do not fly shed their winter coats, [5] except the pig? The dog, for example, does so, and the ox. Is it because the pig is very hot and its hairs grow out of a hot substance (for that which is fat is hot)? In the other animals the hair is shed because either the moisture cools or else the natural heat cannot concoct the nourishment. But the pig<sup>3</sup> does not shed its hair, [10] either because the moisture in it undergoes no change or because its nourishment is properly concocted; for whenever any cause is present to make it shed its hair, the

fat is sufficient to prevent it. Sheep and men are unaffected owing to the quantity [15] and density of their hair; for the cold cannot penetrate deep enough to congeal the moisture or to prevent the heat from concocting it.

**22** · Why is it that in sheep the hair grows again softer when it is plucked out, but in man it is harder? Is it because the hair of sheep grows out of the surface, [20] and so can be plucked out without causing pain, the source of its nourishment, which is in the flesh, remaining unimpaired? So the pores being opened, the excretions evaporate more readily, and the wool receives the natural nourishment of the flesh, the latter being fed by soft, sweet nourishment. The hair of man, on the other hand, since it grows from a great depth, can only be plucked out by force and [25] painfully. This is shown by the fact that it draws blood with it. The place therefore from which it is plucked is wounded and scarred. So at last the hair ceases to grow on those who pluck it out, and as long as it does grow again, it grows hard, because all the nourishing food in the flesh fails, and it is from the excretions of this food [30] that the hair grows. This can be illustrated by the fact that in all those who inhabit a southerly clime the hair is hard, because the exterior heat penetrates deeply and vaporizes the well-concocted nourishment; but the hair of those who dwell in northern climes is soft, because in them the blood and sweet humours are nearer the surface, for which reason also they have a healthy complexion. [35]

**23** · Why is it that in sheep the longer the hair grows the harder it is, whereas in man it is softer? Is it because the hair of sheep, obtaining the nourishment described above, receives less food because it is far removed from the source of it, and the nourishment already present in it easily evaporates out of it owing to the heat as a result of concoction? And as the hair dries it becomes harder;<sup>4</sup> [893<sup>b</sup>1] for it is the moisture which makes it soft. Human hair, on the other hand, receives less nourishment but is situated nearer to the source of it; and the nourishment is more thoroughly concocted because it is less abundant, and, being concocted, it makes the hair softer, because anything that is concocted is softer than that which is [5] unconcocted; for human hair is derived more from excretion than that of sheep. This is shown by the fact that the wool of young sheep is softer than that of old.

24 · Why is it that thick-haired men and birds with thick feathers are [10] lustful? Is it because they are naturally hot and moist? Now both these characteristics are necessary for sexual intercourse; for the heat causes excretion, and the moisture is the form which the excretion takes. Lame men are lustful for the same reason; for, owing to the deficiencies of their legs, the nourishment is carried downwards in small quantities only, but travels into the upper region of the body in [15] large quantities, and is there converted into semen.

25 · Why has man no mane? Is it because he has a beard, and so the nourishment consisting of the necessary excretion, which in animals goes into the mane, in man goes to the jaws?

26 · Why is it that all animals have an even number of feet? Is it because it [20] is impossible to move (except by jumping), unless some part is at rest? Since, then, progression involves two things, namely, movement and rest, we immediately get here a pair and an even number. Quadrupeds have two more legs;<sup>5</sup> for they move two, while the other two are at rest. Six-footed animals have an additional pair,<sup>6</sup> of [25] which one moves while the other is at rest.

27 · Why is it that in horses and asses hair grows out of scars, but not in man? Is it because in the other animals the skin is part of the flesh, but in man it is only as it were a condition of the flesh? For in man the surface of the flesh seems to [30] become harder through cooling and resembles what we call the crust of boiled meal; just, then, as this crust is really only boiled meal, so what is called man's skin would really be only flesh. Now when a man receives a wound or is chafed, the result is [35] that his flesh becomes denser; and so, the surface of the flesh having undergone a change, the wounded parts do not assume the same nature as the original skin; and, as the flesh has undergone a change, it is not to be wondered at that what grew from it no longer does so—a phenomenon also occurring in what is called baldness, which is also due to a corruption and change in the surface of the flesh. When, however, [894<sup>a1</sup>] beasts of burden have been chafed and recover again, the parts of the body affected fill out again with the same substance, but it is weaker than it was before; and since their skin too is a part of them, the hair (which grows out of the skin) must come [5] forth and grow, but it is

white, because the skin which was formed is weaker than the original skin, and white hair is the weakest kind of hair.

**28** · Why is it that among the other animals twins though differing in sex are just as likely to survive, but this is not so with the young of man? Is it because human twins are particularly weak, for man naturally produces only one offspring [10] at a time? Now in twins it is unnatural to find a diversity of sex; and so what is most contrary to nature is also weakest.

**29** · Why is it that in horses and asses hair grows out of scars, but not in man? Is it because the scar impedes the growth of the hair, either owing to the condensation of the flesh or because its nutrition is impaired? In man, therefore, it [15] absolutely prevents the growth owing to the weakness of the hair; but in horses it does not prevent, but merely impairs, the growth.

**30** · Why have animals an even number of feet? Is it because in anything that moves something must necessarily be at rest, and this could not happen if there were an odd number of feet (for<sup>7</sup> it was the arrangement of the feet in pairs which [20] originally made movement possible)?

**31** · Why is it that animals are asleep for a shorter time than they are awake, and their sleep is not continuous? Is it because all the excretion is not concocted at the same time, but, when some is concocted, the animal is relieved and wakes up? Again, they more often wake up when the region in which the excretion [25] is concocted becomes cold; for it quickly and frequently ceases to do its work, and this cessation causes awakening. Sleep not unnaturally<sup>8</sup> seems to be pleasant, because it gives us rest; but the rest which we take in sleep does not last longer than the time taken by our natural activities, nor do we eat for a longer period than that during which we abstain from food, in spite of the fact that eating is pleasanter than fasting.

[30] **32** · Why is it that some animals imitate their parents immediately after birth, while others, like man, do so late, or hardly at

all, or never? Is it because some quickly attain a state of physical perfection,<sup>9</sup> while others are late in doing so, and some are without a perception of what is for their good, while others possess such a perception? Those therefore which possess both these qualities, namely, perception of what is for their good and physical perfection, imitate their parents, [35] but those who have not both these qualities do not do so; for physical and perceptive powers are both requisite.

**33** · Why is it that white leprosy does not occur in animals other than man? Is it because, while it is a disease which afflicts other animals, only in man does the hair and skin turn partially white? (But, if so, one might raise the question why [894<sup>b</sup>1] diversity of colour in animals occurs at birth and not afterwards.) Or is it because the skin of other animals is hard, whereas man has naturally very thin skin? Now white leprosy is an excretion of breath, which in the other animals is prevented from [5] escaping by the thickness of their skin.

**34** · Why is it that in white leprosy the hair turns grey, but it does not necessarily follow that leprosy is always present where there is grey hair? Is it because the hair grows from the skin, and greyness is as it were a corruption of the hair? When therefore the skin is in a morbid condition, the hair that grows from it is [10] necessarily affected; but when the hair is unhealthy the skin is not necessarily so.

**35** · Why is it that some animals are ill-tempered after bearing young, dogs, for example, and pigs, but others are not noticeably so, for instance women and sheep? Is it because those animals which are full of excretions are mild-tempered, for that which causes them pain passes out at the time of birth? Those,<sup>10</sup> on the [15] other hand, who in bearing young lose healthy material, are made irritable by the reduced condition in which they are; just as hens are bad-tempered, not just when they have laid, but when they are sitting, from want of food.

**36** · Why is it that eunuchs, when they are emasculated, in other respects change into the likeness of the female,—for they have the voice, the shrillness, and [20] the lack of articulation which characterize women, and so undergo a violent change, as do other animals when

castrated (in bulls and rams, however, we find the horns assuming contrary forms, the reason being that their females have contrary kinds of horns, and so bulls when they are castrated grow larger horns and rams smaller horns)—in respect of size, however, alone eunuchs change into the likeness of the [25] male, for they become larger? Now size is characteristic of the male, for the female is smaller than the male. Or is it not after all a change into the likeness of the female rather than the male? For it is not a change in every dimension, but only in height, whereas the male is characterized by width and depth as well; for this is what his [30] full growth involves. Furthermore, as is the female to the male, so within the female sex is the maiden to the woman; for the latter has reached the full nobility of form, while the former has not yet done so. It is into the likeness of *their* nature then that the eunuch changes; for their growth is in height. So Homer well says,

Stature chaste Artemis gave them,

[35] as being able to give what, being a maiden, she herself possessed. When, therefore, a eunuch changes in size, he does not change into the likeness of the male; for the change is not in the direction of physical perfection, but eunuchs increase in size only in respect of height.

**37** · Why is it that eunuchs either never suffer from varicose veins, or do so [895<sup>a</sup>1] less than others? Is it because, by their being castrated, their nature changes into that of persons lacking generative power? Now boys and women lack this power, and neither has varicose veins except women very occasionally.

**38** · Why is man better able to utter many voices, while other animals of one [5] and the same species utter only one voice? Has man too really only one voice, but many forms of speech?

**39** · And why has man different forms of speech, while the other animals have not? Is it because men in their speech make use of a number of letters, but the other animals employ either none or only two or three consonants? (Now it is [10] consonants combined with vowels that form speech.) Now speaking is signifying something not merely by the voice but by certain conditions of the voice, and not merely to signify pain or pleasure; and it is the letters which regulate these conditions. But

children express what they want to say in just the same way as wild beasts; for young children cannot yet make use of the letters in speech.

[15] **40** · Why is it that of all animals man alone is apt to hesitate in his speech? Is it because he is also liable to be dumb, and hesitancy of speech is a form of dumbness, or at any rate the organ of speech is not perfect? Or is it because man partakes more of rational speech, while the other animals only possess voice, and hesitancy of speech, as its name implies, is simply<sup>11</sup> being unable to explain one's meaning continuously?

[20] **41** · Why is it that man more than the other animals is apt to be lame from birth? Is it because the legs of animals are strong (for quadrupeds and birds have bony and sinewy legs), but human legs are fleshy, and so owing to their softness they more easily become damaged through movement? Or is it because in man alone of [25] animals the period of gestation varies? For he may be born after the seventh or the eighth or the tenth month. For the other animals there is one fixed time for coming to perfection without any further delay; but in man the period of delay is long, and so, when the foetus moves, its extremities being soft are more liable to become [30] broken in the longer period.

**42** · Why have eunuchs sore and ulcerated legs? Is it because this is also characteristic of women, and eunuchs are effeminate? Or, while this is true, is the cause in women as well this, that the heat has a downward tendency? (Menstruation shows that this is so.) So neither eunuchs nor women grow thick hair, owing to [35] the presence of copious moisture in them.

**43** · Why is it that no animal except man suffers from gall-stones? Is it because in beasts of burden and cloven-hoofed animals the ducts of the bladder are wide? Those animals which produce their young alive not immediately but after an interval, like certain of the fishes, never have bladders, but the sediment which [895<sup>b</sup>1] might form gall-stones is forced into the bowels (as happens also in birds), and so easily passes out with the excrement. But man has a bladder and a stalk to the bladder, which is narrow in proportion to his size; so, because he has this part, the [5] earthy matter is forced into the bladder (and so chamber-pots become



discoloured by it) and, owing to the heat in that region, it becomes concocted and thickens still more and remains there and increases owing to the narrowness of the urethra; for the earthy sediment, being unable to make its way out easily, coheres together and [10] forms a gall-stone.

44 · Why is it that beasts of burden and cattle and horned animals and birds do not belch? Is it owing to the dryness of their stomachs? For the moisture is quickly used up and percolates through; whereas belching results when the [15] moisture remains and evaporates. In animals with long manes and tails, owing to the length of their necks, the breath tends to travel downwards, and therefore they generally break wind backwards. Birds and horned animals neither belch nor break wind; and ruminating animals do not belch, because they have several stomachs and the so-called 'reticulum'; and so the breath finds a passage up and down through [20] many channels, and the moisture is taken up before it can become vaporized and cause either belching or breaking of wind.

45 · Why is it that tame animals are invariably found also in a wild state, but wild animals are not always found also in a tame condition? For even men certainly exist in a wild state in some places, and wild dogs are found in India and [25] horses elsewhere; but lions and leopards and vipers and many other animals are never found in a tame state. Is it because the inferior condition is more easily acquired at first and it is easier to degenerate into it, since it is not the original but the ultimate nature which is difficult to attain to at once? For this reason all tame animals are at first wild rather than tame (for example the child is greedier and [30] more quick-tempered than the man), but physically weaker. So we find the same state of affairs in the products of nature as in those of the arts. For among the latter there are always badly-made objects, and the bad are more numerous than the good, beds for instance and garments and the like; and, where a good object is [35] produced, it is always possible to find also a bad one, but, where a bad object is produced, it is not also possible always to find a good one. This can be seen from an examination of the works of the primitive painters and sculptors; for in their day there was not yet any good painting or sculpture anywhere, but only inferior work. [896<sup>a</sup>1] So likewise nature always produces inferior specimens and in a greater number, and superior specimens in a smaller number and in some cases not at all. Now the tame is superior and the wild inferior. It is, I suppose, easier for nature—

not the primitive nature but that towards which animals develop—to make the good kinds also tame; but the opposite kinds never, or scarcely ever, become tame, and it is only under [5] certain conditions of locality and time that sooner<sup>12</sup> or later owing to a general admixture of circumstances all animals can become tame. The same thing happens in plants of all kinds; those which are garden plants are also found in a wild state, but it is impossible for all to be cultivated, but some are so peculiarly conditioned in many respects in their natural soil that, though neglected and left wild, they grow [10] better and more like cultivated plants than those which are carefully tilled in other soil.

**46** · Why is it that men have large navels, whereas in the other animals they are inconspicuous? Is it because in the latter, owing to the long period of gestation, [15] they wither off and project outwards and swell all up into sores, and so the navel sometimes even becomes misshapen? Now man comes forth from the womb in an imperfect condition, and so his navel comes away still full of moisture and blood. That some animals are perfect and others imperfect at birth is shown by the fact that some animals can fend for themselves at once, but children require looking after.

[20] **47** · Why is it that some animals copulate only once, others frequently, and some only at certain seasons of the year and others at no fixed time? For example, man does so at all times but wild animals only occasionally, and the wild boar only does so once but the domesticated pig frequently. Is it the effect of nourishment and warmth and exercise, since ‘Cypris depends on fullness’? Again, the same species [25] bears young once in some localities but several times in others; for instance, the sheep in Magnesia and Libya have young twice a year. The reason is the prolonged period of gestation; for animals, when their desire is satisfied, feel desire no longer, just as, when they have fed, they no longer desire food. Also animals when pregnant feel less desire for sexual intercourse, because the menstrual purgation does not take place.

[30] **48** · Why is it that men who have widely-spaced teeth are generally short-lived? Is it a sign that the skull is thick? For the brain is weak if it is not well ventilated, and so, being moist, it quickly decays, just as all other things decay if they are not in motion and cannot

evaporate. For this reason too man has very thick [35] hair upon the head, and the male is longer-lived than the female because of the sutures in his skull. But we must next consider length of life in relation to other conditions.

**49** · Why then are men long-lived who have a line right across their palms? Is it because animals whose limbs are badly articulated are shortest-lived, aquatic animals for example? And if those which are badly articulated are short-lived, [896<sup>b</sup>1] clearly those that are well articulated must be the opposite. Now the latter are those in which even those parts are best articulated which are by nature badly articulated; and the inside of the hand is the least well articulated part of the body.

**50** · Why is it that man alone squints, or at any rate does so more than any [5] other animal? Is it because he alone, or more than other animals, is liable to seizure in infancy, when distortion of the vision also always begins?

**51** · Why is man more affected by smoke than other animals? Is it because he is most prone to shed tears, and shedding tears is one of the effects of smoke?

**52** · Why does horse take pleasure in and desire horse, and man take [10] pleasure in man, and generally why do animals delight in animals which are akin to and like them? For every<sup>13</sup> animal is not equally beautiful, and desire is of the beautiful. The beautiful then ought to be pleasanter; but in actual fact it is truer that not every kind of beauty is pleasant,<sup>14</sup> nor are pleasure and the beautiful equally pleasing to all men; for example, one creature takes greater pleasure in eating or drinking and another in sexual intercourse. The question why each [15] creature prefers and takes greatest pleasure in sexual intercourse with a creature that is akin to it is dealt with elsewhere; but to add that what is akin is also most beautiful is not true. But we regard as beautiful that which is pleasing with a view to sexual intercourse, because, when we feel desire, we delight in looking upon the [20] object of our desire. And indeed the same thing happens in other forms of desire; for example, when we are thirsty we take greater pleasure in the sight of something to drink. So that

which is beautiful in view of a certain use of it seems to be most pleasant because we particularly desire it. (But this is not true of that which is beautiful in itself, as is proved by the fact that even grown men appear to us [25] beautiful, when we look at them without<sup>15</sup> any idea of sexual intercourse. Do they then appear beautiful in such a way as to give our eyes more pleasure than those who are of an age for sexual intercourse? There is no reason why they should not, provided we do not happen to feel a desire for sexual intercourse.) Thus something to drink appears to us as particularly good; for, if we happen to be thirsty, we shall see it with considerable pleasure.

**53** · Why is it that in man the front of the body is more thickly covered with hair than the posterior portion, but in quadrupeds the posterior part is hairiest? Is it [30] because all two-footed animals have the front part of the body more thickly covered? For the birds resemble man in this respect. Or is nature always accustomed to protect the weaker parts and is every creature weak in some respect? [35] Now in all quadrupeds the posterior portions are weaker than the front parts owing to their position; for they are more liable to suffer from cold and heat; but in man the front portions of the body are weaker and suffer likewise under these conditions.

[897<sup>a</sup>1] **54** · Why is it that man sneezes more than any other animal? Is it because he also suffers most from running at the nose? The reason for this is that, the heat being situated in the region of the heart and being naturally disposed to rise upwards, in the other animals its natural direction is towards the shoulders and [5] thence, splitting up owing to refraction, it travels partly into the neck and head and partly into the backbone and flanks, because these parts are all in the same straight line and parallel to the ground on which the animal stands. Now the heat,<sup>16</sup> as it travels along, distributes the moisture uniformly to these parts alike; for the [10] moisture follows the heat. Four-footed animals therefore do not suffer either much from running at the nose or sneeze; for sneezing is due to the rush either of a mass of breath, when moisture evaporates more quickly than the body, or of unconcocted moisture (hence it precedes a cold in the head);<sup>17</sup> and these forms of moisture are [15] not found in the other animals, because the rush of heat is equally distributed between the fore and hind parts of an animal. Man being naturally, like the plants, at a right angle to the ground on which he

stands, the result is that a very copious and violent rush of heat takes place in the direction of the head, and the heat in its course thither rarefies and heats the ducts in the region of the head. Now these [20] ducts being in this condition are better able to receive the moisture than those leading downwards from the heart. When, therefore, a man happens to have become in too moist a condition and to have been cooled off externally,<sup>18</sup> the result is that the heat obtaining nourishment and collecting within increases, and as it does [25] so it is carried to the head and the ducts there. Into these the moisture, which is thin and unconcocted, follows the heat and fills them up and causes cold in the head and likewise sneezing. For at the beginning of a cold the heat, being carried along in advance of the moisture and inflating the ducts, causes sneezing by the expulsion of [30] the breath and by the drawing off<sup>19</sup> of those humours which are light and pungent. Hence it happens that after sneezing from a cold in the head one wipes away watery matter. These all having been set in motion, the continuous and solid<sup>20</sup> humours follow closely upon them and block up the ducts in the region of the head and [35] nostrils. If they become swollen and distended, they cause pain in the region of the head. That the ducts are blocked is shown by the fact that no breath can pass out through them;<sup>21</sup> so those who suffer from running at the nose neither sneeze nor can they use their sense of smell. Sneezing unaccompanied by running at the nose is due to the same causes, but has some slight and insignificant origin; and so the humours, being collected by the heat and vaporized by it owing to their small mass, are [897<sup>b</sup>1] precipitated down the nostrils. The noise made by the breath is due quite as much to the violence of its rush as to its quantity. For the heat, being carried along in a direct line to the brain and rushing into it, is refracted into the nostrils, because the ducts [5] there lead out from the brain. The rush made by the breath in breaking out into the nostrils, being unnatural, is consequently violent, and therefore makes loud noises. Amongst the other animals birds are most liable to running at the nose, because [10] they most resemble man in form; but they are less liable to it than man, because they usually hold their heads down, since they derive their food from the ground.

**55** · Why are marine animals larger and better nourished than land animals? Is it because the sun consumes the outer surface of the earth and takes the [15] nourishment out of it? (For this reason too those animals which are enclosed in the earth are better nourished.) Marine animals then are free from all these disadvantages.

**56** · Why is it that the other animals provide themselves more often with dry than with moist food, but man takes more moist than dry nourishment? Is it [20] because man is naturally very hot and therefore requires most cooling?

**57** · Why is it that eunuchs do not become bald? Is it because they have a large amount of brain-matter? Now this is the result of their not having sexual intercourse with women; for the semen passes from the brain through the spine. For [25] this reason too bulls which have been castrated appear to have large horns after castration. For the same reason also, apparently, women and children are not bald.

**58** · Why is it that some animals are able to feed themselves directly after [30] birth, while others cannot? Are those who can do so the shorter-lived among those animals which are capable of memory? It is for this reason that they always die sooner.

**59** · Why does man produce more moist than dry excrement, but horses and asses more dry than moist? Is it because the latter animals take more dry food, [35] whereas man takes more moist than dry nourishment? For all excrement comes from food, and a greater amount of food produces a greater quantity of excrement. Some animals then take more moist food, others more dry food, because some are naturally dry and others moist. Animals then which are naturally dry feel more [898<sup>a</sup>1] desire for moist food, since they require it more; but those which are naturally moist desire dry food, for they stand more in need of it.

**60** · Why is it that birds and men and the courageous animals have hard frames? Is it because high spirit is accompanied by bodily heat, since fear is a [5] process of cooling? Those then whose blood is hot are also courageous and high-spirited; for the blood gives them sustenance. Plants too which are watered with warm water become harder.

**61** · Why is it that quadrupeds of a small size most often give birth to [10] monstrosities, whereas man and the larger quadrupeds, such as horses and asses, do so less often? Is it because the small quadrupeds, such as dogs, pigs, goats, and sheep, have much more abundant progeny than the larger animals, which either always or usually produce only one offspring at a time? Monstrosities come into [15] being when the semen becomes confused and disturbed either in the emission of the seminal fluid or in the mingling which takes place in the uterus of the female. So birds too produce monstrosities; for they lay twin eggs, and their monstrosities are born from such eggs in which the yolk is not separated by the membrane.

[20] **62** · Why is the head in man more hairy than the rest of the body—in fact quite disproportionately so—while in the other animals the opposite is the case? Is it because some of the other animals send an excessive amount of their nutritive material into teeth, others into horns, others into hair? Those who expend their [25] nourishment on horns have less thick hair on the head; for the available material is used up in the horns. Those whose nourishment goes into teeth have thicker hair on the head than horned animals (for they have manes), but less thick than such creatures as birds. For birds have the same sort of covering as man; but, whereas in birds the covering is distributed all over the body owing to its abundance, in man it breaks out only on the head; for man is neither on the one hand devoid of hair, nor [30] on the other hand has he sufficient to cover the whole body.

**63** · Why is it that in man alone of the animals the hair turns white? Is it because most of the animals shed their coats every year, for instance the horse and the ox, while others, though they do not do so, are short-lived, such as sheep and others (in which case the hair does not turn white, because it does not as it were [35] grow old)? But man does not change his hair and is long-lived, and so he grows white owing to age.

**64** · Why is it that those in whom the distance from the navel downwards is [898<sup>b</sup>1] longer than that from the navel to the chest are short-lived and weak? Is it because their stomach is cold owing to its

small size, and therefore it tends to cause excretion rather than concoction? Now such persons are unhealthy.

**65** · Why is it that some animals come into being not only from the sexual [5] intercourse of animals with one another but also spontaneously, while others, such as man and the horse, can only be born as the result of sexual intercourse? Is it due, if to no other cause, at any rate to the fact that the former have a short period of coming to birth, so that the moment of birth is not protracted and can take place at the change of the seasons; but of the latter class the coming to birth is much [10] protracted, since they are born after a year or ten months, so that they must necessarily be born from the intercourse of animals with each other or not at all?<sup>22</sup>

**66** · Why is it that the teeth of Ethiopians are white—indeed whiter than those of other nations, but their nails are not correspondingly white? Are their nails dark because their skin also is black and blacker than that of others, and the nails grow out of the skin? But why are their teeth white? Is it because those things turn [15] white out of which the sun extracts the moisture without adding any colour to them, as happens in the case of wax? Now the sun colours the skin, but it does not colour the teeth, but the moisture is evaporated out of them by the heat.

**67** · Why is it that, when the head is removed, some animals die immediately [20] or very soon, while others do not? Does death occur less quickly in the bloodless animals, which require little nourishment, since they do not need food immediately and the heat in them is not diffused in moisture, whereas full-blooded animals cannot live without food and heat? The former can live after their heads are cut off, for they can live longer without breathing. The reason for this has been [25] stated elsewhere.



# BOOK XI

## PROBLEMS CONNECTED WITH THE VOICE

1 · Why is it that of all the senses the hearing is most liable to be defective from birth? Is it because the sense of hearing and the voice may be held to arise from the same source? Now language, which is a kind of voice, seems to be very [30] easily destroyed and to be very difficult to perfect; this is indicated by the fact that we are dumb for a long time after our birth, for at first we simply do not talk at all and then at length begin only to lisp. And because language is easily destroyed, and language (being a kind of voice) and hearing both have the same source, hearing is, [35] as it were, *per accidens*, though not *per se*, the most easily destroyed of the senses.<sup>1</sup> Further evidence of the fact that the source of language is eminently easy to destroy may be taken from the other animals; for no animal other than man talks, and even [899<sup>a</sup>1] he begins to do so late, as has already been remarked.

2 · Why is it that the deaf always speak through their nostrils? Is it because they are near to being dumb? Now the dumb make sounds through their nostrils; [5] for the breath escapes by that way because their mouth is closed, and it is closed because they make no use of their tongue for vocal purposes.

3 · Why have all hot-natured men big voices? Is it because they necessarily have a large amount of cold air in them? For their breath, which is hot, attracts the [10] air to itself, and the more of it there is the more it attracts. Now a big voice arises from setting in motion a large quantity of air, and when the motion is swift, the voice is shrill, and when it is slow, it is deep.

[15] 4 · Why do the deaf always speak through their nostrils? Is it because the deaf breathe more violently? For they are near to being dumb; the passage therefore of the nostrils is distended by the breath, and those who are in this condition speak through the nostrils.

5 · Why are sounds more audible at night? Is it because there is more quiet [20] then owing to the absence of great heat? For this reason too there is usually less disturbance; for it is the sun which is the source of movement.

6 · Why do voices sound shriller at a distance? For example, those who try to imitate persons shouting from a very great distance utter shrill noises, like those of [25] an echo; and the sound of an echo is distinctly shriller, and it is a distant sound, being the result of refraction. Since then in sound the swift is shrill and the slow is deep, one would have expected voices to seem deeper from a distance, for all moving bodies move more slowly the farther they progress from their starting-point, and at [30] last fall. May not the explanation be that these mimics use a feeble and thin voice<sup>2</sup> when they imitate a distant sound? Now a thin voice is not deep, and it is impossible to emit a small and feeble sound that is deep, but such a sound is necessarily shrill. Or is it true that not only do the mimics imitate for this reason, but also the sounds themselves become shriller? The reason is that the air which travels makes the [35] sound; and just as that which first sets the air in motion causes the sound, so the air in its turn must do likewise and be partly a motive power and partly itself set in motion. That is why sound is continuous, motive power continually succeeding to [899<sup>b</sup>1] motive power, until the force is spent, which results in falling in the case of bodies when the air can no longer impel the missile, while in the case of sound the air can no longer impel other air. Continuous sound is produced when air is impelled by air, while the missile continues its progress as long as there is air to keep a body in [5] motion. In the latter it is always the same body that is carried along until it drops, in the former it is always different air. Smaller objects travel more quickly at first, but do not go far. Therefore voices are shriller and thinner at a distance; for that which moves more quickly is shrill—a question which we have already raised. It is for the [10] same reason that children and invalids have shrill voices, whereas grown men and healthy persons have deep voices. That from near at hand one cannot clearly distinguish degrees of deepness and shrillness and that altogether the conditions are not the same as those of heavy bodies thrown, is due to the fact that the body thrown is one and preserves its identity throughout; whereas sound is air impelled by air. [15] Consequently a body falls in one particular spot, while the voice scatters in every direction, just as though a body thrown were, in the course of its flight, to be broken into

infinitely many pieces, some particles even returning on their track.

7 · Why are newly plastered houses more resonant? Is it because their smoothness gives greater facility for refraction? They are smoother because they are free from cracks and their surface is continuous. One must, however, take a [20] house which is already dry and not one which is still quite wet; for damp clay gives no refraction of sound. It is for this reason that stucco has a higher degree of resonance. Perhaps the absence of disturbance in the air also contributes something; for when the air is massed together it beats back the air that strikes against it.

8 · Why is it that if a large jar or empty earthenware vessels are buried in the [25] ground and lids placed on them, the buildings in which they are have more resonance, and the same is true if there is a well or cistern in the house? Is it because, since an echo is due to refraction, the air when enclosed is necessarily massed together, and so the sound has something dense and smooth upon which it can strike<sup>3</sup> and from which it can be refracted, these being the most favourable conditions for an echo? A well, then, or a cistern causes the contraction and massing [30] together of air, and jars and earthenware vessels also have dense surrounding walls, and so the phenomenon in question results in both cases. For anything which is hollow is particularly resonant; for which reason bronze vessels are particularly so. That resonance still continues when the vessels are buried need not surprise us; for the voice is carried downwards as much as in any other direction—indeed one [35] conceives of it as being carried in a circle in every direction.

9 · But why is it that there is more resonance where vessels are buried than where they are not? Is it because covered vessels receive the air and retain it better? [900<sup>a</sup>1] The result is that the impact of sound upon them is more violent.

10 · Why does cold water poured out of a jug make a shriller sound than hot water poured from the same vessel? Is it because the cold water falls at a greater [5] speed, being heavier, and the greater speed causes the sound to be shriller? Heat, on the other hand, makes water lighter by rarefying it and causing it to rise. We may compare the phenomenon that

torches deal softer blows when they are alight.

**11** · Why is it that the voice is rougher when one has passed a sleepless [10] night? Is it because the body, owing to absence of concoction, is moister than usual, especially in its upper part (which is also the cause of heaviness in the head), and moisture in the region of the windpipe necessarily makes the voice rougher? For roughness is due to unevenness, whilst depth is due to congestion; for the passage of sound is then slower. [15]

**12** · Why does the voice become broken very readily after meals? Is it because the region in which it is produced is thoroughly heated by constant impacts, and, becoming heated, attracts the moisture? The moisture too is itself more copious and readier to hand when food is being taken.

[20] **13** · Why is the sound of weeping shrill, whereas that of laughing is deep? Is it because those who weep either set only a little breath in motion, because they are weak, or else exhale violently, which makes their breath travel quickly? Now speed makes for shrillness; for that which is hurled from a body which is tense travels quickly. (On the other hand, a man who is laughing is in a relaxed condition.) Those [25] who are weak make shrill sounds, for they set only a little air in motion, in some cases merely on the surface. Further, the air emitted by those who are laughing is warm, while the breath of those who are weeping is colder, just as pain is a chilling of the region round the breast. Now heat sets a great mass of air in motion, so that its progress is slow, whereas cold imparts movement to a little air only. The same [30] thing happens with flutes; when the player's breath is hot, the sound produced is much deeper.

**14** · Why do children and the young of other animals have shriller voices than the full-grown of their species, and that though shrillness involves a quality of violence? Is it because<sup>4</sup> the voice is a movement of the air, and the swifter the [35] movement the shriller is the sound? Now a little air can be moved more easily and quickly than a large quantity, and it is set in motion owing either to its concretion or to its dissolution

by heat. Now since we draw in cold air when we inhale, the air within us can become concentered by the act of inhalation; but exhalation, when heat sets air in motion, can become voice, for it is when we are exhaling that we speak, [900<sup>b</sup>1] not when we are inhaling. And since the young are hotter than their elders, and their interior passages are narrower, they may well have less air in them. So, as there is less in them of that which is moved and more motive power, namely heat, for [5] both reasons the movement of the air may be quicker; and, for the reasons already stated, the quicker the movement the shriller the voice.

**15** · Why is the sound of weeping shrill and of laughter deep? Is it because those who weep, in uttering their cries, strain and contract the mouth? Owing to the [10] tension the air that is in them is impelled into swift motion, and the contraction of the mouth, through which it passes, makes its speed still greater. For both these reasons the voice becomes shrill. On the other hand, those who laugh relax the tension in doing so and open the mouth. Since then for this reason they emit the air from the mouth through a wide aperture and slowly, their voice is naturally deep.

[15] **16** · Why is it that persons without generative power, such as boys, women, men grown old, and eunuchs, have shrill voices, while adult men have deep voices? Is it because<sup>5</sup> the thin voice has only one dimension, just as the line and other thin things have one dimension, while thick things have more than one? Now it is easier to create and set in motion one thing than several things. Now the breathing of the [20] persons mentioned above is feeble and sets little air in motion; and the air which has only one dimension is very small in quantity, for it will be thin for the reasons already stated. And the voice produced from it will be of the same quality, and a thin voice is shrill. This then is the reason why persons without generative power have shrill voices; whereas men who are vigorous set a large quantity of air in motion with their breath, and the air, being large in quantity, is likely to move [25] slowly and causes the voice to be deep. For shrillness of voice is, as we have seen, produced by a movement at once swift and thin, neither of which conditions is fulfilled in an adult man.

**17** · Why are our voices deeper in the winter? Is it because then the air both inside and outside us is thicker, and, being such, its movement is

slower and the [30] voice therefore deeper? Further, we are drowsier in the winter than in the summer and sleep longer, and we are heavier after sleeping. In the period then during which we sleep for a longer time than we are awake (namely, the winter), we may expect to have deeper voices than in the season when the contrary happens. For during the [35] short interval of wakefulness the condition set up during sleep persists and causes a tendency to drowsiness.

**18** · Why is the voice deeper as a result of drinking and vomiting and cold weather? Is it due to the congestion of the larynx caused by phlegm, which makes [901<sup>a</sup>1] fluid matter collect in it? In some people vomiting and drinking, in others the season and the constriction resulting therefrom, make the larynx narrower, so that the passage of breath is slower; and its slow passage makes the voice deep. [5]

**19** · Why is it that a deeper voice is more audible close at hand, but less so at a distance? Is it because a deeper voice sets a greater amount of air in motion, but not at a distance? So we hear it less well at a distance, because it travels less far, but [10] better from near at hand, because a greater mass of air strikes upon our sensory organ. A shrill sound is audible at a distance, because it is thinner; and that which is thin has greater longitudinal extension. It might also be said that the motion which causes it is quicker; this would be so, if the breath which sets the air in motion were at the same time dense and narrow. For, in the first place, air which is small in bulk [15] moves more readily (for the air which is set in motion by that which is narrow is small in bulk); and, secondly, that which is dense deals more impacts, and it is these which cause the sound. This can be illustrated from musical instruments; for, all other conditions being the same, it is the thinner strings that give shriller sounds.

**20** · Why does the voice seem shriller to those standing at a distance, [20] whereas shrillness depends on the rapidity with which the voice travels, and that which travels moves more slowly the farther it goes? Is it because the shrillness of the voice depends not only on the rapidity with which it travels but also on the attenuation of sound? The farther one is away the more attenuated is the voice [25] when it reaches one, because very little air is set in motion. For the motion gradually

diminishes; and just as number in diminishing terminates in the unit, so a body terminates in a single dimension, and this in a body is tenuity. So it is also with the voice.

[30] **21** · Why is it that both those who have taken violent exercise and those who are weak speak shrilly? Is it because those who are weak set only a little air in motion, and a little air travels more quickly than a larger quantity? Those who have taken violent exercise, on the other hand, set the air in vigorous motion, and air which is in vigorous motion travels more quickly, and in the voice quickness of motion causes shrillness.

[901<sup>b</sup>1] **22** · Why do those who shout after meals spoil their voices? Indeed, we can see how those who are training their voices, such as actors and chorus-men and all such persons, practise early in the morning and on an empty stomach. Is it because the spoiling of the voice is simply the spoiling of the region through which the voice [5] passes out? So too those who have sore throats have their voices spoilt, not because the breath which causes the voice is any worse, but because the windpipe is roughened. This region by its nature is especially liable to be roughened by violent [10] heat, and so neither can those who are in a fever sing, nor can those who have been suffering from a violent fever sing immediately after it leaves them; for their larynx is roughened by the heat. The consumption of food naturally increases and heats the breath, and it is reasonable to suppose that the breath being in this state makes the [15] windpipe sore and rough as it passes through; and when this happens the voice is naturally spoilt.

**23** · Why is it that the voice, which is air that has taken a certain form and is carried along, often loses its form by dissolution, but an echo, which is caused by such air striking on something hard, does not become dissolved, but we hear it distinctly? Is it because in an echo refraction takes place and not dispersion? This [20] being so, the whole continues to exist and there are two parts of it of similar form; for refraction takes place at the same angle. So the voice of the echo is similar to the original voice.

**24** · Why is it that, although the young of all other animals and infants have [25] shriller voices than the full-grown of their species, calves have deeper voices than full-grown oxen? Is it because in each species the young resembles the female of the same kind? Now among cattle cows have deeper voices than bulls, and the calves resemble the former rather than the latter; but in all other species the males have deeper voices.

[30] **25** · Why is it that when the orchestra of a theatre is spread with straw, the chorus makes less sound? Is it because, owing to the unevenness of the surface, the voice does not find the ground smooth when it strikes upon it and is therefore less uniform, and so is less in bulk, because it is not continuous? Similarly light too shines more on smooth surfaces, because it is not cut off by anything which intercepts it.

[902<sup>a1</sup>] **26** · Why does salt make a noise when it is thrown on fire? Is it because salt has a little moisture in it which is evaporated by the heat and violently bursting forth rends the salt? Now anything which is rent makes a noise.

**27** · Why is it that some children, before they reach the age at which it is [5] time for them to express themselves clearly, find voice and say something distinctly, and then go on as before until the usual age for speaking arrives? Some regard such incidents as portents; and before now cases have been reported of children who spoke immediately after birth. Is it because generally the majority of children at [10] birth<sup>6</sup> follow the usual course of nature (and so the phenomenon in question occurs only in a few), and their faculties keep pace with one another; and so they hear and find voice and understand what they hear and speak and express themselves clearly all at the same time? Sometimes, however, these things do not go together, but some children understand before the faculty by which they converse is set free for use, [15] while in others the opposite happens. The latter, then, would not converse intelligently (for they merely repeat what they hear); but when the time comes at which they can both speak and understand, they make a natural use of both functions. But in those in whose souls perception through hearing has been perfected before the organ<sup>7</sup> by which the voice is first set in motion and speech is [20] formed, the full power and freeing of the organ of



speech sometimes comes to pass when they already understand a great deal. This is especially likely to happen after sleep—the reason being that sleep makes the body and the faculties more sluggish by giving them a rest—or, if not after sleep, after some other similar change has taken place. We can do many things of this sort which require some short-lived [25] opportunity—after which the conditions are no longer suitable—when the organ of speech is in this state of freedom; and when there has been obviously present to their sensation something by which thought was stirred, in virtue of having heard it the child returns to it and utters it. Now tunes and phrases often occur to us without our choosing, but if we originally utter them by choice, we afterwards speak or sing [30] them without choosing and cannot get rid of them from our lips. So too when this happens in children, the part relapses again into its natural condition, until the time comes for it to become strong and to be separately constituted. [35]

28 · Why do some objects, chests for example, suddenly make a noise and move, when nothing perceptible sets them in motion? Yet that which causes motion is stronger than that which is moved. The same question arises in connexion with corruption and old age; for everything which is said to be ‘destroyed by time’ is destroyed by something imperceptible. Is it similar to dripping water and stones [902<sup>b</sup>1] lifted by the growth of plants, namely, that it is not the final effort but its continuity which raises or moves the object? This continuity of effort is imperceptible, but it results in a movement which is perceptible. So too that which is contained within [5] perceptible spaces of time moves and can be divided into imperceptible portions, but these cause motion and corruption by their sum and their continuity? Now continuity is not in the present time but in the period of time terminated by the present.

29 · Why does one hear less well when one is yawning? Is it because a [10] quantity of breath emitted in the yawn finds its way also into the ears from inside, so that the motion which it sets up in the neighbourhood of the ears makes a distinct impression on the perception, especially after sleep? Now sound is air or a certain condition of it. The sound then from outside enters the ear, and that from within [15] comes into collision with it, and the movement thus caused checks the progress of the sound from without.

### 30 · Why do children hesitate more in their speech than grown men?

Is it because, just as when we are children, we always have less control over our hands and feet and at a still earlier age cannot walk at all, so the young cannot control [20] their tongue? Now when they are quite small, they cannot speak at all but can only make sounds like the animals, because they lack control. This is the cause not only of hesitancy in speech but also of lisping and stammering. Lisping is due to the inability to master a letter—not any letter but some particular one; stammering is due to the dropping out of some particular letter or syllable; hesitancy is due to the [25] inability to join one syllable to another sufficiently quickly. All three are due to want of power; for the tongue is not an efficient servant of the intelligence. The same thing occurs in those who are drunken and in the old; but always to a less extent than in children.

[30] **31** · Why is it that the voice trembles in those who are nervous or afraid? Is it because the heart is shaken by the passing out of the heat? For this happens in both conditions, being an effect both of nervousness and of fear. When the heart is shaken, the impact is not one but many, like that from strings which are not [35] properly stretched.

**32** · Why is it that those who are nervous have deep voices, but those who are afraid speak shrilly? Is it because in those who are afraid the region about the heart is chilled, because the heat passes downwards, and so they set only a little air in motion? For the force which sets the air in motion is derived from heat. In those [903<sup>a</sup>1] who are nervous the heat travels upwards, as happens in those who are ashamed; for it is through shame that nervousness is felt. In those who are ashamed the heat travels upwards to the face, as is shown by the fact that they tend to blush. The heat therefore dissolves and thickens the air with which they speak, and such air can only [5] be propelled slowly; and in the voice that which is slow is deep.

**33** · Why are sounds more audible in the night than in the day? Is it for the reason that Anaxagoras gives, namely, that in the day-time the air, heated by the [10] sun, hisses and roars, but at night it is still because the heat has ceased, and that when there is no noise hearing is easier? Or is it because one hears more easily through a comparative void than through a *plenum*? Now in the day the air is dense, being full of light and of the

sun's rays; but at night it is rarer, for then the fire and the rays, which are bodies, have gone out of it. Or is it because in the [15] day-time the various bodies around us distract our intelligence, and so it is less able to distinguish<sup>8</sup> what it hears? Also because we do all that we have to do preferably in the day rather than at night, our intelligence<sup>9</sup> too is busy then; and the perception apart from intelligence does, if one may say so, only an imperceptible amount of [20] work—as the saying is, 'It is the mind which sees, the mind which hears'. But at night when our sight has no work to do and our intelligence is more at liberty, the channel of hearing, being wider open, is just as receptive of sounds and better able to report them to the intelligence, because the latter is neither busy nor distracted by [25] the sight, as it is in the day-time.

**34** · Why is it that persons without generative power, such as boys, women, men grown old, and eunuchs, have shrill voices, while adult men have deeper voices? Is it because of the weakness of the organ which sets the air in motion? For that which is weak sets only a little in motion; and a little air travels quickly, and [30] that which travels quickly is shrill. Or is it because the first passage through which the air passes is narrow in those who are without generative power, so that that which expels the air from it has little force, and the air, being small in volume, travels quickly through the larynx above, which is wide? But in the adult and fully developed men this passage is wide (just as also is that leading to the testicles), and [35] so the quantity of the air expelled is also greater; and so passing through more slowly it makes a deeper sound.

**35** · Why is it that those who hesitate in their speech cannot speak softly? Is it because they are hindered from using their voice by some impediment? Since, [903<sup>b1</sup>] then, there is not equal force exerted and similar movement set up when there is some impediment to the movement and when there is none, a violent effort is required. Now the voice is a movement, and those who use more force speak louder; and so, since they have to force the hindrance out of the way, those who hesitate in [5] their speech must necessarily speak louder.

**36** · Why do those who hesitate in their speech become worse when they are nervous, but better under the influence of drunkenness? Is it because their condition is a state resembling apoplexy of some interior

part of the body which they cannot move and which by its coldness hinders their speech? Wine then, being naturally [10] hot, tends to get rid of the coldness, but nervousness creates coldness; for it is a form of fear, and fear is a chilling condition.

**37** · Why is it easier to hear sounds from outside in a house than those from inside a house outside it? Is it because the sound from inside becomes dispersed because it travels over an immense space, so that each component part of the sound [15] is not sufficiently strong to make itself heard, or at any rate is less audible? On the other hand, a voice from without entering within into a smaller space and into stagnant air arrives in a close mass, and so being greater in bulk is more audible.

**38** · Why are those who hesitate in their speech melancholic? Is it because [20] melancholy is due to their responding too quickly to appearances? Now this is characteristic of those who hesitate in their speech; for the impulse to speak outstrips their power to do so, the mind responding too quickly to that which has appeared to it. The same thing occurs in those who lisp; for in them the organs employed in speech are too slow.<sup>10</sup> This is shown by the fact that men under the [25] influence of wine become lispsers, since then they respond most to the appearances and not so much to the mind.

**39** · Why do leeks contribute to loudness of the voice (for we find that this is so even with partridges)? Is it because, whereas boiled garlic makes the throat smooth, leeks contain a certain amount of adhesive matter, and this cleanses the larynx?

[30] **40** · Why is it that in all other creatures the sounds made are shriller when more violence is used, but man speaks more shrilly when he is weak? Is it because then he sets less air in motion, and this passes along quickly and its speed makes the sound shrill?

**41** · Why can one hear better when one holds one's breath than when one [35] exhales? This is why people when hunting tell one another not to breathe. Is it because the power of perception rises into the upper parts of the body when the veins are distended? For it sinks when one is

asleep; and so those who are sleeping exhale [904<sup>a</sup>1] rather than inhale, and lose the sense of hearing. Or does the blood rise upwards when one exhales, so that the lower parts of the body become void, and one can hear better in a void? Or is it because breathing is a noise, and when it takes place in the act of exhaling it impedes the hearing?

**42** · Why do small quantities of salt make a noise and explode more quickly, [5] but large quantities more violently? Is it because in the former case the particles burst quickly because they are small (for the fire does not have far to penetrate), but in the latter case slowly, since a large mass is more difficult to burst than a small? A small quantity makes a small noise because the impact is small, whereas a large [10] quantity makes a loud noise because the impact is greater; and sound is an impact. The stronger an object is, the greater is the explosion if it is struck; for it is less yielding.

**43** · Why is it that if the same quantity of salt is thrown on to a large fire, it makes less noise than if thrown on a small fire, or else makes no noise at all? Is it because it is burnt up before it can burst? For it burns because the moisture is used up, and it makes a noise because it bursts. [15]

**44** · Why does one hear less well when one is yawning? Is it because the action of yawning cuts off the breath internally and the breath so cut off accumulates in the region of the ears? This is shown by the fact that there is a noise in the ears when one yawns. Now the breath thus cut off hinders the hearing. Further one also makes a noise when one yawns, and this tends to impede the hearing. Also the organs of hearing must necessarily become compressed by the [20] distension of the mouth in yawning.

**45** · Why is it that though the voice, since it is a kind of stream, is naturally inclined to travel upwards, yet it is more audible below from above than above from below? Is it because the voice is a kind of air mingled with moisture, and this air [25] being weighed down by the moisture is carried downwards instead of upwards, since it is the natural characteristic of moisture to be carried downwards? For this reason one

hears better when one is below. Or is such a result characteristic only of the voice of a living creature (for it contains moisture), while the phenomenon which we are discussing is found also in other sounds? Just as the sight then, if it be allowed to [30] fall from a higher to a lower object, makes an upwards reflexion and vice versa, so the voice, which has a natural tendency to rise, coming into collision with the air which bars its progress, cannot overpower the air, which is greater in mass and [35] heavier, but the air which is set in motion by the voice, being refracted, is carried in a contrary direction and downwards, and so, being scattered in a downward direction, it is more audible below. Somewhat similar is that which happens in an echo, which is due to the refraction of the voice in a contrary direction.

**46** · Why are the voices of drunken persons more broken than those of the [904<sup>b1</sup>] sober? Is it because their voice breaks easily owing to their state of repletion? This can be illustrated by the fact that chorus-men and actors practise not after a meal but on an empty stomach. Now since a person in a state of drunkenness is in a [5] condition of greater repletion, his voice is naturally more broken.

**47** · Why can one hear shriller voices at a greater distance? Is it because shrillness in the voice is rapidity, and what is carried forcibly along moves more rapidly, and what is carried violently along is carried farther? [10]

**48** · Why can we hear better if we hold the breath? Is it because breathing makes a noise? It is only natural therefore that we should hear better when the noise is less; for the noise is less when we hold the breath.

**49** · Why is it that light cannot penetrate through dense objects, whereas [15] sound can do so, although light is rarer and travels<sup>11</sup> farther and quicker than sound? Is it because light travels in a straight line, and so, if anything blocks its direct course, it is completely cut off, but sound, because it is a breath, can also [20] travel in a line that is not direct? So we can hear those who make sounds from any direction and not only those who are in a straight line with our ears.

**50** · Why is the sound of laughing deep, whereas that of weeping is shrill? Is it because a voice which comes from those who are in a state of tension is shrill, and that which is shrill is weak? Now both these characteristics are found rather in [25] those who are weeping; for they are in a state of greater tension and they are weaker.

**51** · Why is it that the voice, being air which has assumed a certain form and is carried along,<sup>12</sup> often loses its form by dissolution, but an echo, which is formed by such air striking on something hard, does not become dissolved, but we hear it [30] distinctly? Is it because in an echo refraction takes place, not dispersion? It starts then as a complete whole and continues to be so. Also, the effect produced upon it is due to a similar agency; for it is refracted from the air in the hollow, not from the hollow itself.

**52** · Why is it that when one person makes a sound and a number of persons [35] make the same sound simultaneously, the sound produced is not equal nor does it reach correspondingly farther?<sup>13</sup> Is it because each of them thrusts forward his own portion of air and they do not all impel the same air, except to a very small extent? The result is much the same as when a number of persons throw stones but each throws a different stone, or at any rate most of them do so. Neither in the latter case [905<sup>a</sup>1] will any missile travel far (or at any rate not correspondingly farther), nor in the former case will the voice reach farther. For this great voice is that of many, not of one; so at a short distance it appears correspondingly greater (just as a number of missiles reaches the same spot), but at a great distance this is no longer so.

[5] **53** · Why do those who are nervous have deep voices, but those who are afraid speak shrilly, though a feeling of shame is a kind of fear? Or are the two conditions really very different? For those who feel shame blush (and nervousness is a kind of shame), whereas those who are afraid turn pale. It is clear then that in those who are afraid the heat fails in the upper part of the body, so that the breath, [10] being weak, sets only a little air in motion; and that which is small in bulk travels quickly, and in the voice quickness is shrillness. But in those who feel shame the heat in the region of the breast travels upwards, as is shown by the fact that they blush. Now a strong force sets a great mass of air in motion, and a great

mass travels [15] slowly, and in the voice slowness is deepness.

**54** · What is the cause of hesitation of speech? Is it due to the chilling of the region in which the sound is produced, and to a condition resembling apoplexy in that part of the body? This is why those who hesitate, if warmed with wine and deriving thence a continuity of speech, are better able to connect their words together.

**55** · Why is it that of all animals man alone is apt to become hesitating in [20] speech? Is it because he alone possesses the power of uttering words, while the other animals only have voices? Now those who hesitate in their speech use their voice, but they cannot connect their words together.

**56** · Why is the voice shriller in winter and in those who are sober, and [25] deeper in summer and in those who are drunken? Is it because the quicker a voice is the shriller it is, and it is quicker when it proceeds from one who is in a state of tension? The bodies of those who are sober are in a more solid condition than those of the drunken, and bodies are in a more solid condition in winter than in summer; for heat and warmth have a dissolvent effect upon the body.

**57** · Why does the voice come to perfection later in man than in any other [30] creature capable of sound? Is it because there are many variations and kinds of sounds in the human voice? For the other animals can express few or no letters; and that which is most elaborate and contains a large number of variations takes a long time to perfect.

**58** · Why is it that the sight cannot pass through hard objects, but the voice [35] can do so? Is it because the course of the sight can only take one direction, namely, a straight line (as is shown by the rays of the sun and the fact that we can only see what is directly opposite us), whereas the voice can take many directions, since we can hear from everywhere? When therefore the sight is prevented from making its way through in a straight line, because there is no continuous passage between the eye and the object, it is impossible to see through the impeding matter. But the air [905<sup>b1</sup>] and the voice, since they travel



everywhere, find their way everywhere and make themselves audible. On the other hand, the sight can penetrate through liquids, but voices cannot be heard through them or hardly at all, although the liquid is rarer than the earth, because the passages are small and close together and continuous, [5] and so the sight is not prevented from travelling in a straight line. For the same reason it is possible to see through glass, although it is dense, but not through a fennel-stalk, although it contains rarities, because in the former the pores are continuous, in the latter they are irregular, and their size is no advantage if they are not straight.<sup>14</sup> The voice is not audible through water, because the empty air-spaces [10] in it are too small and so cannot admit the voice or let it pass through, or only with difficulty; for the voice is a kind of air. For that which is rarer is not necessarily more penetrable, unless at the same time the passages are adapted to that which is passing through. So also that which is rarer is not necessarily more compressible, [15] unless its passages are of such a kind as to admit the passage of other bodies. But, it may be urged, that which is rare is soft and compressible. True, but in some things compression is impossible owing to the smallness of the passages—in glass, for example; for its passages cannot be contracted, although it may be rarer than a [20] fennel-stalk, for the reason already mentioned. So too with water and the like. This then is clear, that, although the rare and the soft are either identical or else of a very similar nature, yet it does not follow that the rarer a thing is the more it admits of contraction. The reason in all these cases is the same.

**59** · Why is it that the sound produced becomes less if some of those who [25] produce it are withdrawn, but its character is unchanged? Is it because their voice had formed part of a general mingling of sound, and that which is mingled is not mingled in one part and not in another, but is mingled throughout? So when some of those who make the sound are withdrawn, the volume of sound comes forth in the same way as before from the various voices, and must therefore, though smaller, necessarily retain the same characteristics.

**60** · What is the cause of hesitancy in speech? Are those who hesitate in too [30] great a hurry because of the heat that is in them, and so they stumble and stop? If so, they resemble those who are angry, for they too become full of panting, with the result that a large quantity of breath comes together. Or do they pant owing to the boiling of the heat,

because it is abundant and cannot come forth before the proper moment of exhalation? Or is the right explanation the exact contrary, namely, that [35] it is the chilling rather than the heating of the region in which the sound is produced—a state resembling apoplexy in that part of the body? That is why those who hesitate, when warmed with wine and deriving thence a continuity of speech, are better able to connect their words together.

**61** · Why are voices deeper in the winter? Is it because then the air is thicker and as a consequence its movement is slower, and therefore the voice is deeper? Or [906<sup>a</sup>1] is it because the air passes more slowly through narrow passages, and the region round the larynx is closed by the cold and by the phlegm which flows into it?

**62** · Why is it that boys, women, eunuchs, and old men have shrill voices? Is [5] it because the movement of air which creates a shriller sound is quicker? Now it is more difficult to move a greater amount of the same thing, and so those who are in the prime of life draw in the air in greater quantities, and therefore this air, since it travels more slowly, makes the voice deeper. In boys and eunuchs the contrary occurs, because they contain less air. Old men's voices tremble because they cannot [10] control them, just as, when invalids and children take hold of a long stick by one end, the other end shakes, because they have no control over it; this too is the cause of trembling in old men, namely lack of control. We must suppose also that trembling of the voice in those who are nervous or afraid or chilled is due to the same cause. For in one whose voice is in this state, since most of the heat collects [15] within as a result of the above conditions, the rest, which is small in quantity, cannot control the voice; consequently it shakes and trembles. This is the reason why artists who belong to the class of those who are conscious of nervousness speak in a low voice at first, until they settle down to their work; for by keeping the voice low they [20] can control it.

## BOOK XII

### PROBLEMS CONNECTED WITH THINGS OF PLEASANT ODOUR

1 · Why is it that perfumes produced by burning affect the senses less at a short distance? Is it because the effluvium is pleasanter when mingled with the air in a weak form, as happens in medicinal myrrh? Or can the contrary of this be the [25] explanation, namely, that the fire destroys the odour in the immediate neighbourhood of the flames? For the odour is produced when the perfume evaporates; that is why near the embers the effluvium has no odour, but it appears purer and thinner the farther away it is.

2 · Why is it that the odours of burning perfumes and of flowers are less [30] sweet-scented at a close distance? Is it because particles of earth are given off with the odour, and these, owing to their weight, fall more quickly to the ground, and therefore the odour is pure at a greater distance? Or is the effluvium not at its strongest either quite near to its source or very far from it? For close at hand it has not yet gained strength, while at a distance it has become dissipated. [35]

3 · It is said that trees become sweet-scented upon which the rainbow has fallen. Is this true or false? And if it is true, what can be the cause of the phenomenon? That it does not happen always and as a universal rule is obvious; for [906<sup>b</sup>1] rainbows often occur without any visible effect on the trees. When it does happen (for it does occur sometimes and this has given rise to the saying), the effect is not produced on every kind of wood. The cause can only be attributed to the rainbow [5] *per accidens*, especially if the rainbow does not really occur in nature but is an effect produced on the eye by refraction. Now the phenomenon, as we said, does not occur whatever the condition of the wood; for shepherds say that sweet odour is noticeable after the rains which accompany the rainbow not in green or in dry trees but in [10] burnt wood, and in particular where briars and brambles grow and trees which have sweet-

scented flowers. The reason for the sweet scent is the same as in the soil; for where the soil is hot and burnt through and through, anything which grows from it is at first sweet-scented. For things which contain but little moisture, if they are burnt at all, become sweet-scented; for the heat concocts this moisture. (So, of the [15] whole world, those parts towards the sun have a sweeter odour than those towards the north; and of the former those towards the east have a sweeter odour than those towards the south, for the districts of Syria and Arabia have more soil, but Libya is [20] sandy and free from moisture.) For there must not be a large amount of moisture—for much moisture is difficult to concoct—nor must there be a complete absence of it, or else there will be no evaporation. These conditions are fulfilled in newly burnt wood and wood which naturally has a sweet odour in itself. This is proved to be true by the flowers, for it is through them that the wood emits its scent. [25] The theory that sweet odour is engendered in any trees upon which the rainbow rests is due to the fact that this cannot happen without the presence of water; for it is when the wood has been wetted and has then concocted the moisture by the heat which is in it, that it gives out the vapour which is being engendered in it. But there must not be a large amount of water; for too much water drenches the tree and [30] extinguishes the heat previously caused by the burning. Now the rains which follow the rainbow, so far from being heavy, may almost be called slight. Also if there is a number of rainbows, the rain is not heavy, but it falls little and often. It is therefore natural under these circumstances that men notice nothing unusual except the rainbow and attribute to it the cause of the sweet odour.

[35] **4** · Why is it that flowers and burnt perfumes smell sweeter at a distance, whereas close at hand they have rather the smell either of vegetation or of smoke? Is it because scent is a form of heat and sweet-scented things are hot? Now heat is [907<sup>a</sup>1] light, and so, the further the perfumes penetrate, the more does their scent become purified from other concomitant odours produced by their leaves and by smoke, which is a watery steam; at a short distance, on the other hand, the mingled odours are simultaneously perceptible in the plants in which they are present.

[5] **5** · Why do things always emit a stronger odour when they are in motion? Is it because they fill a larger space of air than when they are at rest? The result is that the odour is thus transmitted more quickly to our

perception.

6 · Why is it that we perceive odours less in the winter, especially in frosty weather? Is it because the air is more free from motion when it is cold? The motion [10] therefore set up by the body which produces the odour cannot have such a far-reaching effect owing to the difficulty of imparting motion to the effluvium and to the air in which it is present.

7 · Why do perfumes have a more pungent odour when they are burnt on ashes than on the fire? And why is their odour stronger and more persistent when [15] they are burnt on ashes? Is it because their odour is less thoroughly concocted on ashes, and therefore greater in bulk? Now fire by quickly concocting their natural force alters their odour; for concoction involves alteration in that which is concocted.

[20] 8 · Why do those roses in which the centres are rough smell sweeter than those in which they are smooth? Is it because those roses smell sweetest which partake most of the natural characteristics of the rose? Now the rose is naturally thorny, and so it smells sweeter when its characteristics are more natural.

9 · Why are the odours both of burnt perfumes and of flowers less pleasant at [25] a short distance? Is it because at a short distance the earthy element is transmitted with the scent, and so mixing with it lessens its strength, whereas the odour travels to a distance? It is for this reason too that flowers when rubbed lose their scent.

10 · Are scents smoke [or air]<sup>1</sup> or vapour? For it makes a difference, in that the former is produced by fire, the latter without it. And is something transmitted [30] from the sense to the objects producing the scent or vice versa, causing a continuous motion in the adjoining air? Also, if any effluvium is given off by these objects, one would expect them to become less; yet we see that those things which have the strongest scent last the longest.

11 · Why have perfumes a more pungent odour when they are burnt

on [35] ashes than on fire? Is it because their odour is less thoroughly concocted on ashes and is therefore greater in bulk? Consequently a large quantity of the earthy element is vaporized in the process and becomes smoke; but the fire burns up the earthy element before it can escape, and so the odour is purer and reaches the senses [907<sup>b</sup>1] untainted by the smoke. This is also the reason why flowers when rubbed smell less sweet; for the rubbing imparts motion to the earthy element and the slow heat does not destroy it.

**12** · Why is it that sweet-smelling seeds and plants promote the flow of urine? Is it because they contain heat and are easily concocted,<sup>2</sup> and such things [5] have this effect? For the heat which is in them causes quick digestion and their odour has no corporeal existence; for evil-smelling plants, such as garlic, by reason of their heat promote the flow of urine, but their wasting effect is a still more marked characteristic. But sweet-smelling seeds contain heat, because odour is in general engendered by heat; while evil-smelling things are unconcocted. Now [10] anything which is to promote the flow of urine must be not only hot but also easily concocted, in order that it may accompany the liquids in their downward course and effect their digestion.

**13** · Why is it that wines mixed with water have a less strong odour<sup>3</sup> than when they are unmixed? Is it because wine mixed with water is weaker than unmixed wine? Now the weaker is more easily changed by any force acting upon it [15] than the stronger. So wine mixed in the water is more easily affected than unmixed wine. Now it is characteristic of that which is easily affected<sup>4</sup> to yield<sup>5</sup> to something else or to receive something which does not belong to it; unmixed wine, therefore, has a strong odour, but wine mixed with water is odourless.

## BOOK XIII

### PROBLEMS CONNECTED WITH THINGS OF UNPLEASANT ODOUR

[20] 1 · Why is it that urine acquires a more unpleasant odour the longer it remains in the body, whereas ordure becomes less unpleasant to the smell? Is it because the latter becomes drier the longer it remains in the body (and what is dry is [25] less liable to putrefaction), but urine thickens, and the fresher it is the more like it is to the original liquid drunk?

2 · Why is it that things of unpleasant odour do not seem to have an odour to those who have eaten them? Is it because, owing to the fact that the scent penetrates to the mouth through the palate, the sense of smell soon becomes satiated and so it [30] no longer perceives the odour inside the mouth to the same extent—for at first every one perceives the odour, but, when they are in actual contact with it, they no longer do so, as though it had become part of themselves—and the similar odour from without is overpowered by the odour within?

3 · Why have flowers an unpleasant odour when they are rubbed? Is it because the earthy element, which is in the flower, mingles with the odour?

[35] 4 · Why is it that no living creature is pleasant to the smell except the leopard—which is pleasing even to animals, for they are said to find pleasure in its odour—and when they decay they are unpleasant to the smell, but many plants when they decay and wither become still more pleasant to the smell? Is it because [908<sup>a</sup>1] the cause of evil odour is an unconcocted condition of excretion? For this reason the perspiration of some people is sometimes unpleasant, particularly in those whose perspiration is not usually unpleasant, as the result of disease. Also farts and belches of those who are in an unconcocted state are unpleasant. The same cause [5] must be ascribed for evil odour in the flesh and in that

which is analogous to it (by which I mean that which in other animals corresponds to flesh); for here too there is sometimes unconcocted excretion. This then when it putrefies is a cause of evil odour in living creatures and in decaying bodies. For this reason too the fat and the bony parts and the hair have no evil odour, because the fat and bones are already [10] concocted, while the hair contains no moisture. Now plants contain no excretion. Or is there excretion in them also, but, because plants are naturally dry and hot, is the moisture in them more easily concocted and not of a muddy consistency? This can be illustrated from the soil, which is pleasant to the smell in hot regions, such as Syria [15] and Arabia, and from the fact that the plants which come from there are sweet-smelling, because they are dry and hot; and such plants are not liable to decay. But animals are not dry and hot, and so their excretions are unconcocted and malodorous, and likewise their exhalations, and when they decay the moisture putrefies. This does not happen in plants, because they contain no excretions.

5 · Why are things of unpleasant odour more unpleasant when they are hot [20] than when they are cool? Is it because odour is a vapour and an effluvium? A vapour, then, and an effluvium is caused by heat; for a movement takes place, and heat is the source of the movement. Cold, on the contrary, is a source of stagnation and contraction and downward movement; but heat and all odours have an upward [25] tendency, because they are in the air, and the organ which perceives them is above and not below; for odour penetrates to the brain and so causes perception.

6 · Why, if one eats garlic, does the urine smell of it, whereas this does not happen when other things are eaten which have a strong odour? Is it because, as some of the followers of Heraclitus say, vaporization takes place in the body just as [30] in the universe, and then, when the process of cooling succeeds, moisture is formed in the universe and urine in the body, so the vaporization from the food, when it is formed by intermixture, causes the odour(for it is odour after it has undergone change)? If so, should not all the foods too which have a strong odour produce this [35] effect, which we know they do not? Furthermore, concretions from vapour do not resume their original form—which would result in wine, for example, being produced from the vapour of wine instead of water, as actually happens—and so this part of their theory is



also untrue. The truth is that garlic, alone of foods which [908<sup>b</sup>1] have an odour which is strong and also promotes the flow of urine, has the quality of inflating the lower part of the belly; all other such foods (radishes, for example) engender breath higher up or else do not promote the flow of urine. But garlic<sup>1</sup> has these three qualities: it promotes the flow of urine, it engenders breath, and it does so in the lower part of the body. The region round the privy parts and the bladder [5] feels the effect of such foods owing to its nearness and because it is liable to admit breath; that this is so is shown by the distension of the privy parts. It is clear therefore that the excretion of garlic is more liable than that of any other such food to reach the bladder with the breath, and this excretion mingling with the urine imparts its odour to it. [10]

7 · Why is it that the mouths of those who have eaten nothing, but are fasting, have a stronger odour, ‘the smell of fasting’, as it is called, but when they eat the odour ceases, when one would expect it to increase? Is it because, as the stomach becomes empty, the air becomes hotter from the absence of motion and causes the breath and the excretions of phlegm to putrefy? That the air becomes hotter is [15] proved by the fact that fasting also induces an increase of thirst. When food is taken, the odour ceases because it is less than that of the food; for the heat in the food overcomes the internal heat, so that it cannot undergo any process of change.

[20] 8 · Why has the armpit a more unpleasant odour than any other part of the body? Is it because it is least exposed to the air? Such parts have a particularly unpleasant odour because putrefaction takes place in them owing to the stagnation of fat. Or is it because the armpit is not moved and exercised?

9 · Why is it that those who have a goaty odour are still more unpleasant [25] when they anoint themselves with unguents? Is it because this kind of thing happens in many instances; for example, if something acid and something sweet are mixed, the resulting whole is sweeter? Now any one who perspires has an unpleasant odour, and unguents are productive of heat and therefore induce perspiration.

**10** · Why is it that the odour of the breath of those who are bent and [30] deformed is more unpleasant and oppressive? Is it because the region round the lungs is contracted and bent out of an upright position, so that it does not give a free passage to the air, but the moisture and the breath, which tends to be enclosed within, putrefies?

**11** · Why is it that most unguents are unpleasant when they mingle with [35] perspiration, but others have a sweeter or at any rate not a more unpleasant odour? Do those which change as a result of movement or friction deteriorate in odour, whereas those which do not are improved? There are some such perfumes, just as [909<sup>a</sup>1] there are some flowers from which scents are made, which deteriorate when rubbed or heated or dried, white violets, for example; but others remain the same, for instance roses. The unguents too made from flowers of the former class change, while those made from the latter do not; and so rose-perfume is least liable to [5] change. Also unguents have a more unpleasant odour on those whose perspiration is malodorous, through mingling with their opposite, just as honey when mixed with salt becomes not sweeter but less sweet.

**12** · Why do objects always produce a stronger odour when they are in motion? Is it because they fill up the air? The result is that the odour is thus [10] transmitted more quickly to our perception.

# BOOK XIV

## PROBLEMS CONNECTED WITH THE EFFECT OF LOCALITY ON TEMPERAMENT

1 · Why are those who live under conditions of excessive cold or heat brutish in character and aspect? Is the cause the same in both cases? For the best mixture [15] of conditions benefits the mind as well as the body, but excesses of all kinds cause disturbance, and, as they distort the body, so do they pervert the mental temperament.

2 · Why is it that in Pontus corn, if exposed to the cold, keeps intact for many years? Is it because the extraneous moisture is evaporated together with the heat, as happens in grapes? For some things are evaporated by the cold and others with the [20] heat.

3 · Why do burning fevers occur more frequently in the coldest season? Is it because the cold imprisons the heat within? In the summer the contrary occurs, the interior of the body being cooler than the exterior. Burning fever is the inflammation in which,<sup>1</sup> the exterior of the body being cold, the interior is in a condition of [25] excessive heat.

4 · Why are the Ethiopians and the Egyptians bandy-legged? Is it because the bodies of living creatures become distorted by heat, like logs of wood when they become dry? The condition of their hair too supports this theory; for it is curlier than that of other nations, and curliness is as it were crookedness of the hair. [30]

5 · Why is it that in damp regions copulation is more likely to lead to the birth of female offspring? Is it because a large amount of moisture thickens more slowly, and in damp regions the semen is moister owing to the presence of more moisture in the temperament?

6 · Why is it that in marshy districts sores on the head are quickly cured, but [35] those on the legs only with difficulty? Is it because the

moisture, since it contains an earthy element, is heavy, and heavy things are carried downwards? Thus the upper parts of the body are easily concocted, because the impurities are carried downwards; but the lower parts become full of abundant excretion which easily putrefies.

7 · Why is it that those who live in airy regions grow old slowly, but those [909<sup>b</sup>1] who inhabit hollow and marshy districts age quickly? Is it because old age is a process of putrefaction, and that which is at rest putrefies, but that which is in motion is either quite free from, or at any rate less liable to, putrefaction, as we see in water? In lofty regions, therefore, owing to the free access of the breezes, the air [5] is in motion, but in hollow districts it stagnates. Furthermore, in the former, owing to its movement, the air is always pure and constantly renewed, but in marshy districts it is stagnant.

8 · Why are the inhabitants of warm regions cowardly, and those who dwell in cold districts courageous? Is it because there is a natural tendency which [10] counteracts the effects of locality and season, since if both had the same effect mankind would inevitably be soon destroyed by heat or cold? Now those who are hot by nature are courageous, and those who are cold are cowardly. But the effect of hot regions upon those who dwell in them is that they are cooled, while cold regions [15] engender a natural state of heat in their inhabitants. Both races are large of stature—those who live in cold regions because of the innate heat in them, and those who inhabit hot districts owing to the heat in which they live; for increase of stature occurs both in those who are hot and as a result of heat, whereas cold has a contracting effect. Since then those who live in cold districts have a powerful [20] principle of growth in themselves, and those who live in hot regions encounter no external cold which prevents their growth, both naturally admit of considerable increase in stature. But this is less true of those who live in our latitudes, because the principle of growth in them is less strong, and those who live in cold regions feel the contracting effect of cold.

[25] 9 · Why are those who live in hot regions longer-lived? Is it because their natural condition is drier, and that which is drier is less liable to putrefaction and more lasting, and death is as it were a kind of putrefaction? Or is it because death is due to the chilling of the interior

heat, and everything is chilled by a surrounding [30] medium which is colder than itself? Now in warm regions the surrounding air is hot, but in cold regions it is cold and so more quickly and effectively destroys the interior heat of the body.

**10** · Why are those who live in hot regions longer-lived? Is it because they [35] preserve their heat and moisture better? For death is the corruption of these.

**11** · Why is it that we become drowsier in marshy districts? Is it because there we are more cooled, and cooling, being a kind of rest, induces sleep, and sleep occurs during rest?

[910<sup>a</sup>1] **12** · Why is it that those who live on board ship, though they spend their time on the water, have a healthier colour than those who live in marshes? Is the weather and the free access of the breezes the cause? Now water makes men pale when it putrefies, a process which is due to the absence of movement; that is why those who live in marshy regions are rather pale.

[5] **13** · Why is suffocating heat very frequently experienced in wintry regions, much more so than in warm districts? Is it because of the moisture in the air? For as a result of the same heat applied to it water becomes hotter than air, and therefore damper air<sup>2</sup> becomes hotter than dry air.<sup>3</sup> Or perhaps the air is not really hotter<sup>4</sup> in these regions, but only seems so by contrast with the general coolness, as the sun [10] emerging from a cloud seems hotter in contrast with its effect when it is behind a cloud.

**14** · Why do those who live in southerly climes tend to have black eyes? Is blueness of the eyes due to excess of internal heat, whereas blackness is due to its absence, as Empedocles affirms? Just, therefore, as those who dwell in the north [15] have blue eyes, because the internal heat is prevented from escaping owing to the external cold; so in those who dwell in southerly climes the moisture cannot escape owing to the surrounding heat, but the heat escapes because there is nothing to bar its exit, and the moisture left behind causes blackness; for when light departs

that [20] which is left behind is dark. Or does the pigmentation of the eye assimilate itself to the colour of the rest of the body? If so, the eyes of those who live towards the north are blue, because they are themselves white (for blue is akin to white); and those who dwell in the south being black, their eyes also are black. [25]

**15** · Why are those who live in warm regions wiser than those who dwell in cold districts? Is it for the same reason as that for which the old are wiser than the young? For those who live in cold regions are much hotter, because their nature recoils owing to the coldness of the region in which they live, so that they are very like the drunken and are not of an inquisitive turn of mind, but are courageous and [30] sanguine; but those who live in hot regions are sober because they are cool. Now everywhere those who feel fear make more attempt to inquire into things than do the self-confident, and therefore they discover more. Or is it because the race of those who live in warm regions is more ancient, the inhabitants of the cold regions having perished in the Flood, so that the latter stand in the same relation to the [35] former as do the young to the old?

**16** · Why are the inhabitants of warm regions cowardly, and those who dwell in cold regions courageous? Is it because human beings have a natural tendency which counteracts the effect of locality and season (for, if both had the [910<sup>b</sup>1] same tendency, they would soon be destroyed)? Now those who are hot by nature are courageous and those who are cold are cowardly. The effect of hot regions upon their inhabitants is to cool them (for, their bodies having rarities, the heat escapes out of them), but those who live in a cold climate become heated in their nature, [5] because their flesh is condensed by the external cold, and when it is in this condition the heat collects internally.

# BOOK XV

## PROBLEMS CONNECTED WITH MATHEMATICAL THEORY

1 · Why is it that of all the lines which divide a rectilinear figure into two [10] parts that drawn from angle to angle alone bears the name of diameter? Is it because the diameter, as its name implies, divides the figure of which it is the diameter into two parts without destroying it? The line therefore which divides it at [15] its joints (by which I mean the angles) will be the diameter; for it does not destroy the figure but divides it, like those who divide up implements of war for distribution. But a division which cuts through a composite figure in the lines which form it destroys the figure; for a rectilinear figure is constructed on angles.

2 · Why is the diameter so called? Is it because it is the only line which divides a rectilinear figure into two parts, as though one should call it the [20] ‘dichiameter’?<sup>1</sup> And why<sup>2</sup> is it the only one that bears this name of all the lines which divide a rectilinear figure into two parts? Is it because it is the only line which divides the figure at the points where its limbs bend, whereas all other lines divide it in its sides?

3 · Why do all men, barbarians and Greeks alike, count up to 10 and not up to any other number, saying for example, 2, 3, 4, 5 and then repeating them, [25] one-five, two-five, just as they say eleven, twelve?<sup>3</sup> Or why do they not stop at some point beyond ten and repeat from there? For every number is made up of one, two, &c, combined with a preceding number, and thus a different number is formed; but the counting always proceeds in fixed sets of ten. For it is clearly not the result [30] of chance that all men invariably count in tens; and that which is invariable and universal is not the result of chance, but is in the nature of things. Is it because ten is a perfect number? For it combines every kind of number, odd and even, square and cube, length and surface, prime and composite. Or is it because ten is the original [35] number, since one, two, three, and four together make ten? Or is it because the bodies which move in the heavens are nine in number? Or is it because in ten proportions four cubic numbers result, from which numbers the Pythagoreans declare that

the whole universe is constituted? Or is it because all men have ten fingers and so, as though possessing counters that indicate the numbers proper to [911<sup>a</sup>1] man, they count all other things by this quantity? One race among the Thracians alone of all men count in fours, because their memory, like that of children, cannot extend farther and they do not use a large number of anything.

[5] 4 · ... because the earth is a centre? For the shapes which appear to us are always similar. This does not seem<sup>4</sup> to be so unless one views them from the centre, but they would sometimes appear triangular, sometimes irregular foursided figures, and sometimes take other forms. Now the earth would appear to us to be the centre of the universe, if we could view it from the heavenly bodies.<sup>5</sup> For the earth being spherical, the centre of the universe and of the earth will be the same. But we dwell [10] on the surface of the earth, so that it is not from the centre but at the distance of half the diameter that the heavenly bodies appear to have the shapes that they do appear to have. What reason then is there why the appearance of their shapes should not remain the same when the distance is increased?

5 · Why is it that, although the sun moves with uniform motion, yet the increase and decrease of the shadows is not the same in any equal period of time? Is [15] it because the angles to the objects seen, that is the angles made by the rays of the sun and subtending equal arcs, are equal? Now if these are equal, so also are the angles which the rays when produced<sup>6</sup> make in the triangle formed by the first ray and the object seen and the shadow. If the angles are equal, the line which is farther from the object seen must be greater than that which is less far; for we know that [20] this is so. Let the circumference, therefore, be divided into any number of equal parts, and let the object seen be *H*. When therefore the sun at *A* falling on *H* makes the shadow *HL*<sup>7</sup> the ray must fall on *L*. But when the sun comes to *B*, the ray from *B* will fall within *HL*, and similarly again when the sun comes to *C*; otherwise one [25] straight line will touch another straight line at two points. Since therefore *AB* is equal to *BC*, the angles which subtend them at *D* will also be equal, for they are situated about the centre. But if the angles on this side of *D* are equal, so also are the corresponding angles in the triangle; for they are at the apexes of the first pair of angles. So while the angle is divided into two equal parts, the line *LE* will be greater [30] than the line *EF* within *LH*.<sup>8</sup>



So too with the other angles formed by the rays from the circumference. At the same time it is clear that the shadow must be shortest at midday and that then its increases are least. For the sun is most over our head at midday, and stifling heat occurs both for the reason just mentioned and because [35] there is no wind; for wind is caused when the sun dissipates the air near the earth. If therefore it does so simultaneously in both hemispheres, midnight and midday [911<sup>b</sup>1] would naturally be windless.

6 · Why does the sun penetrating through quadrilaterals form not rectilinear shapes but circles, as for instance when it passes through wicker-work? Is it because the projection of the vision is in the form of a cone, and the base of a cone is a circle, [5] so that the rays of the sun always appear circular on whatever object they fall? For the figure also formed by the sun must be contained by straight lines, if the rays are straight; for when they fall in a straight line on to a straight line, they form a figure contained by straight lines. And this is what happens with the rays; for they fall on [10] the straight line of the wicker-work, at the point where they shine through, and are themselves straight, so that their projection is a straight line. But because the parts of the vision which are cut off towards the extremities of the straight lines are weak, the parts of the figure about the angles are not seen; but what there is of straight line [15] in the cone describes a straight line, while the rest does not, but the sight falls on part of the figure without perceiving it. For there are many things to which the sight penetrates without our seeing them, objects, for instance, which are in darkness. A similar phenomenon is the fact that a quadrilateral figure appears polygonal, and at a greater distance circular. Now since the projection of sight is in the form of a cone, [20] when the figure is removed to a distance the parts of the vision which are cut off towards the angles, because they are weak and few, do not see anything when the distance is increased; but the parts of the vision which fall upon the centre of the [25] figure, being numerous and strong, are more persistent. When, therefore, the figure is near at hand, they can<sup>9</sup> see the parts in the angles; but, when the distance is greater,<sup>10</sup> they cannot do so. For this reason too a curved line removed to a distance appears straight, and the moon on the eighth day seems to be contained by straight [30] lines, if the vision falls upon the line which encloses it and not on its breadth. For when the circumference is near, the sight can discern how much nearer one part of the circumference is than another; but when it is distant, the sight does not perceive it clearly, and it seems to be equally distant; and so it appears to be straight.

[35] 7 · Why, though the moon is spherical, do we see it straight when it is half-full? Is it because our vision and the circumference of the circles which the sun [912<sup>a</sup>1] makes when it falls upon the moon are in the same plane? Whenever this happens, the sun appears as a straight line; for since that which casts its vision on a sphere must see a circle, and the moon is spherical, and the sun looks down upon it, there [5] must be a circle which is caused by the sun. When therefore this is opposite to us, the whole is visible and the moon appears to be full; but when it changes owing to the altered position of the sun, its circumference becomes on a plane with our sight and so it appears straight, and the rest appears circular, because a hemisphere is [10] opposite our vision, and this has the appearance of a semicircle; for the moon is always facing our vision, but when the sun sheds its rays we do not see it. And after the eighth day it begins to fill out from the middle, because the sun as it passes on makes the circle incline more towards us; and the circle being thus presented to view [15] resembles the section of a cone. It assumes a crescent-like appearance when the sun changes its position; for when the circle of the sun reaches the extreme points, which make the moon seem half-full, the circumference of the circle appears; for it is no longer in a straight line with the vision, but passes beyond it. When this happens and the circle passes through the same points, it must necessarily appear to have a [20] crescent shape; for a part of the circle is directly on a plane with the eye (a part of the circle, that is, which was formerly opposite to us), so that part of the brightness is cut off. Then the extremities too remain in the same position, so that the moon must have a crescent shape to a greater or less extent according to the sun's movement; for when the sun changes its position, the circle upon which it looks also [25] turns, remaining on the same points; for it might assume an infinite number of inclinations, since an infinite number of the largest circles can be described through the same points.

8 · Why is it that the sun and moon, which are spherical, have the appearance of being flat? Is it because all things of which the distance is uncertain [30] seem to be equidistant, when they are more or less distant? And so in a single body composed of parts, provided that it is uniform in colour, the parts must necessarily appear equidistant, and the equidistant must appear to be uniform and flat.

9 · Why does the sun make long shadows as it rises and sets, and shorter when it is high in the heavens, and shortest of all at midday? Is it because, as it rises, [35] it will at first make a shadow parallel to the earth and cast it to an infinite distance,<sup>11</sup> and then make a long shadow, which grows ever less because the straight line from the higher point falls within that from the lower point. Let  $AB$  be the gnomon, and  $C$  and  $D$  two positions of the sun. The ray from  $C$ , the line  $CF$ , will fall outside the line  $DE$ ;<sup>12</sup> and the shadow  $BE$  is formed when the sun is higher in the [912<sup>b</sup>1] heavens, and  $BF$  when it is lower, and it will be shortest when<sup>13</sup> the sun is at its highest and over our head.

10 · Why are the shadows thrown by the moon longer than those thrown by the sun, though both are thrown by the same perpendicular object? Is it because the [5] sun is higher than the moon, and so the ray from the higher point must fall within that from the lower point? Let  $AD$  be the gnomon,  $B$  the moon, and  $C$  the sun. The ray from the moon is  $BF$ , so that the shadow will be  $DF$ ; but the ray from the sun is  $CE$ , and its shadow therefore will necessarily be less, viz.  $DE$ . [10]

11 · Why is it that during eclipses of the sun, if one views them through a sieve or a leaf—for example, that of a plane-tree or any other broad-leaved tree—or through the two hands with the fingers interlaced, the rays are crescent-shaped in the direction of the earth? Is it because, just as, when the light shines through an aperture with regular angles, the result is a round figure, namely a cone (the reason [15] being that two cones are formed, one between the sun and the aperture and the other between the aperture and the ground, and their apexes meet), so, when under these conditions part is cut off from the orb in the sky,<sup>14</sup> there will be a crescent on the other side of the aperture from the illuminant, that is, in the direction of the earth (for the rays proceed from that part of the circumference which is a [20] crescent)? Now as it were small<sup>15</sup> apertures are formed between the fingers and in a sieve, and so the phenomenon can be more clearly demonstrated than when the rays pass through wide apertures. Such crescents are not formed by the moon, whether in eclipse or waxing or waning, because the rays from its extremities are not clearcut, but it sheds its light from the middle, and the middle portion of the [25] crescent is but small.

**12** · Why does the parhelion not occur either when the sun is in mid-heaven or above the sun or below it, but only at the side of it? Is it because the parhelion is produced when our visual ray to the sun is refracted, and this stationary condition of [30] the air, on the occasion of which the vision is refracted, cannot occur either near the sun or far away from it? For, if it is near, the sun will dissolve it, whereas, if it is far away, the sight will not be refracted; for, if it is strained to a distance, it is weak when refracted from a small refractor. (So too a halo does not form.) If then a [35] refractor forms opposite the sun and near to it, the sun will dissolve it, whereas if it be far away, the incidence of the sight upon it will be too weak. If, however, it forms at the side of the sun, it is possible for the refractor to be at such a distance that neither does the sun dissolve it nor does the sight ascend weakened<sup>16</sup> by passing under the earth. It does not form below the sun because, being near the earth, it [913<sup>a</sup>1] would be dissolved by the sun; whereas, if it were above the sun when the sun is in mid-heaven, the sight would be distracted. And it cannot form at all even at the side of the sun when it is in mid-heaven, because, if the sight is directed too far under the earth, very little of it will reach the refractor, so that, when it is refracted, it will be very weak.

[5] **13** · Why does the extremity of the shadow caused by the sun seem to tremble? For it is not due to the fact that the sun is travelling along; for it is impossible for it to move in contrary directions, and it is of such motion that trembling consists. (Moreover it is uncertain why a shadow changes its position, as also why the sun itself moves.) Is it due to the movement of the so-called motes in [10] the air? These can be seen in the rays which enter through a window; for they move even when there is no wind. These then being constantly carried from the shadow into the light and from the light into the shadow, the common boundary between the light and the shadow is seen to move similarly. For changing<sup>17</sup> from side to side of it, these motes cause as it were shadow in one place and light in another; so that the [15] shadow appears to move, though it is not really it but the motes which move in this way.<sup>18</sup>

# BOOK XVI

## PROBLEMS CONNECTED WITH INANIMATE THINGS

1 · Why is it that the bases of bubbles in water are white, and if they are [20] placed in the sun they do not make any shadow, but, while the rest of the bubble casts a shadow, the base does not do so but is surrounded on all sides by sunlight? And, what is still more wonderful, even if a piece of wood is placed on the water in the sunlight, the shadow is cut off by the water at that point.<sup>1</sup> Is no shadow really formed? Is the shadow dissolved by the sun? If then a shadow is to be defined as [25] anything which is not visible to the sun, the whole mass of the object all round must be visible to the sun; but the impossibility of this has been demonstrated in the treatises on optics, for even the largest optical system cannot see the whole circumference of the smallest visible object.

2 · Why are bubbles hemispherical? Is it because the radii between the centre and the outer air extend in every direction upwards to the same distance and thus necessarily produce a hemispherical form? The corresponding hemisphere [30] below is cut off by the watery surface in which the central point is situated.

3 · Why is it that in magnitudes of uneven weight,<sup>2</sup> if you set the lighter part of them in motion, the object thrown revolves in a circle, as happens, for example, with loaded dice if you throw them with the unweighted side turned towards you? Is [35] it because the heavier part cannot travel at the same speed as the lighter when hurled with the same force? Now the object must travel as a single whole, but cannot move alike in all its parts; therefore if the parts were moved with equal speed [913<sup>b</sup>1] they would move in the same line, while since one part travels more quickly than the other, the object necessarily revolves as it moves; for it is only in this manner that the parts which are always opposite one another can follow unequal paths in the same time. [5]

4 · Why is it that objects which fall to the earth and rebound describe similar angles to the earth's surface on either side of the point at which they touch the surface? Is it because all things naturally tend to travel at

right angles to the earth? Objects, therefore, which fall upon the ground at right angles, striking the surface perpendicularly and diametrically, when they rebound, form angles of that size, [10] because the diameter divides the angle at the surface into equal parts. But objects which fall obliquely, since they do not strike the ground perpendicularly but at a point above the perpendicular, when they are thrust back by that against which they strike, travel in the opposite direction. This in the case of round objects is due to the [15] fact that, striking against it in their course, they revolve in an opposite direction to that in which they are thrust back, whether their central point is at rest or changes its position. In the case of rectilinear objects it is due to the fact that their perpendicular is thrown backwards after being brought forward;<sup>3</sup> just as happens to those whose legs are sheared away from under them or whose scrotum is pulled [20] downwards, for such persons always fall in a contrary direction and backwards, because their perpendicular is raised above the ground<sup>4</sup> and then thrust forward. For clearly the opposite of perpendicularity will be to fall backwards and downwards, and objects carried downwards would be heavier. That, therefore, which in these persons involves a fall, becomes movement in rebounding objects. [25] Neither round nor rectilinear objects therefore rebound at right angles, because the perpendicular divides the objects in motion into two parts depthways,<sup>5</sup> and there cannot be several perpendiculars to the same plane surface cutting one another, [30] which will happen if a perpendicular is formed at the moment of their impact at the point where the object in motion strikes the plane surface;<sup>6</sup> so that the original perpendicular along<sup>7</sup> which it travelled must necessarily be cut by the new perpendicular. Now since the object will be borne back, but will not be borne back [35] at a right angle, it remains that the angle on either side of the point of impact with the plane surface must be an acute angle; for the right angle forms the division between the opposite angles.

5 · Why is it that a cylinder, when it is set in motion, travels straight and describes straight lines with the circles in which it terminates, whereas a cone revolves in a circle, its apex remaining still, and describes a circle with the circle in [914a1] which it terminates? Both move with a circular motion, but the cylinder describes straight lines on the plane surface, while the cone describes circles because the circles which compose the cone are unequal and the greater circle always moves more quickly than the less about the same centre. Now since all the circles [5] composing the cone move at different rates, it results that the outermost

circles travel over most space and describe the longest line in the same time (hence they must move in a circle); for all the circles are described by the same straight line, and when the straight line revolves the various points on it do not describe an equal line [10] in the same time, but can travel along an equal line only if they proceed in a straight direction. But in the cylinders, since all the circles are equal and about the same centre, the result is that, since they touch the plane surface at all the points on them at the same time, as they roll they travel at a uniform speed (because cylinders are [15] uniform throughout), and reach the plane surface again simultaneously when each has completed its own circuit; thus the straight lines described on the plane surface are also equal, for the circles describe them by contact, since they both are equal and travel at the same speed. Now the lines described by the same line travelling in a straight direction are straight, and so the cylinder would travel straight along [20] them; for it makes no difference whether you drag the cylinder over the plane surface at the line where it first<sup>8</sup> touched the plane surface, or whether you roll it over it; for the result will always be that an equal and similar line made up of points on the cylinder will touch the plane surface, both when the cylinder is dragged and when it is rolled along.

[25] **6** · Why is it that if a scroll is cut level and straight, then if you cut it parallel to the base, the edge becomes straight when unrolled, but if it is cut obliquely, the edge becomes crooked? Is it due to the fact that, since the circles in the first section are in the same plane, the result is that the oblique section is not parallel but is [30] partly more and partly less distant from the first section, so that, when the roll is unfolded, the circles, which are in the same plane and have their origin in the same plane, assume, when unrolled, the line which they themselves form? For the resulting line is formed from the circles which are in the same plane, so that the line, being on a plane, is also straight. But the line of the oblique section when it is [35] unrolled, not being parallel to the first section, but partly more and partly less distant from it (this being the position of the section relative to it), will not be on a plane and therefore not straight either; for part of a straight line cannot be in one plane and part in another.

**7** · Why is it that magnitudes always appear less when divided up than when [914<sup>b1</sup>] taken as a whole? Is it because, though things which are divided always possess number, in size they are smaller than that

which is single and undivided? For that which is great is said to be great owing to its continuity and because it is of a certain size, but the number of its parts is always greater than the number of any undivided [5] magnitude. So it is only natural that the whole should appear greater than the parts into which it is divided; for, though the whole and its parts are identical, the whole, being continuous, possesses more of the quality of magnitude, while the parts have more of the quality of number.

8 · Of the phenomena which occur in the water-clock the cause seems to be in general that ascribed by Anaxagoras; for the air which is cut off within it is the [10] cause of the water not entering when the tube has been closed. The air, however, by itself is not the cause; for if one plunges the water-clock obliquely into the water, having first blocked up the tube, the water will enter. So Anaxagoras does not adequately explain how the air is the cause; though, as has been said, it certainly is [15] the cause. Now air, whether impelled along or travelling of itself without any compelling force, naturally travels in a straight line like the other elements. When therefore the water-clock is plunged obliquely into the water, the air preserving its straight course is driven out by the water through the holes opposite to those which [20] are in the water, and, as it goes out, the water flows in. But if the water-clock is plunged upright into the water, the air not being able to pass straight up, because the upper parts are closed, remains round the first holes; for it cannot contract into itself.<sup>9</sup> The fact that the air can keep out the water by its immobility can be [25] illustrated by what happens with the water-clock itself. For if you fill the bulb itself of the water-clock with water, having stopped up the tube, and invert it with the tube downwards, the water does not flow along the tube to the outlet. And when the outlet is opened, it does not immediately flow out along the tube but only after a moment's interval, since it is not already at the outlet of the tube but passes along it [30] afterwards, when it is opened. But when the water-clock is full and in an upright position, the water passes through the strainer as soon as ever the tube is opened, because it is in contact with the strainer, whereas it is not in contact with the extremities of the tube. The water does not, therefore, flow into the water-clock, for [35] the reason already mentioned, but flows out when the tube is opened because the air in it being set in motion up and down causes considerable movement<sup>10</sup> in the water inside the water-clock. The water then, being thrust downwards and having itself also a tendency in that direction, naturally flows out, forcing its way through the air [915a1] outside the water-clock, which is set in motion



and is equal in force to the air which impels it but weaker than it in its power of resistance, because the interior air, since it passes through the tube, which is narrow, flows more quickly and violently and forces the water on. The reason why the water does not flow when the tube is closed [5] is that the water on entering into the water-clock drives the air forcibly out of it. (That this is so is shown by the breath and noise engendered in it.) As the water enters, driving the air forcibly along, it rushes into the tube itself, and<sup>11</sup> like wedges of wood or bronze driven in by cleavage, remains in position without anything else to [10] hold it together, until it is expelled from the opposite direction, as pegs which are broken in wood are knocked out. This occurs when the tube is opened for the reasons already mentioned. If this is the reason, it is only natural that it should not flow out or make its way forth, since the air forcibly prevents it and becomes inflated.<sup>12</sup> (The [15] noise which is made shows that the water is drawn up by the air, and this is a common phenomenon.) All the water then, being drawn up and being in itself continuous, remains in the same position under the pressure of the air, until it is thrust away again by it; and, since the first part of the water remains in the same position, the rest of the water is dependent from it in one continuous mass. It is only [20] natural that this should be so; for it is the property of the same thing to move something from its own place and to hold it when it has moved it,<sup>13</sup> and to do so for a longer time, if that which holds and that which is held are of equal force, or if that which holds is stronger, as occurs in the present case; for air has greater force than water.

[25] **9** · Why is it that the parts of plants and of animals which are not instrumental are all round—in plants, for instance, the stem and the shoots, and in animals the calves, thighs, arms, and chest—and no whole or part is triangular or polygonal? Is it due, as Archytas used to say, to the fact that in natural movement [30] the proportion of equality is always present (for he holds that all things move in a proportion), and that this is the only proportion which can return to itself, and so it forms circles and rotundities wherever it occurs?

**10** · Why do extremities always take rounded forms? Is it because nature makes everything as excellent and as beautiful as the available material permits, [35] and a rounded form is the most beautiful, being as uniform as possible?

11 · Why does a circular object when it is thrown at first describe a straight line, but, as it ceases to move, describe a spiral, until it falls? Does it describe a straight line at first, because the air on either side of it alike keeps it upright? The [915<sup>b</sup>1] inclination then to either side being equal, the line also which it describes must be of such a nature that it divides the space on either side of it equally, and such a line is a straight line. But when it inclines to one side, because the air on either side of it is not even, it no longer describes an equal line with its inner and with its outer edge, but is forced to describe a circular line. [5]

12 · Why is it that in magnitudes of uneven weight,<sup>14</sup> if you set the lighter part of them in motion, the object thrown revolves in a circle, as happens for example with loaded dice if you throw them with the unweighted side towards you? Is it because the heavier part cannot travel at the same speed as the lighter when [10] hurled with the same force? Now since it must necessarily move, but cannot do so in the same manner, that is in a straight line, it must take an inward direction and revolve; just as, if part of the object had as a whole remained motionless owing to a weight in the centre, the part next to the person setting the object in motion would have moved so as to occupy the position of the part away from him, while the farther side would have moved towards him. But when the whole object moves and, as it [15] travels, has a weight in the middle, it must necessarily behave in the same manner.

13 · Why is it that objects which are travelling along, when they come into collision with anything, rebound in a direction opposite to that in which they are naturally travelling, and at similar angles? Is it because they move not only with the impetus which accords with their own nature but also with that which is due to the [20] agent which throws them? Their own impetus then ceases when they reach their own proper position (for everything comes to rest when it reaches the position to which it is naturally carried), but, owing to the extraneous impetus, it is forced to continue to move, not, however, in a forward direction, because it is prevented from doing so, but either sideways or in a direct line. Now every object rebounds at [25] similar angles, because it is travelling to the point to which it is carried by the impetus which was imparted by the person who threw it; and at that point it must be travelling at an acute angle or at a right angle. Since then the repelling object stops the

movement in a straight line, it stops alike the moving object and its impetus. As [30] then in a mirror the image appears at the end of the line along which the sight travels, so the opposite occurs in moving objects, for they are repelled at an angle of the same magnitude as the angle at the apex (for it must be observed that both the angle and the impetus are changed), and in these circumstances it is clear that moving objects must rebound at similar angles. [35]

# BOOK XVII

## PROBLEMS CONNECTED WITH ANIMATE THINGS

1 · Why do those who are unsymmetrical appear larger when set side by side with other men than by themselves? Is it because that which is symmetrical is one, and symmetry more than anything else gives unity to a thing, and that which is one [916<sup>a</sup>1] tends to be indivisible, and the indivisible is smaller, whereas asymmetry by causing diversity creates a multiplicity? When things therefore are seen by themselves, their dimensions are less likely to be noticed; but this is not so when they are seen side by [5] side with one another. That then which is indivisible appears to be one, and the impression which it makes on the beholder is one because of its symmetry. But that which is unsymmetrical makes a greater impression, as though it were many, and appears greater because, though in reality only one, it seems to be many; for it partakes of the nature of magnitude, because it is continuous, and of number, [10] because of the inequality of its parts; and so being increased in both these respects, it naturally appears great by the side of that which is simple and one.

2 · Why do animals and plants grow more in length than otherwise? Is it because length increases three times over, width twice, and depth once? For length [15] is the first and original dimension, and so it increases both of itself, and secondly in combination with width, and thirdly in combination with depth. But width implies an increase in two dimensions only, in itself and at the same time in depth.<sup>1</sup>

In what sense must we understand the terms 'prior' and 'posterior'? As those who lived in the time of Troy are prior to us, so are those who lived before them prior [20] to them and so on *ad infinitum*? Or since there is a beginning and a middle and an end of the universe, and when a man, as he becomes old, reaches the limit and turns again towards the beginning, that which is nearer to the beginning is earlier, what prevents our being nearer to the beginning than to the end, in which case we should [25] be prior? Just as the course<sup>2</sup> of the firmament and of each of the stars is a circle, why should not also the coming into being and the decay of perishable things be of such a kind that these things again come into being and decay? This agrees with the saying that 'human life is a

circle'. To demand that those who are coming into being [30] should always be numerically identical is foolish, but one would more readily accept that they were identical in kind. And so we should ourselves be prior, and one might suppose the arrangement of the series to be such that it returns back in a circle to the point from which it began and thus secures continuity and identity of composition. For Alcmaeon declares that men perish because they cannot link [35] together the beginning to the end—a clever saying, if one supposes that he uses it metaphorically and the literal meaning is not insisted upon. If then human life is a circle, and a circle has neither beginning nor end, we should not be prior to those who lived in the time of Troy nor they prior to us by being nearer to the beginning.

# BOOK XVIII

## PROBLEMS CONNECTED WITH LITERARY STUDY

1 · Why is it that some people, if they begin to read, are overcome by sleep [916<sup>b</sup>1] even against their will, whereas others wishing to be overcome by sleep are kept awake by taking up a book? Is it because in those in whom movements of breath take place owing to the coldness of their nature or of melancholic humours, which [5] by their coldness engender an unconcocted excretion of breath—in such people, the intelligence, when it is set in motion and does not think of anything with concentrated attention, is checked by the second movement, which has a cooling effect, and this causes a tendency to sleep? But when they fix the intelligence firmly upon something, as happens in reading, they are impelled by the heating movement, [10] which is unchecked by anything, and so they cannot go to sleep. In those who are in a natural condition, however, when the intelligence, which is very powerful, stands at a single point and does not keep changing from one subject to another, every function in that region (whose inactivity involves sleep) is at a standstill;<sup>1</sup> and when the intelligence stands still and is as it were weary, being situated in the head, it [15] weighs it down and produces sleep. But as long as the mind moves naturally, it does not go to sleep; for it is then that it is most alive, and wakefulness rather than sleeping is the cause of life.

2 · Why are contentious disputations useful as a mental exercise? Is it because they involve frequent victories and defeats? They therefore quickly instil a [20] spirit of rivalry; for, when men are victorious, they are induced by their joy to contend yet more, and, when they are defeated, they continue the struggle in hopes of turning defeat into victory. Those engaged in struggles of other kinds act in the same way, and so when fighting and getting the worst of it often refuse to come to terms.

3 · Why is it that in rhetorical displays men prefer examples and stories [25] rather than enthymemes? Is it because they like to learn and

to learn quickly, and this end is achieved more easily by examples and stories, since these are familiar to them and are of the nature of particulars, whereas enthymemes are proofs based on generalities, with which we are less familiar than with the particular? Further, we [30] attach more credence to any evidence which is supported by several witnesses, and examples and stories resemble evidence, and proofs supported by witnesses are easily obtained. Further, men like to hear of similarities, and examples and stories display similarities.

4 · Why do we talk of an orator, or a general, or a business man as being [35] clever, but not use the term of a musician or of an actor? Is it because the powers of the two last are exercised apart from any desire of gaining an advantage (for their aim is pleasure), whereas the three first aim at some advantage? For a good orator [917<sup>a</sup>1] or general or business man is one who can gain some advantage, and cleverness consists mainly in getting the better of some one else.

5 · Why is the philosopher generally regarded as superior to the orator? Is it because the philosopher treats of the nature of injustice, while the orator says that such and such a person is unjust, and the orator states that such and such a person is [5] a tyrant, while the philosopher discusses the nature of tyranny?

6 · Why is it that some men spend their time in pursuits which they have chosen, though these are sometimes mean, rather than in more honourable professions? Why, for example, should a man who chooses to be a conjurer or an actor or a piper prefer these callings to that of an astronomer or an orator? Is it [10] because some men would prefer to undertake the more honourable professions but do not do so because they do not feel confident that they would succeed in them? Or is it because each man chooses the calling in which he thinks he can excel and devotes himself to that which he chooses, giving up the greater part of each day to it, in order that he may improve his own proficiency in it? Now when men have chosen [15] a calling from the first and have become accustomed to it, they lose the power of discriminating between the higher and the lower; for their mind is warped by their bad choice.

7 · Why is it that some persons, if they begin to read, are overcome by sleep even against their will, whereas those who wish to go to sleep are made unable to do [20] so if they take up a book?<sup>2</sup> Is it because in those in whom movements of breath take place owing to the coldness of their nature or of melancholic humours, which by their coldness engender an unconcocted excretion of breath—in these when the intelligence is set in motion and does not think of anything with concentrated attention, the intelligence is checked by the second movement,<sup>3</sup> and so they undergo [25] a great mental change and go to sleep (for the movement of breath is overcome)? But when they fix their intelligence on something, as happens in reading, they are impelled by the movement of breath unchecked by anything, and so cannot sleep. But in those who are in a natural condition, when the intelligence is fixed on one [30] thing and does not keep changing from one subject to another, every function in that region (the inactivity of which involves sleep) is at a standstill. (Similarly during a rout, if the leader halts, all the forces under his command halt also.) For naturally that which is light rises, while the heavy sinks. As long, therefore, as the mind moves naturally, it does not go to sleep; for it is then that it is most alive.<sup>4</sup> When the mind [35] stands still and is as it were weary, the intellect undergoes a change, and the corporeal elements rise to the head and produce sleep. Reading might be expected to prevent sleep; but wakefulness is not due to the fact that we are thinking (for then our mind is most concentrated) but to the constant change; for the intellectual activities which cause wakefulness are those in which the mind searches and finds [917<sup>b</sup>1] difficulties rather than those in which it pursues continual contemplation; for the former cause lack of concentration, while the latter do not.

8 · Why is it that in contentious disputes no verbosity can ever occur? Is it because such reasoning is apparent deduction, and deduction involves only a brief [5] discussion; and, if it be prolonged, after a time the false reasoning is detected and the disputant can withdraw the premisses which he has granted?

9 · Why do we feel more pleasure in listening to narratives in which the attention is concentrated on a single point than in hearing those which are concerned with many subjects? Is it because we pay more attention to and feel more [10] pleasure in listening to things which are



more easily comprehended, and that which is definite is more easily comprehended than that which is indefinite? Now a single thing is definite, but a plurality partakes of the nature of the infinite.

10 · Why do we like to hear of events which are neither very old nor quite new? Is it because we discredit events which occurred long before our time and take no pleasure in events which we discredit, while we can still as it were perceive very [15] recent events and so take no pleasure in hearing about them?

# BOOK XIX

## PROBLEMS CONNECTED WITH MUSIC

1 · Why do those who are grieving and those who are enjoying themselves alike have the flute played to them? Is it in order that the distress of the former may be lessened and the pleasure of the latter increased? [20]

2 · Why is it that, when the same person uses the same vocal power, the sound travels farther when he is singing or shouting with others than when he does so by himself? Is it because the doing of anything with a number of other people—compressing, for instance, or pushing something—does not produce an effect in simple proportion to the number of persons; but, just as a line two feet long describes a circle which is not double but quadruple that described by a line a foot long, so collective actions have greater force in proportion to their number than [25] when they are carried out separately? When, therefore, a number of persons sing together, the force of their voice unites, and impels the air simultaneously, so that it travels many times as far; for the voice produced by all is the multiple of each single voice.

[30] 3 · Why does the voice waver most when singing *parhypate* and to no less a degree than when singing *nete* and the higher notes, although the interval is greater? Is it because the interval is more difficult to sing and is in primary element? Now the difficulty is due to the straining and pressure of the voice; and these require an effort, and things which require an effort are more likely to fail.

[35] 4 · But why is *parhypate* difficult to sing, but *hypate* easy, although there is only a quarter-tone between them? Is it because *hypate* is accompanied by relaxation of the voice and also because after tension it is easy to slacken?<sup>1</sup> It is probably for the same reason that what a man says with violence,<sup>2</sup> he says with this note or *paranete*. For one must... with a consciousness of the character which one [918<sup>a</sup>1] is representing

and under conditions most akin to it according to one's purpose. But what is the cause of concordant music?<sup>3</sup>

5 · Why do men take greater pleasure in listening to those who are singing such music as they already know than music which they do not know? Is it because, [5] when they recognize what is being sung, it is more obvious that the singer is as it were achieving his aims, and this is pleasant to contemplate? Or is it because it is less<sup>4</sup> pleasant to learn? And the reason for this is that in the one case there is acquisition of knowledge, in the other the use and recognition of it. Further, that which is familiar is always pleasanter than the unfamiliar.

[10] 6 · Why does recitation with a musical accompaniment have a tragic effect when introduced into singing? Is it owing to the resulting contrast? For the contrast gives an expression of feeling and implies extremity of calamity or grief, whereas uniformity is less mournful.

7 · Why did the ancients, when they gave the scale seven notes, leave in [15] *hypate* and not *nete*? Is this a false statement, since they left in both and omitted *trite*, or is the truer answer that the lower note contains the sound of the higher note,<sup>5</sup> so that *hypate* gives the impression of the octave above better than *nete* for the high note is a sign of more force, while the low note is easier to utter?

8 · Why does the low note contain<sup>6</sup> the sound of the high note? Is it because [20] the low note is greater and resembles an obtuse angle, while the high note resembles an acute angle?

9 · Why do we listen with greater pleasure to a solo when a man sings it to the accompaniment of a flute or lyre? Yet the same tune is sung note for note with or without accompaniment. For if there is more of the same thing, it ought to be still more pleasant when accompanied by a large number of flute-players. Is it because [25] the singer is more obviously achieving his aim when he is accompanied by a flute or lyre? And the accompaniment of a number of flute-players or lyres does not add to the pleasure, because it drowns the singing.

10 · Why, if the human voice is more pleasant than an instrument, is the voice of a man singing without words—as, for example, when singing nonny-noes—not [30] so pleasant as a flute or lyre? Or is it true that even in the case of an instrument we get less pleasure if it is not expressive of meaning? The instrument, however, has an advantage even in its actual effect; for while the human voice is pleasanter, instruments strike the note better than the human mouth, which is why they are pleasanter to hear than nonny-noes.

11 · Why is the voice higher when it echoes back? Is it because it is smaller, [35] having become weaker?

12 · Why does the lower of two strings sounded together always give the tune? For if one omits *paranete*, when one should sound it with *mese*, the tune is given none the less; but if one omits *mese*, when one should sound both, the tune is lost.<sup>7</sup> Is it because the low note is large and therefore strong, and the less is contained in the greater? So too if *hypate* is stopped down in the centre, two *netes* [918<sup>b</sup>1] are produced.

13 · Why is it that the low note in the octave gives the effect of unison with the high, but not vice versa? Is it because, if possible, the sound of both notes is in both notes, but, failing that, in the low note, since it is greater? [5]

14 · Why does the accord in the octave escape notice, and why does there appear to be a simple unison, as for example in the Phoenician lyre and in the human voice? For the upper and lower notes do not give the same sound but are analogous to one another at the octave. Is it because their sound appears to be [10] practically the same because analogy is equality in sounds, and equality is of the one? The same deception occurs also in the pipes.

15 · Why were ‘nomes’ not composed in antistrophes like all other songs, that is, choric songs? Is it because the ‘nomes’ were assigned to virtuosos, and as these were already able to imitate different characters and sustain their parts, the songs [15] composed for them became long

and elaborate? Like the words, therefore, the music conformed to the imitation, becoming constantly different; for it was more essential for the music to be imitative than the words. (For this reason too dithyrambs, since they have become imitative, no longer have antistrophes, as they had formerly.) The reason is that in old days free citizens themselves formed the [20] choruses; it was difficult, therefore, for a large number to sing together like virtuosi, so they sang enharmonic songs. For it is easier for a single person to make many changes than for a large chorus, and for a professional than for those who are preserving the character of the music. And so they made the music more simple for [25] them. Now the antistrophic song is simple; for there is one rhythm<sup>8</sup> and one unit of metre. For the same reason songs executed from the stage are not antistrophic, but those sung by the chorus are so; for the actor is a virtuoso and an imitator, but the chorus is less imitative.

[30] **16** · Why is antiphonal accompaniment more pleasing than symphonic accompaniment? Is it because in the former the consonance is more obvious than when the accompaniment of the singing is symphonic? For of the two notes played by the instrument one must be in unison with the note sung, and so two notes contending against one drown the other note.

**17** · Why is it that singing in fifths does not give the effect of antiphony? Is [35] it because the symphonic notes are not the same as are the notes which are an octave apart? For in the octave the deep note in the lower part of the scale is analogous to the high note in the upper part; it is, therefore, as it were at once the same and different. But this does not occur in fifths and fourths so that the sound of the antiphonal note does not appear, for it is not identical.

**18** · Why is it that the accord in the octave alone is used in singing? For in [919<sup>a</sup>1] ‘magadizing’, this and no other accord is used. Is it because it alone is made up of antiphonal notes, and with antiphonal notes, if but one be sung, the same effect is produced as if both were sung? For the one note in a way contains the sounds of both, so that, when one is sung, the concordant note at this interval is also sung; and [5] when they sing both, or when one note is sung and the other played on the flute, they both as it were sing one note. Therefore the accord in

the octave alone is sung, because the antiphonal notes have the sound of one note.

19 · But why does the power of producing the effect of a single note belong [10] only to antiphonal notes? Is it because they alone are equidistant from *mese*? The presence then of this mean creates a certain similarity in their sounds, and the ear seems to tell us that it is the same note and that they are both extremes.

20 · Why is it that, if after tuning the other strings, one alters *mese* and uses the instrument, the ear is offended and an unmusical effect is produced not only [15] when *mese* is used, but in the rest of the piece as well, whereas, if *lichanos* or any other string is altered, it only seems to make a difference when that particular string is used? Surely this is only natural; for in all good music *mese* occurs frequently, and all good composers have frequent recourse to *mese*, and, if they leave it, they [20] soon return to it, as they do to no other note. Similarly in language, if certain connecting particles are removed, such as *τε* and *καί*, the language is no longer Greek; whereas the omission of some particles does not offend the ear, because certain particles must be frequently used, if there is to be language, but others not. [25] So *mese* is as it were a connective among sounds, and particularly in good music, because its sound occurs more often.

21 · Why is it that of singers those who are singing low notes are more conspicuous if they sing out of tune than those who are singing high? So too those [30] who make mistakes in time in the lower notes<sup>9</sup> are more conspicuous. Is it because the period of time occupied by the low note is longer, and this longer period is more perceptible (for,<sup>10</sup> lasting for a greater time, it creates a deeper sense-impression), whereas a quick,<sup>11</sup> high note escapes notice owing to its swiftness? [35]

22 · Why does a large choir keep better time than a small one? Is it because they look more to one man, their leader, and begin more slowly and so more easily achieve unity? For mistakes occur more frequently in quick singing.

23 · Why is *nete* double *hypate*? Is it because in the first place, when half [919<sup>b</sup>1] the string is struck and when the whole string is struck an accord in the octave is produced? So too with wind instruments, the sound produced through the middle hole and that produced through the whole flute give an accord in the octave. Again, [5] in the flutes an accord in the octave is obtained by doubling the length, and this is how flute-makers produce it. Similarly they obtain a fifth by means of a length in the ratio of 3 to 2.<sup>12</sup> Again, those who construct Pan-pipes stuff wax into the extreme end of the *hypate-reed*, but fill up the *nete-reed* to the middle. Similarly [10] they obtain a fifth by means of a length in the ratio of 3 to 2, and a fourth by means of a length in the ratio of 4 to 3. Further, *hypate* and *nete* on triangular stringed instruments, when they are equally stretched, give an accord in the octave when one is double the other in length.

24 · Why, if one strikes *nete* and then stops it down, does *hypate* alone seem [15] to resound? Is it because the vibration produced from *hypate* is very much of the same nature as the sound of *nete*, because it is in accord with it? When it is increased by the addition of its like, it alone is audible, the other sounds being imperceptible owing to their smallness.

25 · Why is *mese* so called in the scale, though there is no middle of eight [20] notes? Is it because in the old days scales had seven notes, and seven has a middle?

26 · Why do most men sing high when they sing out of tune? Is it because it is easier to sing high than low? Or is it because singing high is worse than singing [25] low, and a mistake is doing what is worse?

27 · Why is it that of all things which are perceived by the senses that which is heard alone possesses character? For music, even if it is unaccompanied by words, yet has character; whereas a colour and an odour and a savour have not. Is it because that which is heard alone has movement, not, however,<sup>13</sup> the movement in us to which the sound gives rise (for such movement exists also in the other things [30] which affect our senses, for colour also moves our sight), but we perceive the movement which follows such and such a sound? This movement

resembles character both in the rhythms and in the melodic disposition of the high and low notes, but not in their commingling; for symphony does possess character. This does [35] not occur in the other objects of sense-perception. Now these movements are connected with action, and actions are indicative of character.

**28** · Why are the ‘nomes’ which are sung so called? Is it because before men knew the art of writing they used to sing their laws in order not to forget them, as [920<sup>a</sup>1] they are still accustomed to do among the Agathyrsi? They, therefore, called the earliest of their subsequent songs by the name as their earliest songs.

**29** · Why do rhythms and tunes, which after all are only voice, resemble characters, whereas savours do not, nor yet colours and odours? Is it because they [5] are movements, as actions also are? Now activity possesses and instils character, but savours and colours have no similar effect.

**30** · Why is neither the Hypodorian nor the Hypophrygian mode suitable for use by the chorus in tragedy? Is it because they do not admit of antistrophic [10] melody? They are used, however, from the stage, because they are imitative.<sup>14</sup>

**31** · Why were Phrynichus and his contemporaries primarily musicians? Is it because in those days the lyrical portions of tragedies were many times longer than the purely metrical?

**32** · Why is the diapason so called and not named after the number of notes [15] an octave, like the fourth and the fifth? Is it because the notes were originally seven in number, and then Terpander took away *trite* and added *nete*, and in his time it was called diapason and not octave, since there were seven?

**33** · Why is it more satisfactory to pass from a high to a low note than from a [20] low to a high note? Is it because the former amounts to beginning at the beginning, for the *mese*, or leader,<sup>15</sup> is the highest note in



the tetrachord? But in passing from a low to a high note one begins not at the beginning but at the end. Or is it because a low note is nobler and more euphonious after a high note?

**34** · Why are a double fifth and a double fourth not concordant, whereas a double octave is? Is it because neither a double fifth nor a double fourth is . . .<sup>16</sup> [25] though a fourth and a fifth are so?

**35** · Why is the accord in the octave the most beautiful of all? Is it because its ratios are contained within integral terms, while those of the others are not so contained? For since *nete* is double *hypate*, as *nete* is two, so *hypate* is one; and as [30] *hypate* is two, *nete* is four; and so on. But *nete* is to *mese* in ratio of 3 to 2 (for a fifth is in this ratio), and that which is in the ratio of 3 to 2<sup>17</sup> is not contained within integral terms; for as the lesser number is one, so the greater number is one with the addition of a half, so that it is no longer a comparison of whole numbers, but parts are left over. The like happens also with the fourth; for the ratio of 4 to 3 gives the [35] lesser<sup>18</sup> plus a third of it. Or is it because the accord which is made up of both the other two is the most perfect, and because it is the measure of the melody?

. . .<sup>19</sup> in any body which is displaced the movement is most violent in the middle and gentler at the beginning and end, and when the movement is most violent the [920<sup>b</sup>1] sound of that which is displaced is shriller? For this reason also strings which are tightly stretched give a shriller note, for their movement is quicker. Now if a sound is the displacement of air or of something else, a sound which is in the middle of its [5] course must be shrillest. If this were not so, there would be no displacement of anything.

**36** · Why is it that if *mese* is altered, the sound of the other strings also is spoilt,<sup>20</sup> but if on the other hand *mese* is left alone and one of the other strings altered, the note which is altered alone is spoilt?<sup>21</sup> Is it because for all strings being in tune means standing in a certain relation to *mese*,<sup>22</sup> and the arrangement of each [10] is already determined by *mese*? If, therefore, that which is the cause of their being in tune and which holds them together is taken away, their proper relationship appears to be no longer maintained. But if one string is out of tune but *mese* is not altered, naturally the defect lies in that string only;<sup>23</sup> for all

the others are in tune. [15]

**37** · Why is it that, though height in a voice is in accordance with smallness and lowness in accordance with largeness (for a low note is slow owing to its largeness, and a high note quick owing to its smallness), yet more effort is required to sing a high than a low note, and few can sing the top notes, and the ‘Orthian [20] songs’ and high music are hard to sing owing to the strain which they involve? Yet it requires less effort to set in motion that which is small than that which is large, and this ought to be true also of the air. Is it because the possession of a naturally high voice and the singing of high notes are not the same thing, but naturally high voices are always due to weakness because of the inability to set more than a little air in [25] motion, and the little air thus set in motion is carried quickly along? But height of note in singing is a sign of strength; for that which is carried violently along is carried swiftly—so that height of note in singing is a sign of strength. Hence persons in robust health<sup>24</sup> can sing high. And it requires an effort to sing the high notes, but the low notes are easier.<sup>25</sup>

**38** · Why do all men delight in rhythm and melody and concords in general? [30] Is it because we naturally rejoice in natural movements? This is shown by the fact that children rejoice in them as soon as they are born. Now we delight in the various types of melody because of habit; and we delight in rhythm because it contains a familiar and ordered number and moves us in a regular manner; for ordered [35] movement is naturally more akin to us than disordered, and is therefore more in accordance with nature. This is shown by the fact that by working and eating and drinking in an ordered manner we preserve and improve our nature and strength, whereas if we do these things irregularly we destroy and derange our nature; for [921<sup>a</sup>1] diseases are disturbances of the natural order<sup>26</sup> of the body. And we delight in concord because it is the mingling of contraries which stand in proportion to one another. Proportion, then, is order, which, as we have said, is naturally pleasant. Now that which is mingled is always more pleasant than that which is unmingled, [5] especially if, being perceived by the senses, it contains equally the force of both extremes; and in a concord the proportion has this characteristic.<sup>27</sup>

39 · Why is ‘antiphony’<sup>28</sup> more pleasant than ‘homophony’? Is it because ‘antiphony’ is concord in the octave? For ‘antiphony’ is produced by young boys and [10] men whose voices are separated in pitch as *nete* is from *hypate*. Now any concord is more pleasing than a simple note for the reasons already stated, and of concords that in the octave is the most pleasing; whereas ‘homophony’ produces only a simple sound. ‘Magadizing’ is in the concord of the octave, because, just as in verses the [15] feet stand to one another in the proportion of equal to equal, or two to one, or some other proportion, so too the sounds in a concord stand in a proportion of movement to one another. In the other concords the termination of one of the two notes is incomplete since it coincides with the end of only a half of the other; and so they are not equal in force, and being unequal they make a different impression on the sense-perception, as happens in a chorus when at the conclusion they are singing [20] louder than others. Furthermore, *hypate* happens to have the same conclusions to the periods in its sounds; for the second stroke which *nete* makes upon the air is *hypate*. As, then, these notes, though they do not do the same thing, terminate together, the result is that they carry out one common task, like those who are playing a stringed accompaniment to a song; for these, though they do not play the [25] same other notes as the singer, yet, if they finish on the same note, give more pleasure by their conclusion than they give pain by the differences which occur earlier in the piece, because after diversity the unity due to the accord in the octave is very pleasing.<sup>29</sup> Now ‘magadizing’ is made up of contrary notes, and for this [30] reason it is carried out in the octave.

40 · Why do men take greater pleasure in listening to those who are singing tunes which they already know than if they do not know them? Is it because it is more obvious that the singer is as it were achieving his aim when they recognize what is being sung, and when they recognize it the contemplation of it is pleasant? [35] Or is it because the listener is in sympathy with one who sings what he himself knows? For he sings with him; and every one enjoys singing when he is under no compulsion to sing.

41 · Why are a double fifth and a double fourth not concordant, whereas a [921b1] double octave is? Is it because a fifth is in the ratio of 3 to 2, and a fourth in that of 4 to 3? Now in a series of three numbers<sup>30</sup>

in a ratio of 3 to 2 or 4 to 3, the two extreme numbers will have no ratio to one another; for neither will they be in a superparticular ratio nor will one be a multiple of the other. But, since the octave is in a ratio of 2 [5] to 1, if it be doubled the extreme numbers would be in a fourfold ratio. So, since a concord is a compound of sounds which are in a ratio<sup>31</sup> to one another, and sounds which are at an interval of two octaves from one another are in a ratio to one another [10] (while double fourths and double fifths are not), the sounds constituting the double octave would give a concord (while the others would not) for the reasons given above.

42 · Why is it that, if one strikes *nete* and then stops it down, *hypate* seems to respond? Is it because *nete*, as it ceases and dies down, becomes *hypate*? (This is [15] indicated by the fact that it is possible to sing *nete* from *hypate*; for the similarity can be taken from *hypate* as being a response to *nete*?<sup>32</sup>) And since an echo is a response to a note,<sup>33</sup> and when *nete* ceases a sound is set in motion<sup>34</sup> which is the same as the note of *hypate*, it is only natural owing to the similarity that *nete* should [20] seem to set *hypate* in motion. For we know that *nete* is not<sup>35</sup> in motion, because it is stopped down, and seeing that *hypate* itself is not stopped down and hearing its note we think that it is *hypate* which is giving forth a sound. (This kind of thing is quite [25] common, where we cannot grasp the exact truth either by reasoning or by the senses.) Again, it would be nothing extraordinary if, after *nete* is struck when it is very tightly stretched, the bridge were set in motion; and it would not be strange if, when the bridge moved, all the strings were set in motion with it and made a sound. [30] Now the sound of *nete* is alien to the other notes both in its end and in its beginning, but is the same as *hypate* in its end. This having been added to the movement of *hypate* itself, it would not be strange that the sound should seem to be entirely that of *hypate*; and it will be louder than the combined sound of the other notes, because the latter, being as it were impelled by *nete*, give only a soft sound, whereas *nete*, [35] being the most violent of notes, sounds with its full force; and so naturally its second sound would be louder than that of the others, especially if only a slight movement has taken place in them.<sup>36</sup>

[922<sup>a</sup>1] 43 · Why do we listen<sup>37</sup> with greater pleasure to a solo sung to a flute than to one sung to a lyre?<sup>38</sup> Is it because anything becomes still more pleasant when mingled with what is more pleasant?<sup>39</sup> Now the flute is more pleasant than the lyre, so that singing would be more pleasant

when it mingles with the flute than with the lyre. Further,<sup>40</sup> that which is mingled is more pleasant than that which is [5] unmingled, if there is a simultaneous perception of both the elements. For wine is pleasanter than honey-wine, because natural mixtures are more thoroughly mingled than those which we make ourselves. For there is also wine which is mingled of bitter and sweet savours, as is shown by the so-called vinous pomegranates. Singing, [10] then, and the flute mingle with one another owing to their similarity, for they are both produced by breath. But the sound of the lyre, since it is not produced by breath or is less perceptible than the sound of the flute, mingles less well with the voice and, causing a contrast in the perception, has a less pleasing effect, as has been said of savours. Furthermore, the flute by its own sound and by its likeness to the [15] voice covers up many of the mistakes of the singer; but the sounds of the lyre, which are isolated and mingle less well with the voice, since they are observed show up the mistakes of the singing separately, actually<sup>41</sup> providing as it were a standard for criticizing it. And when there are many mistakes in the singing, the combined effect [20] of the singing and the accompaniment must necessarily be worse.

44 · Why is *mese*<sup>42</sup> so called, though there is no middle of eight notes? Is it because in the old days the scales had seven notes, and seven has a middle? Again, since of the points which fall between two extremes the middle alone forms a kind of starting-point, that which lies between the points which verge towards either end in [25] an extended space, being also a starting-point—*that* will be the middle.<sup>43</sup> And since *nete* and *hypate* are the extremes of the scale<sup>44</sup> and the other sounds lie between them, of which the one which is called *mese* alone is the starting-point of the second tetrachord, the name *mese* is amply justified; for of the points lying between certain extremities, as has been shown, the middle alone forms a starting-point.

45 · Why does a large chorus keep the rhythm better than a small one? Is it [30] because they look more to one man, their leader, and begin more slowly, and so more easily achieve unity? For mistakes occur more frequently in quick singing. Now a large chorus attends to its leader, and no one by differing from the rest would [35] render himself conspicuous by making himself heard above the rest: in a small chorus, on the other hand, individuals make themselves more conspicuous; they, therefore, vie with one another instead of looking to their leader.

46 · Why do most men sing high when they sing out of tune? Is it because it is easier to sing a high note than a low note? They have at all events a tendency to [922<sup>b</sup>1] sing high and make mistakes in what they sing.

47 · Why did the ancients, when they made the scales consist of seven strings, leave in *hypate* but not *nete*? Or should we say that they omitted not *nete* but what is now called *paramese* and the interval of a tone? They treated *mese*, [5] then, as the lower note of the upper ‘pycnon’; whence came the name *mese*. Or is it because it was the end of the upper tetrachord and the beginning of the lower, and was in pitch in an intermediate relation between the extreme notes?

48 · Why do the choruses in tragedy not sing either in the Hypodorian or in [10] the Hypophrygian mode? Is it because these modes have very little of the kind of tune which is specially necessary to a chorus? Now the Hypophrygian mode has a character of action (hence in the *Geryone* the sortie and arming are composed in this mode); and the Hypodorian is magnificent and steadfast, and so is the most suitable of all the modes to accompaniment by the lyre. Now both these are [15] unsuited to the chorus and more proper for the characters on the stage; for the latter imitate heroes, and among the ancients the leaders alone were heroes, and the people, of whom the chorus consists, were mere men. So a mournful and quiet character and type of music are suited to the chorus, for they are human. These [20] characteristics belong to the other modes, but least to the Phrygian among them—for it is exciting and orgiastic. In accordance with this mode, then, we are affected in a certain way, and the weak are more readily affected than the strong; and so this mode is appropriate to choruses. When we use the Hypodorian and Hypophrygian modes, on the other hand, we are active, and action is not fitting for [25] choruses; for the chorus is in attendance and takes no active part, for it simply shows goodwill towards those with whom it is present.

49 · Why is it that of the sounds which form a consonance the softer is the [30] lower note? Is it because melody is in its own nature soft and tranquil, but becomes harsh and full of movement by the admixture of rhythm? Now since the low note is soft and tranquil, and the high note

full of movement, of the notes which maintain the same melody the lower would rather be softer in the same melody; for melody in itself,<sup>45</sup> as has been shown, is soft.

[35] **50** · Why is it that the sounds produced from two jars of the same size and quality, one empty and the other half-full, give an accord in the octave? Is it because the sound produced from the half-full jar is double that produced from the empty jar? This surely is just what happens in the pipes. For the quicker the [923<sup>a</sup>1] movement, the higher seems the note, and in larger spaces the air collects more slowly, and in double the space in double the time, and proportionately in the other spaces. A wine-skin too which is double the size of another, gives an accord in the octave with one which is half its size.

# BOOK XX

## PROBLEMS CONCERNING SHRUBS AND VEGETABLES

[5] 1 · Why is it that celery can endure salt water, but the leek cannot? Is it because the roots of the latter are weak, but those of the former are strong, and that which is stronger is less liable to be affected?

2 · What is the reason for the saying:

Mint should neither be eaten nor planted in season of warfare?

[10] Is it because mint has a cooling effect upon the body, as is shown by the corruption which it causes in the semen? This is opposed to courage and spirit, being the same in kind.

3 · Why is it that some plants, though they have blossom, have no fruit, such as the cucumber and the pumpkin and the pomegranate? Or have they fruit, the [15] blossom being the fruit? For example the part which blossoms is a fruit-case, and the cucumber is a fruit-case.

4 · Why is it that some plants are edible only after they have been boiled, while others can be eaten raw? Do the juices of such plants as are not at first edible become sweeter when the plants have been warmed by heat, whilst in others the juices are originally sweet, and these can be eaten raw? [20]

5 · Why is it that some plants are boiled, others roasted? Is it because the moister plants are not dry enough, while the drier plants must not be further dried? Now anything which is boiled becomes moister and softer, and that which is less moist becomes dry if exposed to the fire.

6 · Why are some plants edible and others inedible? Is it owing to their [25] juices? For plants which in their raw state have unconcocted



juices and, when heated, do not undergo change, are inedible. Now those of which the juice is edible but somewhat strong are used as condiments; for plants which have a strong savour in a small compass serve to flavour those of which the savour is distributed over a large bulk.

7 · Why is it that some plants live only until they have produced seeds and [30] having borne seeds dry up—grass, for instance, and the so-called herbs—while others do not, but bear seeds time after time? And of those which live only until they have produced seed why are the majority annuals, while horse-parsley produces its fruit in the second year and having done so dries up? Is it because all things flourish [35] until they are at their prime as far as their seed is concerned (for man too continues to grow until the age of thirty, sometimes in mass and sometimes in bulk), but when they can no longer produce seed, as in the case of man, they begin to dry up and grow old—in some cases slowly and in proportion? The reason why some forms of [923<sup>b1</sup>] life are long-lived and others short-lived is to be the subject of another treatise. But since the perfection of the seed is the limit in all cases, it necessarily follows that the short-lived bear fruit only once or only a few times, and the long-lived many times; [5] so that the weakest bear only once and so necessarily dry up; and those of them which can bear seed in a year are annuals, whilst others, like horse-parsley, do so in the second year, both plants and trees alike.

8 · Why is it that if one digs down to the roots of celery and surrounds them [10] with barley-husks, and puts earth over these and then waters the plants, the roots become very large? Is it because the barley-husks, being hot and spongy, hold the nourishment in a mass so that it does not rise upwards, but, being hot, causes concoction, and so considerable growth takes place? [15]

9 · Why is it that if one buries gourds or pumpkins in the ground when they are still small, they become large? Is it because the wind and the sun dry everything up and prevent growth, and make everything smaller in bulk but closer in texture? (As can be seen in the difference between trees growing in windy and sunny<sup>1</sup> [20] localities and those in hollow and moist places, the latter being large and spongy in texture, the former small and dense.) Now the burying of things in the earth is the

contrary of this and produces a contrary result. (A similar difference occurs in [25] fruits placed in vessels; if cucumbers are placed in hollow fennel-stalks or boxes, and pomegranates or apples in earthenware jars, the apples become large and spongy, but the cucumbers become small and hard because they grow against a resisting surface.)<sup>2</sup> The reason then is that the nutriment is increased, because it is not dispersed by the wind or dried up; for the covering of earth prevents it from being thus affected.

[30] **10** · Why are the seeds of pungent plants more pungent than the roots and the leaves? Is it because everything is derived from the seed and distributed to the other parts from it, as it were pre-existing in it, as some contend, including the juices and odours, since the odours always become distinctive as soon as the seeds are [35] formed? If, therefore, the pungency in the rest of the plant is derived from the seed, it is only natural that it should be present in the greatest degree in the seed.<sup>3</sup>

**11** · Why are thin radishes more pungent? Is it because the larger radishes are more concocted owing to the lapse of time?

[924<sup>a</sup>1] **12** · Why is it that the caper-plant will not grow easily in tilled ground—for the experiment has often been made of transplanting the roots or sowing the seed (for in some places it is more profitable than roses)—but grows best among the [5] tombs because the ground is most untrodden? As regards this and similar questions the principle must be accepted that all things do not come into being and grow from the same matter, but some things originally come into being and grow from the corruption of other things—for instance lice and the hair on the body when its [10] nutriment is corrupted and when the body is in a state of continual deterioration. As therefore in the body certain products are engendered from the excrement of nutriment (which means that concoction is incomplete), and since, when nature cannot prevail over the excrement, the commonest excretions are absorbed into the bladder and bowels, while from others living organisms are engendered (and so [15] these attain the greatest growth in old age and disease), so in the earth some products are engendered and grow from the concoction of nutriment, others from excretions and matter that is in a condition which is the opposite of concoction. Now tillage concocts the nutriment and makes it productive, and from this the cultivated [20] fruits are formed.

The products, therefore, of this cultivation are called cultivated because they are benefited by art, undergoing as it were a kind of training. Plants, on the other hand, which cannot be so benefited or are formed from an opposite condition, are 'wild' and will not grow in a highly tilled soil. For tillage spoils them by trying to train them; for they are engendered from corruption. It is to this class that the caper-plant belongs.

3 · Why is it that, when radishes are in their prime in the winter, if one cuts [25] off the leaves and heaps earth round them and treads it in so as to keep out the water, they grow to an extraordinary size in the summer? Is it because the heaping up of the earth round them secures them from becoming corrupted by preventing the water from rotting them, and the nutriment, which the plant used to send into the shoot, enters into the radish, so that it must either itself increase in size or send [30] out lateral shoots and grow other roots, as do onions? For onions, if they are not pulled up each year but are left in the ground during the winter, become multiplied. Now onions are among the plants which send out shoots laterally; but the radish does not do so, and must therefore increase in bulk, because it absorbs all the [35] nutriment.

14 · Why is it that if one plants pumpkins or cucumbers near a well and, when they are ripe, lets them down into the well and covers them over, they remain green for a whole year? Is it because the vapour from the water cools them and prevents them from drying up and keeps them in good condition, and the covering of [924<sup>b</sup>1] them up fosters the breath which has formed in them? Their conservation is due to the fact that they still receive nutriment, because their roots are left undisturbed; for even if one removes the shoots, when they have borne fruit, and after cutting them away heaps earth round the roots and treads it down, the plant will produce early cucumbers, because the roots can survive; for the cucumber is not a biennial. [5] The plants themselves will bear fruit more quickly than seedlings, because the root, the most important part of their organism, is already present in their growth, whereas in seedlings the roots must grow first. Furthermore,<sup>4</sup> the heaping of earth round the root engenders warmth, so that it is preserved and sends up a shoot more [10] quickly. So too if one sows cucumber seeds during the winter in small wicker baskets and waters them with hot water and carries them out into the sun and places them by the fire, very early cucumbers will be produced if one plants them out in the ground, as they are, in the baskets,

when the proper season arrives.

**15** · Why are plants watered at dawn or at night or in the evening? Is it in [15] order that the sun may not consume the water? Or is it because, when the water is warm it corrupts the plants which are watered with it?

**16** · Why is it that sweet-smelling seeds and plants promote the flow of urine? Is it because they contain heat and are easily concocted, and such things have this effect? For the heat which is in them causes quick digestion, and their odour has no corporeal existence; for evil-smelling plants, such as garlic, owing to [20] their heat, promote the flow of urine, but their wasting effect is a more marked characteristic. But sweet-smelling seeds contain heat, because odour is entirely engendered by the presence of some heat; but evil-smelling things are unconcocted. Now anything which is to promote the flow of urine must be not only hot but also [25] easily concocted, so that it may accompany the liquids in their downward course and effect their digestion.

**17** · Why is it that vegetables which are produced from older seed (for example two or three years old) produce more stalk than those grown from fresh seeds? Is it because, just as in animals that which is at its prime produces semen [30] most readily, so too very old seeds lose their vigour by evaporation, and those which are produced from fresh seeds are too weak because they still contain excrement which is alien to them, but those which are of moderate age are strongest, because the moisture has left them, and so they produce seed more readily? And the production of seed is the same process as the production of stalk, since the seed comes from the stalk.

[35] **18** · Why does rue grow best and most abundantly if it is grafted on to a fig-tree? Now it is grafted inside the bark and plastered with clay. Is it because the roots of the rue require heat and warmth (and this is why they are benefited by being surrounded with ashes), and the fig-tree contains heat? That this is so is [925<sup>a</sup>1] shown by the fact that its sap is the most pungent of all and by the amount of smoke which it produces when burnt. It therefore possesses the same kind of heat and

moisture as ashes, so that if ashes benefit rue, it must necessarily flourish greatly when grafted on the fig-tree, since, whereas ashes give off no fluid, the flow of liquid [5] from the fig-tree is continuous, its moisture being never exhausted.

19 · Why do some plants always produce empty stalks? Are they among those plants which have to produce something other than stalk?

20 · Why is it that in Attica, while all other fruits are very sweet, thyme is [10] very bitter, yet thyme is a kind of fruit? . . .<sup>5</sup> so that the plants which grow there do not contain much moisture? In plants, then, which are naturally sweet, owing to the moderate quantity of moisture which they contain, when the sun has absorbed the greater part of it the remainder is easily concocted; for it is difficult for a large amount, but easy for a moderate amount, to be ripened. Fruits, therefore, which are [15] naturally sweet become more so; but in those which are naturally dry and not sweet, the natural moisture fails, because it is scanty, and is very far from being sweet. For the sun absorbs the sweetest and lightest part of it; and these fruits have no superfluous moisture, as have other fruits.

21 · Why do pennyroyal and narcissi and onions bloom if hung up at the [20] time of the summer solstice? Is it because there is unconcocted nutriment in them, which<sup>6</sup> in winter does not become concocted owing to the cold, but at the summer solstice owing to the season becomes concocted, and so the growth takes place? This growth, however, because there is no influx of moisture, quickly dies down; for if they have not some source of nutriment or influx of moisture, they dry up. A similar phenomenon occurs in Scythia, where, owing to the presence of abundant snow, the [25] corn remains a long time in the earth and then suddenly shoots up.

22 · Why does the onion alone make the eyes smart to such an excessive degree (hence it is said to derive its name because it makes one cover up the pupil), whereas marjoram and other pungent plants do not have this effect? For the nasturtium, though it is more stinging, does not cause tears to the same extent if [30] placed near the eyes, whereas the

onion has this effect both when so placed and when eaten. Is it because many differences attach to each of the pungent plants, which give each its peculiar property? The nasturtium then, because it is hotter, is so dry that it prevails over the liquefaction which it causes; for it causes tears when [35] it is eaten, but it does not cause tears when placed near the eyes, because it does not give off any thin vapour, being too dry and hot to do so. But marjoram and such warm plants are dry, though only slightly so; and that which is to cause tears must [925<sup>b</sup>1] be stinging and moist and viscous. This is why olive oil causes tears, though its sting is weak; for it penetrates owing to its viscosity and tenuity and causes pain, and the pain causes melting. Now the onion has such properties that its moisture and the [5] vapour which it gives off are hot and tenuous and viscous; and so, when it is placed near the eye, it causes tears, because the vapour which it gives off is of such a character and carries with it a thin moisture; and, when it is eaten, the exhalation penetrates . . .<sup>7</sup> Garlic, on the other hand, is hot and pungent and contains moisture, [10] but is not viscous; and so does not cause tears.

**23** · Why is it that myrtle-berries which have been compressed in the hand seem to us sweeter than those which have not been so compressed? Is it for the same reason as makes dried grapes sweeter than fresh clusters and undried grapes? For [15] dried grapes are, it appears, flavoured by the must, which is naturally sweet (for they are even externally saturated by it), but the grapes which are still in the cluster are not so flavoured. So too myrtle-berries, which are naturally sweet and have their sweetness within, like grapes when they are compressed, become saturated by the [20] sweetness which is within them and are clearly sweeter externally.

**24** · Why is it that, the smaller myrtle-berries are, the more they tend to have no stones, and the same is also true of dates and clusters of grapes, in which<sup>8</sup> the small grapes have no stones at all or only smaller stones? Is it because, being less [25] perfect, they have less distinctly formed stones? For the purpose of the stone is to contain the seed. Now the berries are smaller, because they are mere offshoots and imperfect, and they are less sweet than those which have proper stones; for they are less concocted, and concoction is a process which produces perfection.

25 · Why is it that in some fruits the parts which are near the root are more [30] bitter (for example in the cucumber), but in others the parts towards the upper extremity (for example in acorns)? Is it because in the former the nutriment in that part is unconcocted, because there is a continual influx along the root; while the latter are naturally dry, and so, when the sweetness is drawn off from the extremity and has become concocted, they are henceforward dry and the bitterness is left [35] behind like salt? Now as anything becomes dry, it becomes more bitter, just as olives and acorns become bitter as they grow old.

[926<sup>a</sup>1] 26 · Why do some plants sprout when they are not in the earth, but either cut off or placed in store, lily-stalks, for example, and garlic and onions? Is it because they all have nutriment within themselves and not in some separate place?<sup>9</sup> [5] [It is therefore their superabundance of nutriment which makes them sprout, as is clear from the fact that squills and purse-tassels do the same.]<sup>10</sup> Now each of them grows not merely because it contains nutriment, but only when that nutriment is concocted and distributed; it therefore contains nutriment before, but it only grows when the season comes at which this process takes place owing to the concoction caused by the season, as happens also to crocodiles' eggs. The growth, however, is [10] not continuous, because there is no influx of more nutriment.

27 · Why is it that garlic and onions grow better according as they are drier when planted, whilst other plants grow worse under such conditions? Is it because all plants of this kind are exceedingly full of moisture? If, then, they are planted in [15] this condition, they enjoy equable conditions. A further reason is that they are less likely to rot if they are dried before being planted.

28 · Why is it that garlic and onions alone among plants sprout when they are stored away? Is it because they are full of moisture and nutriment? It is abundance of nutriment, then, which makes them sprout, as is clear from the fact [20] that squills and purse-tassels do the same. But they grow only when the proper season for each of them comes.

29 · Why is it that plants which are watered with cold water are

sweeter than those watered with warm water? Is it because the warm water when it becomes enclosed in the plant is saltier (just as that which is saltier is hotter, and that which is sweet is the opposite, that is, in a sense, cold)? Now the nutriment of vegetables is [25] liquid, and it is this which gives them their juices.

**30** · Why is it that garlic has a stronger odour when it has run to stalk than when it is young? Is it because, when it is young, there is still a large quantity of alien moisture in it which deprives it of its strength? When, however, the plant has ripened, the alien moisture having been already excreted, it then has its own proper odour; and this is naturally pungent. Similarly, all other fruits when they are young [30] are more watery. This is the reason why young onions are less pungent.

**31** · Why is it that, if myrtle-branches are not preserved, the berries rather than the leaves drop off, whereas, if they are preserved with seaweed, the leaves drop off but the berries do not? Is it what naturally happens if the branches are not [35] preserved, for the berries naturally drop off when they become ripe? This does not occur when the branches are stored away, but the moisture in the seaweed only prevents the moisture in the berries from undergoing change. The leaves, on the other hand, drop off as the branches become dry, and the seaweed, which is salty, [926<sup>b</sup>1] has a drying effect upon them. The leaves thus undergo different processes when they remain on the tree and when they are stored away.

**32** · Why do melons grow best in marshy plains which are humid, for [5] example, round Orchomenus and in Egypt, which appears to be a well-watered country? Now marshy districts are full of water and melons themselves are somewhat moist; and this is why those grown in gardens are poor. Is it because they have to be planted deep owing to the hardness of the ground? For clayey, flat ground becomes very hard, and plants grow best which are deeply planted. Or is it [10] because the ground must be dry, because the plant itself is naturally moist? For thus being pulled in opposite directions it will attain the mean. Now ground which is somewhat marshy but deep contains nutriment owing to the depth of the soil and the locality, but not in an excessive quantity, because the ground dries up again. [15]



**33** · Why is it that rue and certain unguents give the perspiration an evil odour? Is it because things which have a heavy and pungent odour, mixing with the excretory fluids, make the odour of these still more unpleasant?

**34** · Why is rue said to be a remedy against the evil eye? Is it because men [20] think they are victims of the evil eye when they eat greedily or when they expect some enmity and are suspicious of the food set before them? For instance, when they take anything for themselves from the same course, they offer some one else a portion, adding the words, 'so that you may not cast the evil eye upon me'. All therefore will take with alarm of what is offered them, whether liquid or solid, of [25] those foods, the constriction or vomiting forth of which causes the solids to be carried upwards and ejected or the flatulence from the liquid to give rise to pain and writhing. Rue, therefore, being eaten beforehand, since it is naturally warming, rarefies the organ which receives the food and the whole body, with the result that [30] passes out the flatulence enclosed within it.

**35** · Why is it that marjoram, being thrown into the must, makes the wine sweet, and two cupfuls are thrown into a jar of wine? Is it because it takes away the elements which cause harshness by absorbing into itself by its dryness the watery [35] and sedimentary parts? That it is these which cause harshness is shown by the fact that wines are less soft if water is added or if they have been allowed to stand a long time on the lees. Also when they make sweet wine, they expose the grapes for a long time to the sun, which draws out the watery element and concocts the remainder. [927<sup>a</sup>1] Now marjoram produces the same result, for it is dry and hot, and so naturally has a lasting effect.

**36** · Why do black myrtle-trees have thicker foliage than white? Is it because they are a wilder species? That they are so is proved by the fact that they [5] grow in the fields and undergo very little modification as a result of cultivation. Now wild plants invariably have denser foliage; for, because their fruit is less concocted, the nutriment is diverted into the foliage.

# BOOK XXI

## PROBLEMS CONCERNING BARLEY-MEAL, BARLEY-CAKE, AND THE LIKE

[10] 1 · Why is it that barley-gruel and wheaten-flour become whiter if oil is poured on to them, though oil is reddish in colour? Is it because oil naturally foams when it is mixed with liquid, and foaming causes whiteness? Now mixing is carried out by pounding and motion, and is most complete in the case of corporeal [15] substances. This process occurs in foods which are boiled, and so makes them whiter.

2 · Why is it that foods made from wheat suit our bodies best and are more nourishing than those made from barley? Is it because wheat contains a moderate [20] amount of stickiness, and food ought to have this quality, since it ought to cling and adhere to the body, and its stickiness causes it to do so? But barley<sup>1</sup> is less cohesive, and so cakes in which the barley is well kneaded are more nourishing than those in which it is not kneaded.

3 · Why is it that of wheaten-flour that which is ground first is whiter, but of barley-meal that which is ground last? Is it because barley, being dry, breaks into [25] pieces, whereas wheat is soft and crushes? Now in both it is the inner part which is whitest.

4 · Why do loaves appear whiter when they are cold than when they are hot? Is it somehow for the same reason that stale oil is whiter than fresh? For the cause [30] of the blackness is the water which in both cases is present in larger quantities when they are fresh; but after a time, owing to evaporation, the water remaining near the surface becomes less. Now it is either the passage of time or the heat of the sun which causes evaporation from the oil; and from loaves the heat goes forth as they cool and has entirely departed when they are cold, whereas it is still present when they are warm.

5 · Why do loaves which contain no salt weigh heavier than those which are [35] salted, the other ingredients being exactly the same? The contrary would be expected, since salt is added, and salt is heavier than water. Is it because the salt causes drying to take place? This is why things which are preserved with salt remain uncorrupted; for the moisture in them is taken up and dried up by the salt, and it is the moisture in things that is corrupted by heat. So too in bread the moisture is [927<sup>b</sup>1] taken up by the salt and evaporates outside. Stale bread therefore is lighter than hot bread, since it is cooler. Now in loaves which do not contain salt this moisture is present in greater quantities and makes them heavier. [5]

6 · Why is it that loaves which have become cold, if they are moistened and placed in contact with one another, do not cohere, whereas hot loaves do so? Is it because the cold loaves give off with the vapour the sticky moisture which is in them, and, because this has gone forth, do not cohere (for the water with which they were wetted is too uncohesive); but the hot loaves contain a certain amount of [10] stickiness, and so, when they are moistened and the vapour comes forth, the heat, owing to its rarity, is given off, but the sticky matter, which comes out with it and mingles with the moisture, causes the loaves to adhere together?<sup>2</sup>

7 · Why is it that of wheaten-flour that which is ground first<sup>3</sup> is whiter, but [15] of barley-meal that which is ground last? Is it because barley, being dry, breaks into pieces, and this happens most when it is ground for a very long time, but the flour which is inside the wheat is soft and fine and is crushed out at first? Now in both cases it is the inner part which is whitest. [20]

8 · Why is it that barley-cake becomes more indigestible the more it is kneaded, whereas wheaten-bread becomes easier to digest? Is it because dough becomes less by being much kneaded (and this is the nature of that which is sticky), but the moisture has been expelled from every part of the loaf by the fire, so that, when the moisture has been entirely expelled, the loaf becomes more uncohesive the [25] more it is kneaded, because in the kneading it is divided up into smaller particles? Now that which is uncohesive is more easily concocted. Barley-cake, on

the other hand, the more it is kneaded becomes more sticky, as the liquid mingles in it; and that which is sticky is not easily divided up, and such foods are not easily concocted; [30] for that which is to be concocted must be split up into small parts.

9 · Why does barley-cake become less when it is kneaded, whereas dough becomes more? Is it because barley-meal when moistened and kneaded unites owing to the binding quality of the moisture, because it is of even texture and [35] granulated, but wheaten-flour rises, because it is very dense? For that which is dense grows hot when kneaded and, when it is hot and inflated, it rises, as does the flesh.

10 · But why does dough increase more when it is heated than barley-cake [928<sup>a</sup>1] does? Is it because dough contains moisture which is not separated in such a way that it can escape when warmed, owing to the kneading? When therefore it is warmed, breath is engendered, and more breath is necessarily engendered from a greater amount of moisture.

[5] 11 · Why is it that although honey is more adhesive than water, wheaten-flour is more uncohesive, when it is boiled or baked, if it is mixed with honey-water than with water? Is it because water becomes stiff and solid under the influence of the heat, whereas the honey becomes solid but also has a drying effect, and so makes [10] the food more uncohesive (for this quality is produced by dryness)?

12 · Why do twice-baked loaves, when they are cool, not become hard? Is it because wheat has in it a certain sweet and sticky juice, which is as it were its 'soul'? This can be illustrated by the fact that when it is dried it becomes quite empty, but, [15] when it is wetted, it expands. This juice, therefore, being present also in wheaten-flour, especially in that of the purest quality, when the flour is made into dough and the dough is kneaded the same thing<sup>4</sup> happens, as is proved by the fact that when it is boiled it becomes more digestible. When, therefore, the bread is baked for the first time, the thin and light part of the moisture<sup>5</sup> is evaporated from the bread, and [20] the part of the flour which most resembles chaff is burnt out. But when the dough is taken out and kneaded again, the smoothest part of the flour and the stickiest part of

the moisture being left mingle more with one another, owing to the fact that they have become smoother and stickier, and owing to the effect of the heat; for their [25] mixing resembles the process of dyeing, so that the dough, when subsequently kneaded, is like boiled flour. For when the dough is kneaded and the lightest flour and the stickiest moisture are left, the bread, when it has been exposed to the fire, becomes glutinous and does not dry up; for that which is sticky cannot be separated, [30] and that which is dense does not of itself give up any moisture. Twice-baked bread then undergoes this same process<sup>6</sup> for the reasons mentioned above, and, always containing moisture, does not become hard.

13 · Why is it that we can go on partaking of some kinds both of solid and of [35] liquid food for a long period—for instance, food made from barley-meal and wheaten-flour and dry wines, and water—whereas we cannot partake continually of others, though they are pleasanter to the taste? Is it because some of the foods which we take tend to float on the stomach and are highly nutritious, so that when one has discharged them, though their first nutriment has been consumed, a considerable force still remains in the body, concocted for the first bodily process [928<sup>b</sup>1] but unconcocted for its final purpose and for the succeeding process? Now most of the pleasing foods belong to this class; for the fatty and sweet and rich foods seem pleasantest to our taste, and these, however they differ from one another, are all [5] foods which are nutritious, and not difficult of concoction, and apt to float on the stomach; their force is therefore lasting, if one takes one's fill of them, and the perception of them does not quickly pass away;<sup>7</sup> for the feeling of satiety does not only continue while they are in the stomach but also when their nutriment has been distributed to other parts of the body. Or is this not the only reason, and is there a [10] further reason, namely, that some foods are naturally suited and akin to us? For our bodies accept all such foods more readily because they are natural, while they accept less readily those which are unnatural. And different foods suit different temperaments; for example, honey is the natural food of bees, so that they take no [15] other, though they are physically weak; so that what they consume must be small in amount, but must be to their strength as what men eat is to theirs. And so any pleasing foods which are of this kind seem pleasing because they are present in small quantities in our nature, but they only appear so for a short time, and then soon cause a feeling of satiety. But we always need the natural foods, so that we feel [20] less satiety from foods continually taken other than those which are

most pleasing in themselves.

**14** · Why is it that the same things seem pleasant when we are becoming accustomed to them and not pleasant if we partake of them too continuously, though being accustomed to anything is doing it often and continuously? Is it [25] because custom engenders a receptive habit but does not bring satiety, whereas taking anything continuously fills up the desire, just as a vessel<sup>8</sup> is filled; for desire is a kind of void?<sup>9</sup> Now habits, when exercised, increase and grow, but vessels when they are filled full do not become any bigger. Hence custom, being an exercise, [30] increases the receptive habit; but that which is continuously taken fills up and satisfies the desire, and, when this is satisfied, we no longer receive any more, and nothing can increase the desire for the reasons already stated regarding the filling of vessels. Furthermore, custom is not pleasant through constantly giving pleasure (for such things too cause pain through continual practice), but because we enter upon [35] the beginning of the process with pleasure and can continue doing the same thing longer than if we were unaccustomed to it. In the same way then as custom, which is pleasant, causes pain, so too do all other pleasant things; for things which happen and foods which are taken continuously, both alike cause pain. The reason is that the powers of acceptance and action which we possess in ourselves are not unlimited [929<sup>a</sup>1] but limited, and when they have reached their full capacity (and this is continually visible to an increasing extent) the receptive powers are satisfied, and the powers for [5] action can no longer function.

**15** · Why does dough become white when it is kneaded, while barley-cake becomes blacker? Is it because the surface of the barley-meal becomes drier, and it is the<sup>10</sup> heat in the moisture which causes the whiteness? Or is it because, through exposure to the heat, the surface of barley-meal attracts the moisture, since it [10] consists of larger particles?

**16** · Why does barley-meal adhere better together when mixed with water than with oil, though oil is more viscous? Yet that which is viscous is more binding, and oil is more viscous than water. Is it because water is thinner and so penetrates [15] into everything and makes the barley-meal soft, and the grains adhere together better and are compressed into one

another, even though pressed together without any kneading?

**17** · Why does bread which is either not kneaded or very much kneaded break up? Does the unkneaded bread do so because it is not sufficiently bound together? Now it is the kneading that binds the bread; so that unkneaded bread is [20] already on the way to breaking up. Further, it contains much moisture not properly mixed in. Bread which is very much kneaded is dry, because it has very little moisture; for when it is heated, the moisture all escapes. So that in both cases the bread breaks up because much moisture goes forth; for much moisture is actually present in the unkneaded bread, and in the over-kneaded bread much escapes<sup>11</sup> compared to what remains behind.

[25] **18** · Why is the admixture of barley-meal and liquid lighter than the two things together when unmixed? Is it because, when they are mixed, air is enclosed in them? Or is it because part of the water is evaporated by the heat in the barley-meal, and so the mixture becomes smaller in bulk? The air, however, if it were also mixed in, would not make the mixture any lighter; for air enclosed in air [30] possesses weight.

**19** · Why do milk and sweet wine appear sweeter if drunk with barley-meal? Do they appear sweeter in contrast with anything which is not sweet (for barley-meal is not sweet)? Or is it because the barley-meal continues to hold [35] sweetness, and so the perception of it is prolonged?

**20** · Why does the same potion seem less strong if it is drunk with barley-meal? Is it because the barley unites what has one quality with what has another, or because the barley-meal interferes with the potion and destroys it, absorbing it into itself?

**21** · Why does gruel take up more water than the wheat from which such [929<sup>b</sup>1] gruel is made? Is it because the gruel is a kind of flour, and flour takes up more water (for its bulk is greater than that of the wheat, for even the particles of the wheat are packed closely together)? Now that which is more holds more both for this reason<sup>12</sup> and also because both

flour and gruel contain heat, and heat both [5] attracts the moisture more and expends it by evaporation.

**22** · Why does wheaten-flour increase much more in proportion than barley-meal when it is kneaded? Is it because flour admits a large quantity of water, but barley-meal only a little? (But why does it admit more, for barley-meal would [10] naturally be expected to do so, because it has been exposed to heat, whereas the flour has not, and that which has been exposed to heat is drier?) Or is it because flour admits of more kneading, the reason being that it is composed of smaller particles? As therefore it is potentially as it were more manifold by reason of the smallness of its parts, so much the more water does it take up. For it uses the water [15] as a glue—a metaphor employed by Empedocles in the *Physics*, when he says ‘gluing barley with water’—and it consumes much water for this reason.

**23** · Why does dough increase more when it has been heated than barley-cake does? Is it because it contains moisture which is not separated in such a way that it can escape when it is warmed, and this<sup>13</sup> moisture, becoming breath and not [20] being able to escape (as it can in the barley-cake) owing to the density of the dough (for that which is made up of smaller particles is dense), makes the dough, therefore, rise and causes the mass to be greater? Furthermore, the moisture which it contains is more considerable, and it is from this, when it is heated, that the breath is engendered; and from the greater amount of moisture more breath must necessarily be engendered. [25]

**24** · Why is it that, of persons engaged in the preparation of cereals, those who handle barley become pale and are subject to catarrh, while those who handle wheat are healthy? Is it because wheat is more easily concocted than barley, and therefore its emanations are also more easily concocted?

**25** · Why is it that bread, if one toasts it, becomes harder, whereas, if one [30] warms it, it becomes moister up to a certain point? Is it because, when it is toasted, the moisture goes out of it, and so it becomes harder, whereas, when it is warmed, the moisture having acquired



consistency is liquefied again by the fire, and so the bread becomes moister?

26 · Why does flour, as it cools, become less closely packed, but barley-meal [35] more so? Is it because things which are made up of small particles contain no vacant spaces, and heavy things, by the pressure which they exert, take up the same space whether they are more or less<sup>14</sup> numerically? Barley-meal then is soft; when it cools, therefore, it becomes less, so that the less is more compressed.<sup>15</sup> But wheaten-flour [930<sup>a</sup>1] already consists of small particles, and so it does not cool because of this, but in such a way as to become lighter and not so as to become more closely packed by compression; for wheaten-flour is naturally heavier than barley-meal.

# BOOK XXII

## PROBLEMS CONNECTED WITH FRUIT

[5] 1 · Why is it that the volume of food necessary for repletion is not proportionate in the same persons if they eat fruit at the beginning and at the end of a meal? Is it because fruit is much heavier than solid food? This can be illustrated by the fact that figs, though eaten last, are vomited out last. If, therefore, they are [10] eaten first, owing to their weight they sink downwards and leave ample space above, so that one can easily contain the volume of solid food. If, however, the converse takes place, the solid food when it enters in, because it does not sink downwards, quickly occupies the vacant upper space.

2 · Why is it that, although sweet foods are more akin to us than pungent, we [15] are more quickly sated by the former? For the contrary might have been expected, since we might naturally be supposed to be less sated by foods which are akin to us. Is it because the organ whereby we receive replenishment and the body, which is nourished, are not sated equally quickly, but sometimes the stomach is full, in those, for instance, who are thirsty, but the thirst is not less? For we do not cease being thirsty because the stomach is full, but when each part of the body has drawn in its [20] own particular moisture; and we cease being thirsty only when they have received this in sufficiency. The same thing also occurs when we are hungry.

3 · Why are we more quickly sated by sweet than by pungent foods? Is it [25] because we cease desiring sweet things sooner? Or, while it is not generally admitted<sup>1</sup> that we become satiated as the stomach is filled by sweet foods, yet might it not be said that our desire is more quickly sated by them? Or is it because desire is simply a lack, which occurs when we no longer have any nutriment in us or very [30] little? Pungent foods then are not nourishing, but contain little nutriment and a considerable amount of excrement. We therefore naturally seek to eat them in large quantities, and yet do not satiate our desire with them, because we still lack nutriment and they do not contain it. But all sweet foods are nutriment, and the [35] body derives a large amount of

nutriment from a small quantity of them. When, therefore, it derives a large amount of nutriment, it can no longer eat, because it cannot tolerate more. We are therefore naturally more quickly satisfied by sweet foods.

4 · Why is it that fruits and meat and the like remain uncorrupted if placed in skins, when these are tightly inflated, as also do substances placed in closely [930<sup>b</sup>1] covered vessels? Is it because all things become corrupt through being in motion, and things which are full are without motion (for it is impossible for anything to be moved without there being a void), and these vessels are full?

5 · Why does wine seem bitter when drunk after the eating of rotten fruits? [5] Is it because such rottenness contains bitterness? That, then, which remains on the tongue, mingling with the draught and becoming diffused in it, makes the draught bitter. The fruit by itself, when eaten, seems less bitter, because juice of this kind takes effect at many different points and is divided up into small particles. [10]

6 · Why should dried fruits be eaten? Is it in order that we may drink sufficiently? For we ought not only to drink to satisfy the thirst which is engendered by solid food, but also when the solid food is finished.

7 · Why do roasted nuts deteriorate when they become cool, and also bread [15] and acorns and many such things, but improve when they are heated again? Is it because, when they become cold, the juice congeals, but when they are warmed up it becomes liquid again, and it is the juice which is pleasing?

8 · Why is it that, for the proper enjoyment of fruits such as figs and the like, [20] one ought to drink with them either unmixed wine or water, which are the opposites of one another? Is it because fruit is both hot and moist owing to the manner of its growth? For it contains much both of fire and of moisture; and so, owing to the fire, the juice causes as it were a boiling within, such as must makes on the surface (though the others, the hard-shelled fruit, also have this force, but in a less degree), [25] while the large quantity of moisture causes an unconcocted condition. Water then, owing to its coldness, extinguishes the boiling, as

wine also usually does by its heat; for it takes away its power, just as one fire sometimes diminishes the force of another if the latter be less. And wine by its heat is better able to concoct the [30] moisture, and by its weight it prevails over the scum formed on the surface by the boiling.

9 · Why is it that those dried figs are sweetest which are cut in half and not those which are cut either many times or not at all? Is it because, if they are cut many times, most of the sweetness escapes and evaporates with the moisture, whereas in those which are entirely closed the watery element is considerable, [35] because it has not been turned into vapour? Those, however, which have been cut but not many times, do not suffer from either of these disadvantages.

10 · Why is it that figs when they are cooled in an oven are harder if they are [931<sup>a</sup>1] left to cool in the oven than if they are taken out to cool? Is it because in the oven all the moisture is evaporated by the heat, whereas outside the surrounding air cools the moisture and prevents it from escaping and the moisture retains its consistency [5] rather than evaporates?<sup>2</sup> Now what is dry is hard, and what is moist is soft.

11 · Why is it that wine and water seem sweeter when taken with something sour, if, for instance, one munches acorns or myrtle-berries or something of the kind? Is not this natural and does it not happen in other things too? For everything seems to assert its identity more forcibly when compared with its contrary and here [10] the tastes of the contraries are in a way opposed. Or is it because, as in objects which are being dyed, the tongue has already been permeated by the sour matter and opens its pores, and so the sweetness can penetrate better? For objects which are being dyed are for this reason first of all moistened in sour liquid—because what is [15] permeated takes the dye better.

12 · Why do sweet things seem to be less sweet when they are hot than when they are cold? Is it because two sensations of the two qualities are present together, and so that of heat dispels the other? Or is it because that which is sweet<sup>3</sup> is also hot, and it is therefore a case of ‘fire upon fire’, and thus the heat prevents the perception [20] of the sweetness? Or is it because fire takes away the power of everything, since

it causes motion? Things, then, which are hot are nearer to change, but when they cool they become stable again.

**13** · Why is it that chaff concocts hard fruits and does not corrupt those which are already concocted? Is it because chaff is both hot and absorbent? It, [25] therefore, by its heat causes concoction, while owing to its absorbent property it attracts the corrupted sap, which therefore does not cause corruption.

**14** · Why do figs, which are soft and sweet, destroy the teeth? Do they, owing to their stickiness, penetrate into the gums, and, because they are soft, [30] insinuate themselves into the spaces between the teeth, and, being hot, quickly cause decay? Perhaps also, owing to the hardness of the seeds, the teeth are quickly caused to ache in the process of chewing them up.

# BOOK XXIII

## PROBLEMS CONNECTED WITH SALT WATER AND THE SEA

1 · Why is it that the waves do not ripple in the deep open sea, but only where [35] it is confined and shallow? Is it because a small amount of liquid, as it is carried along, is more divided up by the wind than a large amount?

2 · Why do the waves sometimes begin to move before the winds reach them? Is it because the portion of the sea near the source of the wind being impelled along first has continually the same effect upon the adjoining part, and so, since the [931<sup>b</sup>1] sea is continuous, the same effect is caused in every part of it, as though from one continuous impetus? Now this occurs simultaneously, with the result that the first and the last parts of the sea are set in motion at the same time. This effect is not produced in the air, because it is not a single body (since many hindrances affect it [5] from all sides, which often cut short the first and most vigorous movement); the sea, however, suffers from no such impediments, because it is heavier and less easily disturbed than the air.

3 · Why do ships seem to be more heavily loaded in harbour than out at sea, and why do they travel more quickly from the open sea towards the land than from [10] the land towards the open sea? Is it because the greater quantity of water offers more resistance than<sup>1</sup> the less, and the vessel sinks deeper into the latter, because it prevails more over it, for it pushes up the water from below? Now in a harbour the sea is shallow, but deep out at sea; so that a vessel will seem to carry a heavier load [15] in harbour and will move with greater difficulty, because it is sunk deeper into the water, which offers less resistance. But in the open sea the contrary happens.

4 · Why is it that if anything (for example an anchor) is thrown into the sea when it is rough, a calm ensues? Is it because the sea is stopped

by the descending [20] object, with which a certain amount of air is carried down, and this air, carried in a direct course downwards and drawn thither, draws with it also the lateral force which is disturbing the sea? Now a wave does not move downwards from above but along the surface, and, when it ceases, a calm ensues. Furthermore, the sea, as it [25] closes in upon the space opened by the descending object, makes an eddy, and eddies move in a circle. Now since a straight line touches a circle at a point (and waves travel obliquely in a straight line), the result would be that the waves touch the circumference of the eddy only at a point, both for the reasons stated and because the eddy pushes the wave off as soon as it comes into contact with it. The place, [30] then, where the eddy is, being without waves, the result is that there is a calm where the surface is broken, because the air, which descended with the object thrown in, subsequently ascending and thrusting the sea upwards, causes it as it were to [35] bubble; for a bubble consists of moisture thrust up by air from below. Now every bubble is smooth and still. An indication that the above process takes place is given by the fact that the sea at the point where the object is thrown in rises a moment later to a higher level than the surrounding sea.

5 · Why is it that sometimes vessels which are journeying over the sea in fine [932<sup>a</sup>1] weather are swallowed up and disappear so completely that no wreckage even is washed up? Is it because, when a cavernous space breaks open in the earth beneath the sea, the ship at the same time follows the rush of air into the sea and into the cavern? And in like manner the sea, being carried everywhere round in a circle, is [5] borne downwards; and this constitutes a whirlpool. And ships in the Straits of Messina suffer the same fate owing to the flow of water, which causes eddies, and are swallowed up into the abyss, for the reasons stated above and also because the sea is deep and the land cavernous to a great distance. The eddies, therefore, overpower the ships and carry them thither, and so no wreckage is washed up. The [10] flow occurs when, the former wind having stopped, a contrary wind blows over the sea when it is running under the impulse of the former wind, and especially when the contrary wind is the south wind. For the currents flowing against one another try to thrust one another aside, as happens in rivers, and eddies are formed. And the [15] original movement, which is strong, is borne whirling round and round from above. Since then the currents cannot travel laterally (for they are mutually repelled), they must be thrust down into the depths, and so whatever is caught by the eddy must necessarily

be carried down too. Hence they build ships with slanting ends; for cases [20] have been recorded before now in which a ship with straight ends has been swallowed up.

6 · Why is the water whiter in the Black Sea than in the Aegean? Is it owing to the refraction of the vision from the sea into the air? For in the region of the [25] Black Sea the air is thick and white, so that the surface of the sea appears to be similar, whereas in the Aegean it is blue, because it is clear to a great distance, and so the sea too reflecting the air appears to be similar. Or is it because all lakes are whiter than the sea, and the Black Sea has the character of a lake because many [30] rivers flow into it? Now lakes are whiter than the sea, and than rivers; at any rate, painters picture rivers as pale yellow and the sea as blue. Or is it because the sight cannot penetrate quickly through fresh water and is refracted into the air,<sup>2</sup> but is not refracted upwards from the sea, because the water is not smooth, but the sight [35] tires of trying to penetrate into the depths, and so the sea appears black? But in seas of a lake-like character, since the fresh water is on the surface and the salt water below, the sight does not penetrate, but is refracted towards the daylight; and so the surface of the sea appears white.

7 · Why is the sea less cold than fresh water, and salt water in general than [932<sup>b</sup>1] sweet? Is it because the sea is denser and has more body? Now such things are less susceptible to cold, just as they are more easily heated; for owing to their density they are better able to retain heat. Or is it because the sea is of a more fatty composition and so does not extinguish fire? (And similarly in other cases.) And the [5] more fatty anything is the hotter it is. Or is it because it contains much earth and is therefore drier, and the drier a thing is the hotter it is?

8 · Why is the sea more transparent than fresh water, although it is thicker? For fresh water is rarer than salt. Or is the cause not its rarity but the fact that in it there are direct interstices which are very numerous and wide? Fresh water, [10] therefore, has density owing to the small particles of which it is composed, whereas salt water contains great voids. Or is it because the sea is purer? For there is no earth in it, but the sand, which is heavy, is precipitated; but fresh water is earthy, and the earth floating in its midst is easily stirred into mud. [15]



9 · Why is the sea more transparent when the wind is in the north than when it is in the south? Is it because the sea has colour when it is calm? For there is something fatty in the juice of salt water, as is shown by the fact that in hot weather an oily substance is excreted from the sea. When, therefore, the sea is calm and [20] warmer, juice of this kind forms on the surface of the sea owing to its lightness. This is less likely to happen when the wind is in the north, owing to the cold. Now water is more transparent than oil; for oil has colour, but water, presenting itself without colour to the vision, gives a clearer image.

10 · Why does one dry more quickly after washing in the sea, although sea [25] water is heavier than fresh? Is it because the sea is thicker and earthy? Since, therefore, it has little moisture in it, it dries more quickly.

11 · Why are the waves windy? Is it because they are a sign of wind in the future? For wind is a massing together of air, which<sup>3</sup> occurs because the air is [30] continually thrust forward. But the wind begins to thrust the air forward when it is not yet blowing continuously but only just beginning. The first breath of wind then as it were dies down before having any effect, but it thrusts forward another breath and drives on another mass of air and then dies away. It is clear therefore, when the wave which is thrust forward is already present, that that which sets it in motion [35] will also come; for it causes this effect when it first begins to blow.

12 · Why do the waves break forth before the wind? Is it because the wind does not cease to blow<sup>4</sup> and the sea to be rough at the same time, but the sea ceases later? For<sup>5</sup> it is possible that the wind which set the wave in motion perishes before [933a1] it becomes perceptible; and so the wave is not prior to the wind, but the former is noticeable, while the latter is not. Or do the winds not blow everywhere at the same time, but at first only in the quarter from which they arise? Now as soon as they begin to blow, they set in motion the sea which is near them, and this sets in motion [5] the adjoining sea; and thus it would be possible for the wave to break forth before the wind reaches it. For the movement is due to the sea and not to wind, being a movement of the sea which travels more quickly than that of the air.<sup>6</sup>

13 · Why is it easier to swim in the sea than in a river? Is it because the [10] swimmer always leans on the water as he swims, and we receive more support from that which is of a more corporeal nature, and sea water is more corporeal than river water, for it is thicker and able to offer more resistance to pressure?

14 · Why can one remain longer in the sea than in a river? Is it because river [15] water is rare and therefore penetrates more into the body and chokes one?

15 · Why is the sea combustible, while water is not? Or does water also burn, while the reason why the sea has less power to extinguish fire is because it is of a more fatty composition? (And that it is so indicated by the fact that an oil is given [20] off from sea water.) Or are the interstices less able to adapt themselves to fire because they are too wide, and all the more so owing to the presence also of salt? As, therefore, that which is dry has less power to quench than that which is moist, so that which is drier is proportionately more capable of being burnt, one thing being [25] more so than another, since the drier a thing is the more closely allied is it to heat;<sup>7</sup> and the sea possesses both these qualities to a greater extent.

16 · Why is it that the wind blows cold in early morning from rivers, but not from the sea? Is it because the sea extends over open spaces, but rivers are in narrow [30] places? The breeze, therefore, from the sea is dispersed over a wide area and is consequently weak; whereas the breeze from a river is carried along in a mass and is stronger and therefore naturally seems colder. Or is the reason other than this, [35] namely, that the rivers are cold, but the sea is neither hot nor cold? Now a breeze or an exhalation is due to the heating or cooling of liquids; for whichever of these two processes they undergo, evaporation takes place, and, when water evaporates, the resultant air is set in motion, and this is a breeze. That which is produced from cold liquids naturally blows cold, while that which blows from very hot liquids cools and becomes cold. One would, therefore, find that all the rivers are cold, but that the sea [933<sup>b</sup>1] is neither very hot nor very cold. That which blows from it, therefore, is not cold, because it is not itself cold, nor does it cool quickly, because it is not very hot.

[5] **17** · Why do waves calm down more slowly in the wider open sea than in shallow waters? Is it because everything calms down more slowly after much motion than after little? Now in the wide open sea the ebb and flow is greater than in shallow waters; there is, therefore, nothing strange if that which is greater is more slow in calming down. [10]

**18** · Why is it that salt water when it is cold is not fresh, but becomes more fresh when it is heated, and when it is heated and then cooled? Is it because a thing naturally changes from one opposite into the other? Now fresh water is the opposite of salt water; and, when salt water is heated, the salt is boiled out, and, when it [15] cools, is precipitated.

**19** · Why is it that waters near the sea are usually sweet and not salty? Is it because water which is strained becomes more fresh, and the nearer water is to the sea the more it is strained? [20]

**20** · Why does salt water not flow readily? Is it because that which is heavy is stationary, and salt water is heavy? Hence only warm salt waters flow readily, for they have lightness in them which prevails over the heaviness which is in their saltness; for that which is hot is lighter. Furthermore, water which flows readily is [25] strained through the earth; and if water is strained, the thickest and heaviest part of it is always carried to the bottom, while the light and clean element becomes separated. For salt water is heavy and sweet water is light. And so flowing water is sweet. It is for the same reason that salt water, when it is set in motion and [30] undergoes change, becomes sweeter; for it becomes lighter and weaker owing to the motion.

**21** · Why is it that in Libya, if one digs a hole near the sea, the water that first comes is fresh, but afterwards quickly becomes salty, but this happens less elsewhere? Is it because the water which comes first is the water which was already [35] there and has been concocted by the earth, but after a time the sea also is strained through and, because it is new, makes the water more salty? Elsewhere, however, there is either no water or abundant water, because the ground is not dried up.

22 · Why does salt water melt salt more quickly than fresh water? Is it [934<sup>a1</sup>] because the process of melting anything is its dissolution by moisture or heat penetrating into it so that it becomes liquid? Now those things do not cause melting which either cannot penetrate at all or penetrate in such a way as not to touch the substance. Those things which pass through easily scarcely cause any melting, but [5] those which enter in with violence dissolve substances very quickly. Now those liquids which are composed of very large particles do not penetrate, for they are too large for the pores; while those which are composed of small particles pass through without touching. Now fresh water is rare, while salt water is thicker; and so the former, passing through easily owing to its rarity, scarcely causes any melting, [10] whereas the latter penetrates, but percolates through<sup>8</sup> to a less extent, because it is composed of larger particles, and forces its way in more quickly.

**23** · Why does water appear less white when it is in motion, for instance when there is a ripple? Whence Homer says that, when the wind begins to blow,

[15] the sea grows blacker beneath it.<sup>9</sup>

Are there two reasons? Firstly, because, when the sight is near to it, it can penetrate farther through the water when it is still, but when it is in motion the sight cannot pass directly through it. (And that which is transparent appears white, for that through which the sight cannot pass is what Homer calls black; therefore the air appears black from a distance but white near at hand, and the part of the sea which [20] is near is white, while that which is distant is blue or black.) And, secondly, because, when the sight is at a distance and is subject in any way to disturbance, it is refracted back in a mass towards the light, if the water is still, but cannot be refracted when it is in motion.

[25] **24** · Why is it that the waves do not ripple in the deep, open sea, but only on small expanses? Is it because a small amount of water, as it is carried along, is more divided by the air than a large amount? Hence it beats more and is broken up. Now in deep water the quantity which is set in motion is great, but in shallow water it is small.

[30] **25** · Why are the waters saltier in regions facing the south wind? Do they become mixed because the sea is driven under the earth by the south wind?

**26** · Why does the salty element in water come to the surface more in sweet than in dry wine? Is it because sweet wine, like raisin wine, has more earth in it? Or [35] is it because sweet wine is heavier and stickier and so mixes less, and, as it does not mix,<sup>10</sup> the salty element comes to the surface?

**27** · Why does the salty element, being earthy, float on the surface at all (for [934<sup>b</sup>1] its natural tendency is to sink)? Is it<sup>11</sup> owing to its heat, as happens with salt (for it resembles an efflorescence)? Or is there some

other reason? For if it is for no other reason,<sup>12</sup> it is not unreasonable that it should be for this reason that it floats specially on the surface of sweet wine; for that is the hottest of wines.

**28** · Why do the waves sometimes begin to move before the winds reach [5] them? Is it because they also cease to move later? For the first breath of wind as it were dies down before the wave which has been impelled by it into motion; and it is not the wave which is first set in motion that arrives, but there is a successive impetus given to the adjoining water.

**29** · Why is it that the ground where the waves break more violently becomes solid, often to such an extent as to appear to have been artificially levelled, [10] and why is the ground where the waves break solid, whereas further from the sea it is loose? Is it because the fine sand is not cast up from a long way off by the waves, but rather the coarser sand, just as it is not possible to throw a very small object far with the hand? Then, many objects being mingled in confusion, the smallest particles fall together and form into a mass, and the motion of the wave, as it [15] recedes, levels them and no longer disturbs them. Since, then, the smallest particles cannot leap far, a mass is formed of very small objects; and since it is in frequent motion, it becomes continuous, the sand falling in amongst it until it unites it together; it is then levelled by the last waves, and the slight moisture causes it to [20] adhere together. But the ground farther from the sea, being dry, becomes disintegrated, and is formed of larger pebbles and is unlevelled.

**30** · Why is it that the upper parts of the sea are saltier and hotter than the depths? So, too, in wells of fresh water the upper water is saltier than that at the bottom; yet salty water, being heavier, ought to stand at a lower level. Is it because [25] the sun and the air always attract the lightest part of liquid? Now the fresher is always lighter, and the sun can more easily attract things from the nearest parts. And so that which is left on the surface both of the sea and of fresh water is saltier [30] (since the sweet element has been extracted) than that from which little or nothing has been withdrawn. For this reason the upper part is also hotter; for salt water is hotter than fresh. Therefore some of the followers of Heraclitus declare that stones [35] and earth are formed from the drying and

solidifying of fresh water and that the sun draws up vapours from the sea.

**31** · Why are the waters of the sea sweeter which are nearer the land? Is it because they are more continuously in motion? Now salt water becomes sweeter through motion. Or is it because the water is saltier in its depths, and the part of the [935<sup>a</sup>1] sea near the land is less deep? Hence also water which shelves quickly is salty and less sweet. The reason for this is that the salty element being heavy is carried down more into deep water.

**32** · Why is sea water the only kind of water that is combustible, whereas [5] fresh water and river water are not? Is it because it has much earth in it, as is proved by the presence of the salt in it? Or is it because it is of a fatty composition, as is proved by the oil which forms on the surface<sup>13</sup> of salt water?

**33** · Why does sand not form in lakes, or at any rate less than in the sea and in rivers? Is it because rocks form in the sea and the earth has been to a great extent [10] burnt out of them? Now sand is rock which has been broken up into small and minute particles, and it is broken up by the impetus of the waves. But in lakes pure rocks are not formed to the same extent, nor are they broken to the same extent, [15] because there are not waves to the same extent. But sand is formed more in rivers, because they carry down the earth and break up the rocks with their impetus.

**34** · Why is it that, when a lake either falls or dries up, the corn in the adjoining plain is more likely to be frosted? Is it because the moisture in the lake [20] evaporates and warms the air with its vapour, and so makes the frosts slighter and weaker than in hollow and marshy districts? Or is it from the earth, as men say, that the cold begins and penetrates unnoticed? If then the lake becomes dry, owing to [25] the larger space of earth greater cold attacks the crops and freezes them and frosts them to a greater extent; and on such ground the cold comes from below, as indeed seems to be the case. And yet the earth is warm in winter; but the surface heat which is in the earth, owing to the fact that it is moist, becomes cooled, for the [30] moisture is neither so far in as not to be

affected by cold, owing to the heat which is present in liquids, nor so slight as to have no force, since the earth is permeated with water. For instance, owing to its becoming cold, one walks and lives upon ice.

**35** · Why is the sea salty and bitter? Is it because the juices in the sea are [35] numerous? For saltiness and bitterness appear at the same time.

**36** · Why do shells and stones which are in the sea become round? Is it because the breaking off of their extremities equally on every side causes them to [935<sup>b1</sup>] assume a round form? For the outer surface of this shape is the same on all sides, and the sea by moving objects in every direction breaks off their extremities equally.

**37** · Why is it that sometimes, if one digs a hole near the sea, the first water which enters is fresh but afterwards it becomes salty? Is it because the water comes [5] from the sea itself which is strained under the earth? The water which first comes is, therefore, naturally sweet; for sweet water is lighter than salt water, and the sea has some sweetness in it, which mingling with the earth tends to come to the surface. But the salt water, owing to its weight and to the fact that it has power to penetrate, is carried downwards. Whether this is so or whether the sweet water flows from the [10] mainland into the sea through the earth's veins, it would naturally float on the surface of the sea which mingles with it; but, the passages being opened, the salt water, owing to its greater volume, subsequently prevails and makes the whole sea salty. For if the passages are blocked the result is that the inflowing salt water finds [15] another way higher up;<sup>14</sup> but when they are opened, it is all carried there, just as happens in the veins in the body.

**38** · Why is it that the sea, which is heavier than fresh water, is more transparent? Is it because of its fattier composition? Now oil poured on the surface [20] of water makes it more transparent, and the sea, having fat in it, is naturally more transparent. Or is that which is lighter not always more transparent also? For oil itself is lighter than water but not more transparent. Or is the sea not really more transparent, but only apparently so? For fresh water comes from the earth or from streams, and



its source sends forth earth also with the water, so that the streams, not [25] being pure, bring down with them the earth and sediment. This then is the reason why fresh water is less transparent.

**39** · Why do the bowels of those who swim in the sea open readily? For if it is because they take violent exercise, those who run also take very violent exercise, yet their bowels do not open. Or does not every form of exertion cause the bowels to [30] open, but only such exercise as does not cause liquefaction? Now staying in the sea seems to make men, generally speaking, hungrier and opens the bowels; for the vapour given off by it is both hot and dry.

**40** · Why does the Lake of Paesus,<sup>15</sup> of which the water is fresh, wash and also remove the stains from garments? For water which is sweet washes, but that [35] which is bitter removes stains, and water cannot have both these qualities at the same time. Are stains removed not because the water is bitter, but by the quality of stickiness which has this power? Hence animals' hoofs have this effect, and anything which contains mucous matter; and so also any bitter substances which partake of this character do the same. Now in this lake it so happens that the bitter [936<sup>a1</sup>] element of the quality of soda has been burnt out, but the fatty and sticky element remains. It is by virtue of this that it removes stains, and it washes because it is fresh.

**41** · Why does the part of the sea which is calm appear white, while that [5] which is agitated appears black? Is it because that which is less visible appears blacker, and water which is in motion is less seen than that which is still? Or is it because that which is transparent is white, while that which is not so is black, and that which is in motion is less transparent? [10]

# BOOK XXIV

## PROBLEMS CONCERNING HOT WATER

1 · Why is it that, if one is anointed with oil, hot water poured over one seems less hot, in spite of the fact that oil contains heat? Is it because owing to the smoothness caused by the oil the water glides off and sinks in less? [15]

2 · Why is it that in the summer the water in wells becomes warm after midday? Is it because by that hour the heat has mastered the air, whereas before midday the heat is dissolving and putting an end to the cold; but the one does not [20] prevail as soon as the other has ceased, but only after time has elapsed?

3 · Why is it that water, which sometimes becomes hotter than a flame, does not burn wood, whereas the flame does so? Is it because the flame, and the breath which comes from it, consist of small particles, whereas water is made up of large particles and so does not penetrate? Now flame and the heat from coals owing to [25] their rarity can penetrate and destroy.

4 · Why is it that boiling water has not the power to melt, while the stomach possesses this power? Is it because the heat which is in the stomach penetrates owing to its rarity, whereas water cannot penetrate because of its density? Or is it because liquid prevents other things also from melting (for nothing melts in liquid)? [30] In the stomach, however, the liquid flows down into the bladder and so permits the process of melting.

5 · Why is it that the bottom of a vessel containing boiling water does not burn, but one can carry it holding it by the bottom, whereas if the water be removed it burns? Is it because the heat as it is engendered in the bottom of the vessel is [35] extinguished by the water? That is also

why substances which can be melted do not melt if any liquid is added to them.<sup>1</sup>

6 · Why is it that water does not boil over so much in winter as in summer, although heated not only up to the same temperature but even higher, and although [936<sup>b</sup>1] equally hot or even hotter? Is it because boiling over is due to the rising of bubbles? The water then itself becomes just as hot in winter as in summer,<sup>2</sup> but the bubbles cannot rise to the same extent, because the surrounding air is cold, but they rise [5] smaller in size, being compressed by the cold, and soon burst, being broken by the air. They are, therefore, smaller in bulk and fewer in number in the winter, and the contrary in summer. Now boiling over is due to the number and size of the bubbles forming the froth.

[10] 7 · Why does hot water cause wrinkles, but fire, though it is hot, not do so? Is it because fire produces breath and so causes swelling (for it distends the skin), whereas it is the curving of the skin which makes wrinkles?

8 · Why is it that the bottoms of vessels in which water is being heated are hotter while the water is still cold? Is it because, while the water is still cool, the heat [15] is enclosed and driven inwards, being prevented from making its way out, but, when the water in the vessel becomes thoroughly heated, since the fire no longer holds the heat but expends itself and becomes less, the bottom of the vessel becomes cooler, just as a bath does? For a bath is hotter in winter than in summer, because the heat [20] is more enclosed in winter than in summer by the surrounding air which is cold.

9 · Why is it that water when it boils does not form a scum, as do pea-soup and lentil-soup? And yet water is lighter than these, and light substances ought to be able to project themselves more easily to a distance. The same thing happens in the case of silver when it is being purified; for those who clean out the mint make [25] gains by appropriating the remnants, sweeping up the silver which is scattered about. Is it because the heat causes the scum by vaporizing and subjecting to force anything which opposes its own natural impetus? Water,

therefore, owing to its [30] lightness and rarity is not subjected to force, and so no great heat is collected in it, but the heat which continually passes into it cuts its way through before it can become massed together. But substances which have body in them, like thick soups and silver, since, owing to their weight, they contain much corporeal matter and offer resistance,<sup>3</sup> because they are subjected to violent force as the heat tries to [35] make its way out, form bubbles wherever the heat prevails; for, owing to their density, the heat cannot pass through them, but the density prevails until it is thrown off by the heat which flows into it. The result is a sudden impact, and not a continuous pressure, owing to the heat passing up quickly from below.

**10** · Why, if substances are moistened in hot water for a short time, do they [937<sup>a</sup>1] swell, but, if for a long time, collapse and become wrinkled? Is it because the heat makes a thing liquid instead of solid and produces breath from liquid and rarefies what is dense? At first, therefore, it heats things which are solid and makes them moister, and producing breath from the moisture distends and swells them; but [5] when it heats them still more, it rarefies their outer part,<sup>4</sup> so that the vapour is given off, and the drying up of moisture causes their bulk to collapse. Now, as anything collapses, its outer skin shrivels up, and where it shrivels up unevenly, wrinkles are formed. [10]

**11** · Why are stones formed by hot water rather than by cold? Is it because a stone is produced from the failure of moisture, and moisture fails more through the operation of heat than of cold, in other words petrification is the result of heat—as Empedocles says that both rocks and stones come into being through the action of<sup>5</sup> [15] hot waters? Or, while it is true that heat petrifies, can petrification also take place through cold, because an extremely hard frost consumes the moisture and causes hardening? That cold, pure and simple, produces this effect is clear from the fact that its excess does so.

**12** · Why is it that if one has one's foot in hot water, if the foot is kept still [20] the water appears to be less hot, but hotter if it is moved? Does the same thing happen as in the body, viz. that, when one runs in the wind, the opposing air becomes increasingly colder, and the farther one goes the more one notices it?

[25] **13** · Why do hot things cool off more in the sun than in the shade? Is it because the lesser heat is destroyed by the greater? Or is it because in the shade the surrounding cold represses the interior heat and does not allow it to make its way out, producing the same effect as the pouring of cold water produces upon those who [30] are fainting<sup>6</sup> (for it encloses the heat and prevents it from escaping); and speaking generally the interior parts of anything are warmer in the winter? But in the sun, since there is nothing which intercepts it, the heat is free to move and vanishes more quickly.

**14** · Why is it that water heated by the sun is not more wholesome for [35] washing purposes? Is it because, owing to the fact that it is cooling, it causes shivering while it is still upon the body?<sup>7</sup> Or, while it has this effect, is it unhealthy if used often for washing? For hot water, generally speaking, produces concoction and has a drying effect, whereas cold water has an astringent effect, and so both do [937<sup>b</sup>1] good. Therefore cold water and water heated over a fire are both beneficial to those who wash in them; but water heated by the sun owing to the weakness of its heat produces the effect of neither of these, but merely has the effect of moistening—like the light of the moon.

[5] **15** · Why is water which has been heated in the sun not wholesome? Is it because that which is cooling causes shivering?

**16** · Why are the hot waters at Magnesia and at Atarneus fresh? Is it because more water pours into the hot water as it flows out, and so its saltiness [10] disappears, but its heat remains?

**17** · Why is it that in Magnesia the hot waters ceased to be hot but the water remained salty? Is it because more cold water from elsewhere was poured at the same time into the springs and extinguished the heat? Now the earth was salty, but [15] not hot owing to the abundance of water flowing into it. (A similar process occurs in water which is strained through hot ashes; for the water being strained through the hot ashes cools the ashes and itself becomes cold, but is salty and bitter owing to the ashes.) But when the water which was added had become transformed, the heat in [20] the earth for a different reason prevailed

over the coldness of the water owing to its small volume, and hot waters flowed again.

**18** · Why are waters from hot springs all salty? Is it because they usually percolate through earth which contains alum (as is shown by the smell of the water) and has been burnt? Now the ashes of anything are salty and smell of sulphur. The earth therefore burns the water like a thunderbolt. Many hot springs therefore are [25] due to strokes of thunderbolts.

**19** · Why are hot bathing-places sacred? Is it because they are due to two very sacred things, sulphur and the thunderbolt?

# BOOK XXV

## PROBLEMS CONNECTED WITH THE AIR

1 · Why is it that pain is caused if the limbs are enclosed in inflated skins? Is [30] it due to the pressure of the air? For just as the air does not yield to pressure applied to the skin from outside but repels it, so the air also presses upon the limbs enclosed within. Or is it because the air is held within by force and is compressed, and so, [35] having naturally an outward impetus in every direction, it presses against the body enclosed within?

2 · Why is it that in marshes near rivers the so-called ‘bellowings’ take place, which according to the fable are uttered<sup>1</sup> by the sacred bulls of the god? That which is produced is certainly a noise which resembles the roaring of a bull, so much so [938<sup>a</sup>1] that it has the same effect on cows when they hear it as the bellowing of a bull. Is it due to the fact that this phenomenon always occurs wherever rivers stagnate into marshes,<sup>2</sup> or are driven back by the sea, or give forth wind in unusually large quantities? The reason is that hollows in the earth form, and the water making its [5] way in (for there is always a flow of water in marshy ground of this kind) thrusts the air also through a narrow entrance into a wider hollow, just as a noise like roaring is produced if one makes a sound through the aperture into an empty jar; for it is by a similarly shaped organ that a bull’s roaring is produced. Now, if the hollows have [10] irregular forms, a variety of strange noises is produced; for if one takes off the lid of a vessel and rubs it against the bottom, drawing it in and out,<sup>3</sup> it makes enough noise to frighten away wild animals when orchard-watchers employ this device. [15]

3 · Why does the air not become moist when it comes into contact with water? For all other things become moist when they touch water. Is it because the extremities of the air and water meet, but the surface of each remains distinct?<sup>4</sup> All other things then are heavier, but the air does not sink below the outer extremity of [20] the water. It therefore touches it, because there is nothing between them; but it does not become wet,

because it always remains above the water.

4 · Why does calm weather occur most often at midnight and at midday? Is it because calm is immobility of the air, and the air is most at rest when it either has [25] the mastery or is overmastered, and it is in movement when it is struggling? Now it has the mastery most at midnight and is overmastered at midday; for at the former time the sun is farthest away and at the latter nearest at hand. Again, the winds begin to blow either about dawn or about sunset; and the wind which blows at dawn dies down when it is overpowered, and that which blows at sunset dies down when it [30] ceases to have the mastery. Consequently the former dies down at midday, the latter at midnight.

5 · Why is it colder when dawn is breaking and it is already early morning than at night, although the sun is nearer to us? Is it because towards daybreak dew and hoar-frost fall, and both of these are cold? The whole ground then being as it [35] were sprinkled with cold moisture, a process of cooling takes place.

6 · Why is it that in Pontus both intense cold and stifling heat occur? Is it because of the thickness of the air? For in the winter it cannot be thoroughly warmed, and in the summer, when it is heated, it burns because it is thick. It is for [938<sup>b</sup>1] the same reason also that marshy regions are cold in winter and hot in summer. Or is it because of the course of the sun? For in the winter it is far away, and in the summer near at hand.

[5] 7 · Why is the sky finer at night than by day? Is the sun the cause of wind and disturbance? For these occur when some movement takes place; the cause therefore is the heat. So, when the heat is not present, everything is at rest, and there is more rest when the sun is rising than when it is sinking. And the saying,

[10] Having no fear of a cloud from the land,

means that, where there is most movement, there must be least permanence and consistency, that which is trying to hold together being irregular and unable to gain the mastery. And this is what happens on the



sea in winter and on land in summer.

8 · Why is it that when liquid which fills a jar is poured into skins the jar not [15] only holds the liquid and the skins as well but also has room for more liquid? Is it because there is air present in the liquid? This then, when it is in the jar, cannot be given off owing to the size of the jar; for the larger anything is the more difficult it is to press any moisture or air out of it, as can be seen in sponges. But when it is divided [20] up into small portions, it is pressed out of the skin together with the air already there, so that the space occupied by the air becomes empty; and so the jar can hold the skins and additional liquid as well. This is more especially the case with wine, because there is more air in wine than in water. Similarly the same vessel can hold [25] the same quantities of ashes and water together as it can hold of each poured in separately. For there are apparently many empty spaces in ashes, and so the water, being thinner, sinks in more and saturates the ashes, so that they become dense, because the saturation takes place in one part after another (for a thing always becomes more thoroughly saturated if the process takes place little by little than all [30] at once), and, as this takes place, the ashes gradually sink, at the same time absorbing the liquid because they contain hollows. (But ashes thrown into water while still hot cleave the water and cause it to evaporate.) And the same thing happens if the water is poured in first and the ashes put in afterwards, so that the [35] water also would seem to contain hollows and empty spaces. Or do the ashes take up the water, and not the water the ashes? For it is only natural that that which is composed of smaller particles should be that which finds its way into something else. (Further, this can be illustrated by an experiment; for when ashes are sprinkled water is attracted to any spot where they are sprinkled; whereas the contrary would [939<sup>a</sup>1] have taken place if it were the water which takes up the ashes.) Or does this process not occur if the water be poured in first and fill the vessel to the brim, but, if anything then be added, does it overflow? But if the water once overflows and the ashes settle down, then it does occur; for it was the ashes which took up the water. [5] There is a parallel to this in the fact that trenches do not hold all the earth which has been dug out of them; for apparently some air occupies the space excavated, and for this reason it does not hold all the earth.

9 · Why is it that, though air is denser than light, it can pass through

solids? [10] Is it because light travels in a straight line only, and so the sight cannot see through porous substances like pumice-stone, in which the pores are irregular, whereas they are not so in glass? The air, on the other hand, is not obstructed, because it does not travel in a straight line through anything through which it passes. [15]

**10** · Why is it that the air becomes cold by touching water but not moist, even though one blows so hard upon water as to cause waves? That it becomes cold is clear from the change which it undergoes; for the air from water causes cold. Is it because it is the nature of air to be cold or hot, and it changes by touching anything [20] with which it comes into contact; but it does not also become moist, because it is too light and so never penetrates below the level of the water, but always remains in contact only with the surface, even though it be forced downwards, and the water then recedes still lower, so that the air can never penetrate into its depth?

**11** · Why is the air from bubbles and the air which comes up from beneath [25] the water never wet? Is it because the moisture is not retained, but the water drops off? The water on the surface of a bubble is also too little to moisten anything.

**12** · Why is it that air cannot saturate anything, but water can? For water even when it is transformed into air is moist. Is it for the same reason as that for [30] which stone cannot do so? For everything has not this faculty of saturating other things, but only that which is viscous or liquid.

**13** · ... Is it because the air in it is carried upwards? For when the skin is empty it sinks; but when it is inflated, it remains on the surface, because the air supports it. But if the air makes it lighter and prevents it from sinking, why does a [35] skin become heavier when it is inflated? And how is it that when it is heavier it floats, and when it is lighter it sinks?

**14** · Why is it that the air does not rise upwards? For if the winds are the [939<sup>b</sup>1] result of air being moved by heat and it is the nature of

fire to rise upwards, the wind ought to travel upwards, since that which sets it in motion rushes upwards and that which is set in motion has a natural tendency to travel in the same direction. As a matter of fact, however, the air obviously travels in an oblique direction.

[5] **15** · Why is the hour of dawn colder than the evening? Is it because the former is nearer to midnight and the latter to midday? Now midday is the hottest time, because it is nearest to the sun, and midnight is colder for the opposite reason.

**16** · Why is it that in hot weather the nights are more stifling than the days? [10] Is it owing to the absence of wind? For the periodical winds and the ‘forerunners’ blow less at night.

**17** · Why is it that substances enclosed in inflated skins and closely covered vessels remain uncorrupted? Is it because things which are in motion become corrupt, and all things that are full are without motion, and such skins and vessels are full?

[15] **18** · Why is it that it is colder when the sky is clear than when it is overcast, though the stars and the heaven are warm? Is it because in clear weather there is nothing to hold the vapour, but it is diffused everywhere, whereas in cloudy weather it is contained? For the same reason it is colder when the wind is in the North than when it is in the South; for the South wind attracts cloud, whereas the North wind [20] dispels it, and more evaporation appears to take place when the wind is in the North than when it is in the South, and in winter than in summer. Or is it because of dissimilarity? Or because vapour is formed when that which is hot cools?

**19** · Why is it that a smaller amount of air is warmer than a larger quantity (for confined spaces are always warmer)? Is it because a larger quantity is [25] subjected to more motion, and motion makes a thing cold? This can be seen from the fact that hot things become cold if set in motion.

20 · Why is it that water and earth become corrupt, but air and fire do not? Is it because anything which is corrupted must become very hot, but there is nothing hotter than fire? Or is it because a thing must be chilled before it can be corrupted, [30] but fire is always hot and the air is full of fire? So nothing becomes corrupted when it is hot, but only when it is chilled. Now earth and water<sup>5</sup> can become hot and cold.

21 · Why is cloudy weather hotter than clear weather? Is it because, as the men of old said, the stars are cold? Or is this too absurd a doctrine, and is the real reason that in clear weather vaporization takes place? That this is so can be inferred [35] from the fact that, when there is no wind, dew and hoar-frost are formed. When, therefore, the weather is clear, the hot substance, by which the moisture is taken up, is blown about, and so the air becomes cold; for which reason also the moisture which the hot substance lets fall forms dew. But when the weather is cloudy the moisture is contained; and therefore there is no dew or hoar-frost in cloudy weather. [940<sup>a</sup>1] The heat, therefore, remaining in the neighbourhood of the earth makes the weather warm.

22 · Why is it that in lofty rooms the air constantly ebbs and flows, especially in calm weather? Is it because the air contains much void in its composition? When, therefore, it begins to flow in, the air inside the room gives way [5] and contracts; and when in course of time this air becomes massed together, the air outside becomes more full of voids and contains much vacant space. Into this space then the air from the room rushes, since it is near at hand, and passes into it, because it is suspended and the nature of the void cannot resist. So when this happens in [10] many parts of it, the adjoining air follows it owing to the forward impetus;<sup>6</sup> and then, since a large quantity of air rushes out,<sup>7</sup> the space within becomes full of voids, while the air outside is denser and so rushes in again from outside. Thus these two currents continually interchange. [15]

# BOOK XXVI

## PROBLEMS CONNECTED WITH THE WINDS

1 · Why does the North-East wind (Caecias) alone of the winds attract the clouds to itself? Is it because it blows from higher regions? For the parts towards the East are higher than those towards the West, as is shown by the extent and [20] depth of the sea towards the West. Now Caecias, blowing from above to a contrary direction, describes in its course a line which follows an upward curve in relation to the earth;<sup>1</sup> and falling, as has been said, upon the western regions of the earth and massing the clouds together as a result of the form of line which it follows, on its [25] return it thrusts the clouds before it towards itself. It is the only one of all the winds which does this, because for some the opposing regions are higher,<sup>2</sup> towards which their course, either starting from a lower level or proceeding in a straight line, as a result travels in a downward curve<sup>3</sup> towards the earth, so that there can be no return [30] of the wind to its source because it ends its course round the earth, where, besides, there are no clouds.<sup>4</sup> The East wind (Apeliotes) and the other winds which follow a less curving course do not form clouds because they have no moisture. Since, then, it forms no clouds, the effect produced by the East wind (Apeliotes) is less obvious than that produced by Caecias.

[35] 2 · Why do the North winds occur at a fixed period of the year, whereas the South winds do not? Or do South winds occur annually but are they not continuous, because the source of the South wind is far away from us, and we live close to the North wind? Further, the annual North winds blow when the air is still (for they [940<sup>b</sup>1] blow in summer); whereas the South winds occur in the spring, when the region of the air is less stable. Again, the South wind is moist, and the upper region of the atmosphere is unfavourable to moisture; so any moisture which is formed in it is quickly dissolved. Also moisture is erratic; and so the South wind, because it does [5] not remain in the same place, helps to set up changes in the movement of the air. And since the air does not remain in the same place when it moves, other winds are consequently set up; for a wind is a

movement of air.

3 · Why does the South wind blow after a hoar-frost? Is it because hoar-frost occurs when concoction takes place, and after concoction and cleansing a change to [10] the opposite condition takes place? Now the South wind is the opposite of the North wind. For the same reason also the South wind blows after snow. In a word, both snow and hail and rain and all such processes of cleansing are a sign of concoction; [15] therefore after rain and similar storms the winds fall.

4 · Why do the alternating winds blow? Is it for the same reason as causes the change of current in straits? For both sea and air are carried along until they flow; then, when the land-winds encounter opposition and can no longer advance, because the source of their motion and impetus is not strong, they retire in a [20] contrary direction.

5 · Why do the alternating winds come from the sea? Is it because the sea is close at hand? Or is it because the alternating wind is the opposite of the land-wind and as it were the reverse of it? Now the land-wind is the breeze which blows from [25] the land towards the sea, and the alternating wind is the reflux of the land-wind, so that it must necessarily come from the sea. Or is it because the air which has been set in motion collects out at sea? The reason of its not collecting on land and of its being thrown back is the fact that the sea is in a hollow, and air, like water, flows always into the deepest hollow it can find.

[30] 6 · Why do cloud-winds stop sooner when rain falls? Is it because, when it rains, the hollows of the cloud, in which the source of the wind is formed, collapse?

7 · Why are not the same winds everywhere rainy? Is it because the same winds do not everywhere blow against mountains, but different winds are opposed to different mountains? For example, when the winds blow laboriously against [35] steep mountains, the clouds are more likely to form there, since the wind cannot push them farther forward; and when the clouds form and are compressed, they burst.

8 · Why are sunsets, if they are clear, a sign of fine weather; if they are [941<sup>a</sup>1] disturbed, a sign of stormy weather? Is it because a storm occurs when the air is dense and thick? When, therefore, the sun prevails, it breaks up and clears the air; but, if it is itself overpowered, an overcast sky results. If, therefore, the density is [5] excessive, a storm occurs as soon as the day dawns; whereas if it is weaker but not completely overpowered, the denseness which forms is driven towards the setting sun and remains there, because the air round the earth is thicker than the storm. And the rest of the air quickly densifies, because a beginning of the process has already been made and there is a rallying point to receive and collect anything [10] which comes to it,<sup>5</sup> the same thing occurring in the air as happens in a rout, where, if one man makes a stand, the rest also remain firm. Hence the sky sometimes becomes quickly and suddenly overcast. When, therefore, there is a disturbed sunset, it is a strong indication that the sun has not got the mastery over the density, [15] though it has struggled long against it, so that probably further condensation has taken place. This is a less alarming symptom when it occurs after a storm than in calm weather; for in the former circumstances it is probably the remnant of a storm, but in the latter the beginning of condensation.

9 · What is the origin of the saying, [20]

Boreas blows not at night when once the third sun has arisen?

Is it because the breezes which come from the north are weak when they blow at night? A proof that the amount of air which is set in motion is not great is the fact that they blow at a time when there was a small amount of heat; and a small amount of heat was moving a small amount of air. Now all things terminate in multiples of three, and things which are very small terminate at the end of the first triad; and [25] that is what this wind does.

10 · Why does the North wind blow more frequently than the South wind? Is it because the North wind, being near the inhabited portion of the world, attracts our notice in spite of its short duration (for it is with us as soon as it begins to blow), whereas the South wind does not reach us, because it blows from a distance? [30]

11 · Why does the South wind blow as much<sup>6</sup> on winter nights as on winter days? Is it because during the night the sun is near the southern region, and the nights there are warmer than are the days in the north? Much air, therefore, is set in [35] motion and not less than by day; but the warmer days prevent the wind from blowing more strongly by drying up the moisture.

12 · Why does the South wind blow at the time of the dog-star, and why does this happen regularly like any other natural phenomenon? Is it because the southern regions are warm, since the sun is not far<sup>7</sup> away, and so the evaporation is considerable? The South winds would blow frequently if it were not for the annual [941<sup>b</sup>1] winds; as it is, these prevent their blowing. Or is it because a sign occurs at the setting and rising of any star, and especially of the dog-star? It is clear that winds blow most of the time of and after its rising, and since it causes stifling heat, it is [5] only natural that the hottest winds should be set in motion when it rises; and the South wind is hot. And since things are most accustomed to pass from contraries into contraries, and the ‘forerunners’, which are northern winds, blow before the rising of the dog-star, the South wind naturally blows after the dog-star appears, [10] since a sign then occurs, and the occurrence of a sign<sup>8</sup> at the time when stars rise means a change in the air. Now all winds change either into their contraries or into those on their right; but since the North wind cannot<sup>9</sup> change into the winds on its right, the only thing left for it to do would be to change into a South wind. Now on the fifteenth day after the winter solstice the wind is in the south, because the [15] solstice marks as it were a fresh start and the sun sets in motion air which is nearest to it<sup>10</sup> and at this solstice it is near the south. Just as, therefore, when it sets the region of the east in motion it stirs up the East winds, so when it sets in motion the southern region it stirs up the South winds. It does not do this immediately after the [20] solstice, because the changes which it sets up extend at first over a very small area, but only on the fifteenth day, because this date corresponds to the first sensible impression made by the change; for the said date is simply the most significant part of a whole.

13 · Why are the days most changeable during the period of Orion, and why [25] is there then such variability in the wind? Is it because during a period of change all things are always most indeterminate, and



Orion rises at the beginning of autumn and sets in the winter, so that, since there is not yet one settled season, but one is coming on and the other coming to an end, the winds must therefore necessarily be [30] unsettled, because those of each season are passing into one another? And Orion is said to be dangerous both in his setting and in his rising owing to the uncertainty of the season; for it must be full of confusion and inconsistency.

**14** · Why does the North wind which blows at night cease on the third day? [35] Is it because it comes from a small and weak source and the third day marks the crisis? or is it because it expends itself all at once like the cloud-winds, and therefore quickly dies down again?

**15** · Why do the North winds blow more than the other winds? Is it owing to the fact that the inhabited portion of the earth is near the region of the north, which is high and outside the tropics and full of snow, which never leaves some of the [942<sup>a</sup>1] mountains? As, therefore, frozen matter is usually melting there, a wind often arises, and this wind is the North wind which comes from the region of the pole.

**16** · Why do the South winds blow during winter and at the beginning of [5] spring and the end of the autumn, and why are they boisterous and whirling in their course and why are they cold to the inhabitants of Libya in like manner as the North winds are to us? Is it because, the sun being near, the winds must necessarily be set in motion? Now during the winter the sun travels towards the south, and at the beginning of the spring and at the end of autumn it is giving forth heat; whereas [10] during the summer the sun travels towards the north and leaves those other regions. The South wind is hot, because it mingles its breath with the air in the region of Libya, which is hot; and so it is boisterous and makes the summer rainy, sweeping down on the sea. [15]

**17** · Why does the South wind cause evil odours? Is it because it makes bodies moist and hot, and they are then most liable to corruption? South winds, however, which come from the sea are good for plants—for it falls on them from the sea, as it does on the Thriasian Plain in Attica—and the reason is that it is cooled before it arrives.<sup>11</sup> Now mildew is

caused by moisture which is hot and comes from [20] without.

**18** · Why does wind usually occur before eclipses, at nightfall before midnight eclipses and at midnight before those which occur at dawn? Is it because the heat which comes from the moon becomes faint, because its course is already [25] getting near the earth, and when it is quite near the eclipse will take place? Now when the heat, by which the air is held back and kept still, is set free, the air begins to move again and a wind springs up later in time according as the eclipse is later.

**19** · Why is the South wind rainy not when it is beginning but when it is ending? Is it because it collects the air from a distance? For the rain comes when the [30] South wind masses the air together, and it masses the air together only after it begins to blow. Or is it because, when the South wind begins to blow, the air is still hot, because it comes from a hot region, but in course of time it becomes cool, and then tends to become massed into rain?

**20** · Why is it that the South wind, when it is less strong, brings clear weather, but, when it is strong, brings clouds and lasts longer? Is it, as some say [35] owing to the source from which it comes? For if it comes from a weaker source it brings clear weather, but if it starts from a stronger source it brings clouds. Or is it because it is weaker when it begins, so that it does not propel much air, but in the [942<sup>b</sup>1] end it usually becomes strong? Hence comes the proverb,

When the South wind begins and when Boreas ceases his blowing.

**21** · Why is it that in the winter the winds come forth from the east, but in the summer also from the west? Is it because, when the sun no longer prevails, the [5] air flows freely? When, therefore, the sun sinks, it leaves clouds behind it, which cause the West winds, and anything which it carries with it to the inhabitants of the southern hemisphere becomes an East wind. And, contrariwise, when it sinks in the southern region of the earth, it will cause West winds for the inhabitants of that [10] region and East winds in our part of the world from the air which accompanies it. For this reason too, if it finds another wind blowing, that wind

becomes stronger when the sun rises, because it adds something to it.

**22** · Why are hounds least able to find the scent when a West wind is blowing? Is it because it disperses the scent most owing to the fact that of all the [15] winds it blows most continuously and down on to the earth?

**23** · Why, when there are shooting stars, is it a sign of wind? Is it because they are carried along by the wind, and the wind occurs where they are, before it reaches us? For this reason also the wind rises in that quarter from which the stars are set in motion.

[20] **24** · Why is it that of all the winds the West wind drives the largest clouds? Is it because it blows from the open sea and over the deep, so that it collects clouds from a large area?

**25** · Why are the winds strongest which are at their ending? Is it because when they expend themselves all at once, what remains is very little?<sup>12</sup>

[25] **26** · Why is it that, if the South-West wind (Lips) blows about the time of the equinox, rain results? Is it because the sun sets the winds in motion from any part of the universe in which it is? Hence the succession of the winds corresponds to the course of the sun. Now since the equinox is the boundary between winter and [30] summer, when it happens that the sun, according to the equinox as it appears to us, has passed the exact boundary or falls short of it and is rather in the wintry region, the result is that the winds from that region blow, of which the first is the South-West wind, which is naturally moist. Now when the sun is rather in the wintry region of the universe and stirs up the winds there, the result is that the typical conditions of winter result; one of which is wet weather. Again, since the [35] equinox is as it were winter and summer equally balanced, if anything is added to either one of them it causes a distinct inclination in one direction, just as happens in the case of equally balanced scales. But, since the South-West wind is of the wintry [943<sup>a</sup>1] order and naturally moist, its addition at the equinox causes an inclination towards winter and rainy weather; for rain is the

wintry weather most akin to the wind that has begun to blow.

**27** · Why are the South wind and the South-East wind (Eurus), which are [5] warmer than their respective contraries, the North wind and the West wind, more rainy, although water is engendered from the air by cold? For it is not true that the clouds form because the North wind thrusts them away from our part of the world; for the West and South-East winds both alike—for they are similarly at the sides of the world—drive away clouds from the quarter from which they blow, as also do all [10] the other winds. Is it because the more the heat exists outside, the more the cold is driven within? Or is it due in some degree to the quarter from which they blow that certain winds bring clear weather? For the South-East wind rises from the dawn (and the region is warm), while the West wind is situated towards the evening.<sup>13</sup> But is there not a further reason, namely, that air, like water, cools most quickly and [15] thoroughly when it is previously heated? The air then brought by the South-East wind arrives warm from the rising sun, as does that brought by the South wind from the midday sun; when, therefore, they reach the colder region, they quickly condense and become massed into rain. And the South-East wind has a greater tendency to form rain, because it brings the air more directly from the sun and [20] equally hot; but the South wind is rainy as it ceases to blow, because the first air that is brought comes cold from the sea, whereas the last air, which is very warm, is brought<sup>14</sup> from the land. Or is there not a further reason, namely, that the South wind is stronger as it ceases to blow (hence the proverb applied to it, ‘When the South wind begins . . .’), and stronger winds are colder, and so the South wind [25] masses the clouds together at the end of its duration? Is not this why it is more rainy then than when it first begins to blow?

**28** · Why do the winds, though they are cold, cause dryness? Is it because the colder winds cause evaporation? But why should they do so more than the sun? Is it because they carry off the vapour, whereas the sun leaves it where it is and [30] consequently causes more moisture and less dryness?

**29** · Why does the North-East wind (Caecias) alone of all the winds attract the clouds towards itself, as the proverb has it, ‘Drawing it to

himself, as Caecias draws clouds'? For the other winds simply drive forward the clouds from the quarter from which they blow. Is this phenomenon to be attributed to the fact that [35] the contrary wind blows at the same time? But would not this have been obvious, and is it not more likely that the North-East wind naturally follows a circular course? The other winds therefore blow round the earth, but the North-East wind [943<sup>b</sup>1] has the concave side of its course towards the heavens and not towards the earth, and so, blowing towards its source, it attracts the clouds to itself.

**30** · Why is it that the wind blows cold in the early morning from rivers but [5] not from the sea? Is it because the sea extends over open spaces, but rivers are in narrow places? The breeze, therefore, from the sea is dispersed over a wide area and is consequently weak; whereas the breeze from a river is carried along in a mass and [10] is stronger and therefore naturally appears colder. Or is the reason other than this, namely, that the rivers are cold, but the sea is neither hot nor cold? Now a breeze or exhalation is due to the heating or cooling of liquids; for whichever of these two processes they undergo, evaporation takes place, and, when water evaporates, the resultant air is set in motion, and this is a breeze. That which is produced from cold [15] liquids naturally blows cold, while that which blows from very hot liquids cools and becomes cold. One would therefore find that all the rivers are cold, but the sea is neither very hot nor very cold. That which blows from it therefore is not cold, because the sea is not itself very cold, nor does it cool quickly because the sea is not [20] very hot.

**31** · Why is the West wind always considered to bring fair weather and to be the pleasantest of the winds? So, for instance, Homer says that in the Elysian Plains.

Ever the breezes blow of the Zephyr.<sup>15</sup>

Is it because in the first place it contains a mixture of air? For it is neither hot like [25] the winds from the south and east, nor cold like that from the north, but is<sup>16</sup> on the boundary between the cold and the hot winds; and, being near to them both, it partakes of their qualities, and is consequently temperate and breathes most of spring. Furthermore, the winds change either into their contraries or into those on [30] their right; blowing therefore after the North wind (for the west is on the right of the

north), it enjoys a good reputation, as being mild as compared with an inclement wind. Also as soon as wintry weather ceases, fine weather usually follows; and the North wind is a wintry wind. [The East wind, though it lies between the warm and the cold winds, partakes less of them; for, when it blows, it sets in motion the winds [35] towards the south (for when it changes it does so in that direction), but though it sets them in motion it does not mingle with them. The West wind is set in motion by the South winds, and when it blows it sets the North winds in motion; for there the [944a1] succession of the winds ceases. Hence the West wind, constituting as it does the end of some winds and the starting-point of others, justly is and is considered to be a pleasant wind.]<sup>17</sup>

**32** · Why does the South wind blow at the time of the dog-star? Is it because a sign occurs at the setting or rising of any star, and especially of the [5] dog-star? It is clear then that the wind blows most at the time of and after its rising. And since it causes stifling heat, it is only natural that the hottest winds should be set in motion when it rises; and the South wind is hot.

**33** · Why does the West wind blow towards evening and not in the early [10] morning? Is the sun at its rising and setting usually the cause of breezes? For when it concocts and dissolves the air, which is moist, by thoroughly heating it, it dissolves it into breath; and if the air is full of breath, it becomes still more evaporated by the sun. When, therefore, the sun is in the east, it is far away from the West wind, for [15] the latter blows from the setting sun; but when the sun is already near its setting, the breath is then thoroughly dissolved, and from midday onwards and towards evening the sun is most suitably situated for heating and dissolving the air. It is for this reason also that the East wind begins to blow in the early morning; for since the air above the earth becomes charged with moisture during the night and owing to its [20] weight approaches the earth, the sun from dawn onwards dissolves it and sets in motion first the air which is nearest to itself. Now the East wind gets its name Apeliotes because it is the wind which blows from the rising sun.

**34** · Why is it that when the sun rises the winds both rise and fall? Is it [25] because a wind is the movement either of the air or of moisture carried up? Now this movement, when it is only slight, is quickly

absorbed by the sun, so that no wind occurs; but when it is greater, the movement is increased when the sun rises, for the sun is a source of movement. [30]

**35** · Why does the West wind blow in the evening? Is it because all the winds blow when the sun disperses the moisture? For the moisture being already in a mass, the power of heat, when it approaches it, concocts it.<sup>18</sup> Now the West wind blows from the setting sun; it is only natural then that it should rise in the evening, for then the sun reaches the quarter proper to that wind. [35]

The North and the South winds are the most frequent of winds, because, when one contrary is overcome by its direct contrary, it is least able to continue, whereas it is better able to resist a wind blowing against it from an angle. Now the South and [944<sup>b</sup>1] the North winds blow from regions on either side of the sun's course, while the other winds blow rather in a straight line with it.

**36** · Does the wind come from a source, as water does, and is it unable to rise to a higher level than that source, or is this not so? And does it come from a single [5] point or from a wider area? There are indeed in the wind certain similarities to that which seems to occur in water; for water flows faster when it travels downhill, whereas it stagnates on flat and level ground, and the winds act similarly, for on [10] promontories and high ground the air is always in motion, whereas in hollows it is often at rest and there is a calm. Moreover on exceedingly high mountains there is no wind at all—on Mount Athos, for example, amongst others, as is proved by the fact that offerings which persons sacrificing leave there one year are, so it is said, [15] found there still in the following year. It is clear then that the course of the wind starts as it were from a source of some kind. It cannot, therefore, rise any higher. Hence the above phenomenon occurs on high mountains, to which what happens to water would be a close parallel; for apparently neither a strong flow of water nor a [20] violent wind is found in high mountains.

**37** · Why is it that when the South wind blows the sea becomes blue, but when the North wind blows it becomes dark? Is it because the North wind disturbs the sea less, and that which is less disturbed appears to be all black?

[25] **38** · Why do the South winds when they blow gently cause no overclouding, but when they become strong overcloud the sky? Is it because, when they blow gently, they cannot produce many clouds? They therefore cover only a small area with cloud; but, when they blow strongly, they thrust along many clouds, and therefore seem to cause more overclouding.

[30] **39** · Why is the North wind strong when it begins to blow, but weak as it ceases, whereas the South wind is weak when it begins, but strong as it ceases? Is it because the North wind is near to us and the South wind distant? The former then, when it begins, blows immediately in our part of the world, whereas the beginning of the latter becomes dispersed owing to the long time it takes to travel, and little of [35] its first breath reaches us; and we feel the end of the North wind, but that of the South wind not at all. It is, therefore, only natural that the North wind should be weak as it ceases (for the end of all things is weak), while the South wind is not weak at its close, since we do not feel its ending at all.

[945<sup>a</sup>1] **40** · Why do alternating winds blow where there are bays, but not where there is a wide expanse of open sea? Is it because the wind, when it pours into the bays, is less broken up and travels for the most part in a collected mass, whereas [5] over open expanses of sea the land-winds tend to be broken up as they begin to flow, and when they move the same thing happens to them, because they are free to travel in many directions? For an alternating wind is the reflux of a land-wind.<sup>19</sup>

**41** · What is the origin of the saying,

When the South wind begins and when Boreas ceases his blowing?

Is it because the North wind, owing to the fact that we live near it and our [10] habitation is towards the pole, immediately blows strongly, for it is with us as soon as it begins? Hence, as it ceases, it blows pleasantly; for it then blows weakly. The South wind, on the other hand, because it is far away, reaches us later in greater strength.



**42** · Why is it that men feel heavier and weaker when the wind is in the south? Is it because moisture becomes abundant instead of scanty, being melted by the heat, and moisture, which is heavy, takes the place of breath, which is light, and [15] under these conditions men's strength becomes languid?

**43** · Why are men hungrier when the wind is in the north than when it is in the south? It is because the North winds are colder?

**44** · Why does the South wind not blow in Egypt itself in the regions towards the sea nor for the distance of a day and a night's journey inland, while in the [20] regions beyond Memphis and for the distance of a day and a night's journey it blows freshly; and does not blow to the west for the distance of two days' and two nights' journey, while to the east the South-West wind (Lips) blows? Is it because Egypt in its lower regions is hollow, so the South wind passes over above it, but to the south and farther away the regions are loftier? [25]

**45** · Why is it that the South wind is weak when it begins to blow, but becomes stronger as it ceases, while with the North wind the contrary is the case, hence the proverb,

Sail when the South wind begins and when Boreas ceases his blowing?

Is it because we dwell rather towards the pole than towards the midday sun, and the North wind blows from the pole, while the South wind blows from the midday sun? [30] It is only natural, therefore, that the North wind, when it begins, immediately attacks with violence the regions nearer to it, and afterwards transfers its violence to the dwellers farther south. The South wind, on the contrary, when it begins, presses upon those who dwell towards the midday sun, and, when it has passed them by, blows freshly upon those who dwell towards the pole. [35]

**46** · What is the origin of the saying,

Straightway the winter comes, if the South wind call to the North

wind?

Is it because it is the nature of the South wind to collect clouds and much rain? When therefore the North wind blows under these conditions, since there is [945<sup>b</sup>1] abundant material, the North wind freezes it and brings on the winter. Hence the saying,

When Boreas findeth the mire, soon cometh the season of winter.

Now mud and rain in general are usually, if not invariably, due to the South wind.

[5] **47** · Why does the North wind follow quickly upon the South wind, but not the South wind upon the North wind? Is it because the North wind arrives from near at hand, but the South wind from a distance, since our habitation is towards the north?

**48** · Why is it that the winds are cold, although they are due to movement caused by heat? Is movement caused by heat not invariably hot, but only when it [10] occurs in a certain manner? If it comes forth in a mass, it burns with its heat the very thing which emits it; but if it passes out gradually through a narrow space, it is itself hot, but the air which is set in motion by this process completes the movement in accordance with whatever was its original nature. This can be seen in the human [15] body; for there is a saying that from the same organ we breathe both hot and cold, but this is untrue, since all that proceeds from the mouth is hot, as is shown by the fact that it appears hot if the hand is placed close to the mouth. It is the manner in which it comes forth which makes the difference. For if in yawning we emit breath from a wide opening, it appears hot because we can feel it; but if it be emitted [20] through a narrow opening, being more violent, it impels the air in its immediate neighbourhood, which in its turn impels the adjoining air. If the air is cold, its movement is also cold. May not the same thing happen also in the winds, and their first movement be through a narrow channel and then set in motion the adjoining air, and then other air begin to rush onwards? So in the summer the winds are hot, [25] in winter they are cold, because in each case this is the temperature of the air which is already there; for that the air does not follow this course because it is either set in motion by itself or overpowered by the heat, is clear not only

from the fact that it heats the winds when there is more heat in it, but also because it was originally [30] being carried upwards. For fire is of this nature; whereas cold naturally travels downwards. The winds move horizontally and for good reason; for since the heat presses upwards and the cold downwards and neither prevails, and the air cannot remain still, it is only natural that its motion should be sideways.

[35] **49** · Why are the South winds cold in Libya as the North winds are with us? Is it primarily because the sources of these winds are respectively nearer to us and to them? For if, as we have already said, the winds pass through a narrow channel, they will be colder to those who are nearer to them owing to the violence of their [946<sup>a</sup>1] movement; for when their movement proceeds farther, they become dispersed. Hence the North winds are cold in our part of the world, because we are nearer to them and dwell quite near the pole.

**50** · Why is it that those South winds which are dry and do not bring rain [5] cause fever? Is it because they engender unnatural moist heat in the body? For they are by nature moist and hot, and this causes fever, which is due to a combined excess of these two things. When, therefore, the South winds blow under the influence of the sun without bringing rain, they engender this condition in us;<sup>20</sup> whereas, when they bring rain with them, the rain cools us.

**51** · Why do the periodical winds always blow at the season at which they do [10] blow and with the force with which they blow? And why do they cease at close of day and not blow during the night? Is this due to the fact that the melting of snow by the sun ceases towards evening and at night? Now these winds blow in general when the sun begins to prevail and melt the northern ice. When the ice begins to melt, the 'forerunners' blow; when it is already melting, the periodic winds blow. [15]

**52** · Why is the West wind at once the gentlest of winds and also cold, and why does it blow mainly at two seasons, namely, spring and autumn, and towards evening, and usually in the direction of the land? Is it cold because it blows from the [20] sea and from extended areas? It is

less cold indeed than the North wind, because it blows from evaporated water and not from snow; but it is cold, because it blows either after the winter, when the sun is only just beginning to prevail, or in the autumn, when the sun no longer has power. For it does not have to wait for its proper matter,<sup>21</sup> as it would if it were a land-wind, but wanders freely, because it has [25] travelled over water. For the same reason it blows evenly; for it does not blow from mountains or from forcibly melted matter, but flowing gently as through a channel. For the regions towards the north and south are mountainous; but towards the west there is neither mountain nor land but the Atlantic Ocean, so that it travels in the direction of the land. Further, it blows towards evening owing to the quarter from [30] which it comes; for the sun then approaches that quarter. It ceases at night because the movement set up by the sun dies down.

**53** · Why do all things appear larger when the South-East wind (Eurus) blows? Is it because it makes the air very gloomy?

**54** · Why is it that during the winter the winds blow early and from the east, [35] but in summer in the evening and from the setting sun? Is it because what happens in our part of the world during the summer occurs during the winter among those who inhabit the opposite hemisphere of the earth, and with us in the winter the winds blow early and from the east, because the air, which during the night is full of moisture, is dissolved and set in motion by the sun in the early morning, the air [946<sup>b</sup>1] nearest the sun being the first to be affected? The sun begins to produce this effect even before it rises; therefore the breezes blow just as much before sunrise. Since then the sun attracts the moisture to itself and in the winter before its rising sets in [5] motion in our part of the earth the air which is moist, it is clear that it would also attract the moisture when it is in the southern hemisphere, and it would be evening there when it is early morning with us. The result would be that the air, which the sun attracts to itself before its rising in our part of the world would become a West [10] wind to the dwellers in the south and would blow in the evening. Now what happens during our winter happens to them at dawn, and what happens in the summer to them happens to us in the evening; for when it is summer here, it is winter there, and our evening is their early morning, at which time they have breezes from the east, [15] while we have West winds for the same reasons as are mentioned above.

In the summer breezes do not blow from the east, because the sun, when it rises, finds the air in our part of the earth still too dry, owing to the short period of its absence; and West winds do not blow in the evening during the winter, because East winds do not blow in the southern hemisphere either at that time for the aforesaid reasons, in [20] virtue of which the sun attracts the moisture to itself and produces the West wind in our part of the earth.

55 · Why is the West wind always considered to bring fair weather and to be the pleasantest of the winds? Is it because it is on the boundary between the hot and the cold winds, and being near to them both it partakes of their qualities, and is therefore temperate? The East wind, though it also lies between the hot and the cold [25] winds, partakes less of them; for when it blows it sets in motion the winds towards the south (for, when it changes, it does so in that direction), but, though it sets them in motion, it does not mingle with them. The West wind is set in motion by the South winds and, when it blows, it sets the North winds in motion; for there the succession of the winds ceases. Hence the West wind, constituting as it does the end [30] of some winds and the starting-point of others, justly is and is considered to be a pleasant wind.

56 · Why are different winds rainy in different places; for example, Hellespontias (the East wind) in Attica and the islands, the North wind on the Hellespont and in Cyrene, and the South wind round Lesbos? Is it because rain occurs [35] wherever there is a collection of clouds, since density collects wherever it can settle? It is for this reason that there is more rain among the mountains than where the mass of clouds can find a free passage, for that which is confined becomes dense as a necessary consequence; also it rains more in calm weather. In the Hellespont [947<sup>a</sup>1] the North wind, blowing from its upper end, masses together many clouds, which Hellespontias (the East wind) drives towards Attica and the islands, being thus provided with material; for most clouds come round from the north.

Round Lesbos the South-East (Eurus) and South winds bring much cloud [5] from the open sea and drive it against the land. Similar instances might be quoted for the other winds.

57 · What is the origin of the saying,

Have no fear of a cloud from the land in the season of winter,  
But if it come from over the deep have a care; and in summer  
Ever distrust the cloud that sweeps from the gloom of the mainland?

Is it because in the winter the sea is warmer, so that, if any cloud has formed, it must [10] have done so from some powerful cause, otherwise it would have been dissolved, because the region in which it forms is warm? Now in the summer the sea is cold, as also are the sea breezes, but the land is hot, so that if any cloud comes from the land, it must have been formed from some considerable cause; for it would have been dissolved if it had been weak.

**58** · Why is it that in Arcadia, which is high, the winds are no colder than [15] elsewhere, but when there is no wind and it is cloudy, it is cold, just as it is in flat, marshy districts? Is it because Arcadia resembles a marshy district, since it has no outlet for its waters to the sea, for which reason also there are many chasms there? When, therefore, there is a wind, it winnows away the exhalations from the earth, [20] which are cold, but the winds themselves are not cold, because they arrive from the sea; but when there is no wind the vapour which rises from the stagnant water causes the cold.

**59** · Why is it that the wind lasts a long time when it begins to blow at dawn? [25] Is it because, when the sun rises, the impetus given to the wind is very violent and can therefore maintain its character? That this is so is shown by the fact that it forms a strong mass.

**60** · Why is it that the North wind is keen during the day but falls at night? Is it because it is generated from frozen rain when this is evaporated by the sun? It [30] falls at night, because the process does not go on as before, but is reversed; for at night the North wind expends itself, but it is less apt to do so during the day.

**61** · Why is it that when many spiders' webs are borne through the air, they are a sign of wind? Is it because the spider works in fine weather, but the webs are [35] set in motion because the air, as it cools, collects on the ground, and this cooling process is the beginning of winter, so that the movement of the webs is a sign? Or is it because after

rain and storms the spiders<sup>22</sup> are borne through the air in large numbers, since they work in fine weather (for they do not appear at all in the winter, the spider being unable to support the cold), and as they are borne along by the wind [947<sup>b</sup>1] they unwind a quantity of web? Now after rain winds usually blow.

62 · Why is it that the strong North winds in winter cause clouds in the cold regions, but outside them bring a clear sky? Is it because they are at the same time [5] cold and strong, and in the regions near the north they are colder and so congeal the clouds before they can drive them along, and the clouds, when they are congealed, remain where they are owing to their weight? Elsewhere, however, it is their strength rather than their coldness which takes effect.

## BOOK XXVII

### PROBLEMS CONNECTED WITH FEAR AND COURAGE

[10] 1 · Why do those who are afraid tremble? Is it due to the process of chilling? For the heat fails and contracts; that is also why the bowels usually are loosened.

[15] 2 · Why do men become thirsty under certain conditions, those, for example, who are about to be punished? For this ought not to be so, since they are chilled. Is it because the chilling and heating do not occur in the same region, but the former takes place on the surface of the body, from which the heat departs, but the heating takes place in the interior, so that it warms it, as is proved by the fact that the bowels become loosened? For thirst occurs when the sovereign region of the body becomes [20] dry. The same thing seems to happen as occurs in those suffering from ague, who are thirsty and cold at the same time; for in their case too the same part of the body is not hot and cold.

3 · Why is it that under the influence of anger men become heated and bold (the heat collecting in the interior of the body), whereas in a state of fear they are in [25] a contrary condition? Is it because they are not affected in the same region, but in those who are angry the heat collects in the region of the heart—hence they become courageous and red in the face and full of breath—the course of the heat being upwards, whereas in those who are afraid the blood and heat both retreat in a downward direction—hence the bowels become loosened. For the beating of the [30] heart is different, since in those who are frightened it is frequent and strongly punctuated, as would naturally occur from the failure of heat, while in those who are angry it has the character which one would expect when a greater quantity of heat collects. Hence the expressions about anger ‘boiling up’ and ‘rising’ and ‘being stirred up’ and the like are apt and fitting. Is the thirst also due to this cause, since [35] dry-spitting and the parching of the tongue and the like are due to the simultaneous upward rush of breath and heat? Thirst, moreover, is clearly due to the body becoming heated. How then can the same region,



namely, that in which we feel thirst, become dried up both in one who is afraid and in one who is angry? That fear [948<sup>a</sup>1] tends to produce thirst is clearly shown in the case of routed soldiers; for under no other condition is such thirst experienced. The same is true of those suffering from great anxiety; therefore they wash out their mouths and swallow liquid, as did Parmenon the actor. Or is it in such cases not thirst but dryness due to the flight of [5] blood (whence also they become pale)? This is indicated by the fact that they do not drink much but simply take a gulp; routed soldiers on the other hand are undergoing violent exertion. So those who are about to be punished feel thirst, and in this there is nothing strange. In war some brave men even, when they are drawn up in battle array, actually tremble when they are not distraught but confident; and they often [10] beat their bodies with a flat cane or, failing that, with the hand, in order that they may be warmed.<sup>1</sup> It seems probable that owing to the violence and impetus of the heat a disturbing inequality of the temperature is set up in the body.

4 · Why are brave men generally fond of wine? Is it because the brave are full of heat, and the heat is in the region of the chest? (For it is there also that fear shows itself, acting as a process of cooling; with the result that less<sup>2</sup> heat remains in [15] the region of the heart, and in some men the heart beats violently as it is cooled.) Those then who have an abundance of blood in their lungs have hot lungs, as though they were drunk, and so the presentiment of danger does not chill them. Such men are fond of drinking; for the desire for drink is due to the heat of this region, as has [20] been stated elsewhere, and the desire is for that which has power to stop the heat. Now wine is naturally hot and satisfies the thirst better than water, particularly in those whom we are now considering;<sup>3</sup> the reason for this has been stated elsewhere. Hence those who are suffering from inflammation of the lungs and those who are mad both desire wine, though the lungs of the former are hot owing to the fever, and [25] those of the latter owing to their state of disturbance. Since, then, the same people are usually of a thirsty and of a brave kind, and those who are thirsty desire wine and are therefore fond of drinking, it necessarily follows that the two characteristics of bravery and fondness for wine usually go together. Hence those who are drunk are braver than those who are not. [30]

5 · Why do states honour courage more than anything else, though it

is not the highest of the excellences? Is it because they are continually either making war or having war made against them, and courage is most useful in both these circumstances? They, therefore, honour not that which is best, but that which is best for themselves.

6 · Why do those who are afraid tremble most in the voice, the hands, and [35] the lower lip? Is it because this affection is due to the departure of heat from the upper parts of the body? If so, their pallor is due to the same cause. The voice, then, trembles owing to the departure of heat from the chest, the region in which the voice is set in motion thus becoming cooled. So too with the hands; for they are attached to the chest. The lower lip trembles, and not the upper, because the upper lip hangs [948<sup>b</sup>1] downwards<sup>4</sup> in the direction of its natural tendency; but the upward direction of the lower lip is contrary to nature and it is held steady in that position by the heat. When, therefore, the heat is withdrawn as the process of cooling takes place, it trembles. For the same reason the lip hangs down when a man is angry, as can be seen clearly in children; for the heat rushes together into the heart. [5]

7 · Why do those who are afraid tremble, especially in the voice, the hands, and the lower lip? Is it because the heat fails in the region of the body in which the voice is situated, while the trembling of the lip and hands is due to the fact that they are very easily set in motion and contain very little blood? Those who are afraid also [10] emit bile and their sexual organs contract, the emission of bile being due to the heat which descends and causes liquefaction, while the contraction of the sexual organs is due to the fact that fear comes from outside, and therefore the rush of heat is in the contrary direction.

8 · Why do those who are afraid feel both thirst and cold, these being contrary affections? Do they feel cold because they are chilled, and thirst because [15] they are heated, since under the influence of fear the heat and the moisture leave the upper parts of the body? That this happens is shown by the change of colour and by the effect on the bowels; for the face becomes pale and the bowels are sometimes loosened. The cold, therefore, is caused by the departure of the heat, and the thirst by the departure of the moisture, from the upper parts of the body.

[20] **9** · Why is it that, although both fear and pain are a kind of grief, those who are in pain cry out, but those who are afraid keep silence? Is it because those who are in pain hold their breath (and so it is emitted all at once and comes forth with a loud cry), whereas the body of those who are afraid is chilled and the heat is carried [25] downwards and creates breath? It creates breath in the particular region to which it is carried; hence those who are frightened fart. Now the voice is a rush of breath upwards in a particular manner and through certain channels; and the reason why those who are in pain hold the breath is that when we suffer anything (just as the other animals use their horns or teeth or claws in self-defence) we invariably make [30] use straightway and without thought of the resources which we have in ourselves by nature, and against all or most forms of pain heat is helpful. This is what occurs when a man holds his breath; for he applies heat and concoction to the pain by collecting heat within him by means of the breath.

[35] **10** · Why is it that in those who are afraid the bowels are loosened and they desire to pass urine? Is it because the heat in us is as it were alive? It therefore flees whenever it is afraid of anything. Since, then, the fears due to nervousness and the like come from without and pass from the upper to the lower parts of the body and [949<sup>a</sup>1] from the surface to the interior, the regions round the bowels and bladder becoming heated are loosened and make these organs ready to function. For anise and wormwood and all substances which promote the flow of urine have heating properties. Similarly the drugs which affect the bowels are those which cause heat in the lower parts of the body, and some of those which are applied merely<sup>5</sup> have a [5] loosening effect, while others set up a further process of liquefaction, like garlic, which passes into the urine. Now heat coming from the surfaces of the body and meeting in these regions has the same effect as such drugs.

**11** · Why do the sexual organs contract in those who are afraid? For one would expect the contrary to happen, namely, that they should become relaxed, [10] since the heat collects in this region in those who are afraid. Is it because those who are afraid are almost always as it were chilled? Their sexual organs therefore contract, because the heat has left the surface of the body; hence also those who are greatly frightened have internal rumblings. The surface of the body and the skin of those who are

cold seems to contract, because the heat is driven out; and it is for this reason too that they shiver. Now the scrotum too contracts upwards and the testicles [15] also are lifted up with it as it is drawn in. This is more readily seen in the effect on the sexual organs; for fear causes excretion, and an emission of semen often occurs<sup>6</sup> in those who are nervous or greatly alarmed. [20]

## BOOK XXVIII

### PROBLEMS CONNECTED WITH TEMPERANCE AND INTEMPERANCE, CONTINENCE AND INCONTINENCE

1 · Why is it that some men become ill when, after having been accustomed to live intemperately, they adopt a temperate mode of life? For example, Dionysius [25] the tyrant, when during the siege he ceased drinking for a short time, immediately became consumptive, until he changed his manner of life and began to drink again. Is it because in every one habit is a matter of importance, since it soon becomes nature? Just, then, as a fish would fare ill if it continued long in the air or a man if he continued long in the water, so those who alter their manner of life suffer from [30] the change, and a resumption of their accustomed mode of life is just as much their salvation as if they were returning to a natural condition. Furthermore, men waste away if they have been accustomed to large quantities of a particular diet; for if they do not receive their usual food, they are reduced to the condition in which they would be if they had no nourishment at all. Moreover, the excretions, when mixed [35] with a large quantity of food, disappear, but by themselves they rise to the surface and are carried to the eyes or lungs; whereas, if one takes nourishment, they mix with it and become diluted and harmless. But in those who live an intemperate life [949b1] the excretions become superabundant up to a certain point, when they cease from their accustomed mode of life, owing to the fact that much undigested matter is still present in them from their former manner of living; and, when this is melted, like a mass of snow, by the natural heat, the result is that violent fluxes take place. [5]

2 · Why is it that we speak of men as incontinent in connexion with two only of the senses, namely, touch and taste? Is it because of the pleasures that result from these in us and in the other animals? Being then shared by the animals, they are held in least honour and so are regarded as the only pleasures deserving of reproach, [10] or at any rate more so than any others. So we blame a man who is a slave to them and call him incontinent and intemperate, because he is a slave to the worst

pleasures.

3 · Why are men called incontinent in respect only of their desires, although incontinence is possible also in anger? Is it because an incontinent man is one who acts in some way contrary to reason, and incontinence is a mode of life which is [15] contrary to reason, and the desires are, generally speaking, contrary to reason? Feelings of anger, on the other hand, are in consonance with reason, not in the sense that reason prompts them, but in the sense that reason informs us of the insult or of the charge made against us.

[20] 4 · Why is it that we approve most of continence and temperance in the young and wealthy, and of justice in the poor? Is it because we feel most admiration if a man abstains from what he most needs, rather than from the contrary? Now a [25] poor man needs resources, while a rich young man needs enjoyment.

5 · Why can men tolerate thirst less easily than hunger? Is it because thirst is more painful? A proof that it is so is the fact that there is more pleasure in drinking when one is thirsty than in eating when one is hungry. Now the contrary of what is pleasant is more painful. Or is it because the heat whereby we live requires moisture [30] more?<sup>1</sup> Or is it because thirst is a desire for two things, namely, drink and food, but hunger is a desire for only one, namely, food?

6 · Why can we endure thirst less than hunger? Is it because the former causes us more pain? A proof of the pain it causes is the fact that the pleasure it gives is more intense. Further, he who is thirsty needs two things, nourishment and [35] cooling, and drink provides both of these; but he who is hungry needs one of them only.

7 · Why are men called incontinent if they indulge to excess in the pleasures connected with touch and taste? (For those who are intemperate in sexual [950<sup>a</sup>1] intercourse and the enjoyments of eating and drinking are called incontinent; and in the joys of eating and drinking the pleasure is partly in the tongue and partly in the throat; hence Philoxenus longed for the throat of a crane.) And why is the term

incontinent never extended to the pleasures of sight and hearing? Is it because the [5] pleasures of touch and taste are common to us and the other animals? Being, then, shared by the animals they are held in least honour and so are regarded as the only pleasures deserving of reproach, or at any rate more so than any others. So we blame a man who is a slave to them and call him incontinent and intemperate, because he is a slave to the worst pleasures. Now the senses being five in number, [10] the other animals find pleasure only in the two already mentioned; in the others they find no pleasure, or, if they do, it is only incidentally. For the lion<sup>2</sup> rejoices when he sees or scents his prey, because he is going to enjoy it;<sup>3</sup> and when he has satisfied his hunger, such things do not please him, just as the smell of dried fish gives us no [15] pleasure when we have eaten our fill of it, though, when we wanted to partake of it, it was pleasant.<sup>4</sup> The scent of the rose, on the other hand, is always pleasant.

8 · Why are men less able to restrain their laughter in the presence of friends? Is it because, when anything is especially elated, it is easily set in motion? Now benevolence causes elation,<sup>5</sup> so that laughter more readily moves us. [20]

# BOOK XXIX

## PROBLEMS CONNECTED WITH JUSTICE AND INJUSTICE

1 · Why is it that, although injustice is greater according as the good which is injured is greater, and honour is a greater good, yet injustice in the matter of money seems to be more serious and those who are unjust as regards money are considered more unjust? Is it because men prefer money to honour, and money is [25] common to all, whereas honour comes only to a few and its enjoyment is a rare occurrence?

2 · Why is it a more terrible thing to rob a man of a deposit than of a loan? Is it because it is disgraceful to wrong a friend? Now he who robs another of a deposit does wrong to a friend; for no one places a deposit with another unless he trusts him. [30] A creditor, on the other hand, is not a friend; for, if a man is a friend, he gives and does not lend. Or is it because the injustice is greater, since, in addition to the loss inflicted, he also violates his good faith, for the sake of which, if for no other reason, he ought to abstain from doing the wrong? Further, it is base not to requite like with like; for the one party in making the deposit regarded the other as his friend, but the [35] latter in robbing him treated him as an enemy; but a lender does not lend in the spirit of friendship. Again, a deposit is handed over to be guarded and returned, whereas the lender lends for his own advantage as well. Now we are less angry at losing if we are in pursuit of gain, like fishermen when they lose their bait; for the [950<sup>b</sup>1] risk is obvious. Again, those who make deposits are generally the victims of plots or misfortune, but it is the rich who lend money; and it is more terrible to wrong the unfortunate than the fortunate.

3 · Why is it that in some law courts the jury give their verdict in accordance [5] with the birth of the litigants rather than the provisions of the will? Is it because about birth it is impossible to lie, but the truth must be declared, whereas before now many wills have been proved to be forged?

4 · Why is it that poverty is more commonly found amongst the good than [10] amongst the bad? Is it because, being universally hated and



despised, she takes refuge with the good, thinking that with them she is most likely to find safety and a place of habitation; whereas she thinks that if she goes to the wicked, they would never remain content with the same condition but would steal or plunder, in which [15] case she could no longer remain with them? Or is it because she thinks that the good will treat her better than any one else and that she is least likely to be insulted by them? So, just as we place deposits of money with good men, so she of her own accord ranges herself with them. Or is it because, being of the female sex, she is [20] more helpless, so that she needs the assistance of the good? Or is it because, being herself an evil, she will not betake herself to that which is evil, since if she were to choose the evil, her position would be quite irremediable?

5 · Why is it that wrongs in other matters are not so liable to be committed on a large scale as those in respect of money?<sup>1</sup> For example, a man who has spoken a light word would not therefore necessarily divulge a secret, nor<sup>2</sup> would one who has [25] betrayed an individual also betray a city, as a man who has stolen an obol would steal a talent also. Is it because, though there are forms of unjust disposition which are worse, the acts resulting from them are less serious owing to lack of power?

6 · Why is it more disgraceful<sup>3</sup> to rob a man of a small deposit than of a large loan? Is it because he who robs another of a deposit is deceiving a man who thought [30] him to be honest? Or is it because he who commits the one crime would commit the other also?

7 · Why is it that man, who of all animals has the advantage of most education, is yet the most unjust of all? Is it because he possesses the power of reasoning to the greatest degree, and has therefore most carefully estimated the [35] pleasures and happiness, and these are impossible of attainment without injustice?

8 · Why is it that wealth is more often found in the hands of the wicked than in those of the good? Is it because, being blind, it cannot read men's hearts and choose the best?

[951<sup>a1</sup>] 9 · Why is it considered more just to defend the dead than

the living? Is it because those who are alive can look after themselves, but a dead man can no longer do so?

**10** · Why is it that a man who associates with one who is healthy does not himself become any healthier, nor does association with the strong or beautiful [5] improve a man's condition, whereas association with the just and temperate and good does have this effect? Is it because some qualities can, and others cannot, be imitated by the soul, goodness being a quality of the soul and health of the body? A man can, therefore, accustom himself to feel pleasure and pain under the proper circumstances; but his association with the healthy does not produce this result, for health does not consist in taking pleasure or not in certain things, since none of these [10] things can produce health.

**11** · Why is it more terrible to kill a woman than a man, although the male is naturally superior to the female? Is it because she is weaker and so he commits a greater<sup>4</sup> injustice? Or is it because it is not a manly act to use one's strength against that which is greatly inferior?

**12** · Why is the defendant given the position on the right hand in a law [15] court? Is it from a desire to equalize matters? Since, then, the plaintiff possesses other advantages, the defendant is given the advantage of position. Further, as a rule defendants are under guard; and, if the defendant has the right-hand position, the guard is on his right.

**13** · Why is it that, when the votes for the plaintiff and for the defendant are [20] shown to be equal, the defendant wins the case? Is it because the defendant has heard only during the course of the trial itself<sup>5</sup> the charges against which he has to make his defence and produce the witnesses to refute the accusations,<sup>6</sup> if any advantage is to be obtained from them? Now it is not easy for a man to foresee of what he ought to provide witnesses or some other kind of evidence to prove his [25] innocence. The plaintiff, on the other hand, can act as he pleases, and can begin to take action before having the summons issued; and even after he has summoned his opponent he can invent and bring against him any plausible accusation he likes. The lawgiver, then, recognizing that the defendant has the disadvantage in all these [30] respects, has given him

any advantage which may accrue from the disagreement of the jury. And, indeed, that defendants are at a disadvantage is shown by the fact that when men are in a state of alarm they omit much of what they ought to have said or done, and defendants are, generally speaking, always in greater danger; and so, if they omit necessary parts of their defence, when they are put on a level with [35] their opponents in respect of their claims, they would clearly have been victorious if they had not omitted anything.

Further, any one of us would prefer to pass a sentence acquitting a wrong-doer rather than condemn as guilty one who is innocent, in the case, for example, of a [951<sup>b</sup>1] man being accused of enslavement or murder. For we should prefer to acquit either of such persons, though the charges brought against them by their accuser were [5] true, rather than condemn them if they were untrue; for, when any doubt is entertained, the less grave error ought to be preferred; it is a serious matter to decide that a slave is free; yet it is much more serious to convict a freeman of being a slave.

Further, if one man brings a charge and another disputes his claim to any piece [10] of property, we do not consider that we ought to award the disputed property immediately to the plaintiff, but that the man in possession ought to enjoy it until the matter is decided. Similarly, when a number of persons are involved in a case and the numbers of those who declare that a wrong has been committed and of those who deny it are equal—just as in the case cited above when one man brought an accusation, while another denied the truth of it—we consider that the lawgiver is [15] right in not handing over the disputed property to the accuser but allowing the defendant to remain in possession until the plaintiff<sup>7</sup> has established some superiority. Similarly, when the votes of the jury are equal and so neither side has the superiority, the lawgiver has allowed matters to be left as they are.

Again, in serious crimes the punishments are also heavy, so that, if the jury [20] pass an unjust sentence and then change their mind,<sup>8</sup> it is impossible to take the opportunity of remedying the mistake; if, on the other hand, they acquit the accused when they ought not to do so, if he lives so circumspectly as never to commit any crime again, how can the jury have made a serious mistake in failing to condemn such a man to death? If, however, he subsequently commits a crime, the law would [25] consider that he ought to be punished for both crimes.

Or is it because it is the mark of a more unjust man to commit acts of injustice for which one is less likely to be unjustly accused.<sup>9</sup> For wrong-

doing may be due to anger or fear or desire and to many other causes, and not only to intent, but an [30] unjust accusation is generally due to intent. So when the votes have proved equal, indicating both<sup>10</sup> that the accuser has brought an unjust charge and that the defendant is in the wrong, the unjust accuser being judged the offender, the lawgiver has awarded the legal victory to the defendant.

Again, we ourselves adopt the attitude towards our servants that, when we [35] suspect that they have committed a crime and have no certain knowledge, but nevertheless think that they have done the deed, we do not immediately proceed to punish them; and when we cannot pursue our inquiries any further, we acquit them [952<sup>a</sup>1] of blame.

Further, he who from intent commits a crime does a greater wrong than he who does not act from intent. Now the man who brings a vexatious charge against another always does wrong from intent, whereas he who commits any other crime may happen to do so either under compulsion or through ignorance or by some other [5] chance. But when the votes are equal, the prosecutor has been judged by half the jury to be committing a wrong from intent, while the defendant is considered by the remainder to be in the wrong, but not from intent; and so, since the prosecutor is judged guilty of a more serious wrong than the defendant, the lawgiver has rightly decided that he who has committed the less serious wrong wins the case.

Further, a man is always more unjust who does not expect to escape the [10] observation of the man whom he wrongs and nevertheless commits the wrong, than he who expects to remain undiscovered. Now he who brings a vexatious charge against another does not expect to escape the observation of the man whom he falsely accuses, whereas those who commit any other crime usually try to commit an injustice with the expectation of doing so without the knowledge of their victims, so that plaintiffs ought to be regarded as more unjust than defendants. [15]

14 · Why is it that, if a man steals from the baths or the wrestling-school or the market or any similar place, he is punished with death, whereas if he steals from a house he merely pays back double the value of what he has stolen? Is it because in houses it is possible in some way or other to safeguard one's property? For the wall [20] is strong and there is a key, and it is the business of all the slaves in the house to see that the contents of the house are kept safe. At the baths, however, and in places which are similarly public, it is easy for any one who wishes to commit a

crime; for those who place their property there have no sure means of guarding it except their [25] own eyes, so that, if one takes one's eye off it for a moment, it is immediately placed at the mercy of the thief. Hence the lawgiver, considering that bathers are not able to guard their property, has set the law to guard against thieves by threatening that they shall lose their lives if they appropriate the possessions of others.

Further, the owner of a house is responsible for admitting into it whom he [30] wishes and for introducing into it any one whom he does not trust; but the man who deposits any property in a bath cannot prevent any one from coming in, nor can he prevent him, when he has entered, from placing his garments next to his own when he has stripped himself; but, contrary to his wishes, the clothing of the thief and of [35] the man who is about to be robbed lie together in a confused heap. Therefore the lawgiver has prescribed not very heavy penalties to help the man who of his own free will and by his own mistake has admitted the thief to his house, but has clearly fixed [952<sup>b</sup>1] heavy penalties for theft to aid those who are obliged to share with others the right of entrance and the promiscuity of the baths.

Further, it is obvious that all those who commit theft in places the entrance to which is open to any one who wishes to come are bad men,<sup>11</sup> and so, if they are [5] allowed to live, do not desire to have the semblance of honest men even for the future advantage which they can gain from it, regarding it as useless to pretend to be honest in the eyes of those who know their real character; they therefore continue henceforward to be openly wicked. Those, on the other hand, whose wickedness is known to one person only, try to persuade that person by bribery not to make known [10] their real character to the rest of the world; they are not likely therefore to be completely wicked for ever, and so the penalty which the lawgiver has fixed for them is less severe.

Further, of all crimes those which are committed in the most crowded [15] meetings and assemblies bring most disgrace upon the city, just as public orderliness brings the greatest credit; for it is at public gatherings that the citizens are most conspicuous to each other and the rest of the world. The result, therefore, of such thefts is that not only is the man who loses his property personally injured, but also abuse is heaped upon the city. This is why the lawgiver has fixed heavier [20] penalties for such thieves than for those who abstract property from a private house.

Again, the man who loses anything from a private house is in a place where it is easy for him to bear his misfortune, since he is in his own home and neither suffers anything nor is jeered at by others. But the man

who is robbed at the baths finds it [25] difficult to leave without his clothing, and, in addition, is usually jeered at by others; and this is harder to bear than the actual loss. Therefore the lawgiver has prescribed heavier penalties to assist such persons.

Again, many legislative parallels can be found for these penalties. For example, if any one speaks evil of a magistrate the punishment is severe, but there is no penalty for speaking evil of an ordinary individual; and rightly so, for the [30] legislator considers that the slanderer not only commits an offence against the magistrate but also insults the city. Similarly, a man who commits a theft at the harbour is considered not only to harm the individual whom he robs, but also to bring disgrace upon the city. And the same is true of any crime committed in a place [35] of public meeting.

**15** · Why is it that in law courts, if equal votes are given for the two adversaries, the defendant wins the case? Is it because the defendant has remained [953<sup>a</sup>1] unaffected by the action of the plaintiff, and in a position of equality with him he would probably have won?

**16** · Why is it that for theft the punishment is death, whereas for assault, which is a more serious crime, the penalty or fine is assessable in court? Is it because [5] to commit an assault is an act of human weakness, of which all more or less partake, whereas there is no force which compels us to theft? A further reason is the fact that a man who tries to commit theft would think nothing of committing assault also.

# BOOK XXX

## PROBLEMS CONNECTED WITH PRACTICAL WISDOM, INTELLIGENCE, AND WISDOM

[10] **1** · Why is it that all those who have become eminent in philosophy or politics or poetry or the arts are clearly of an atrabilious temperament, and some of them to such an extent as to be affected by diseases caused by black bile, as is said to have happened to Heracles among the heroes? For he appears to have been of this nature, and that is why epileptic afflictions were called by the ancients ‘the sacred [15] disease’ after him. That his temperament was atrabilious is shown by the fury which he displayed towards his children and the eruption of sores which took place before his disappearance on Mount Oeta; for this often occurs as the result of black bile. Lysander the Lacedaemonian also suffered from similar sores before his death. [20] There are also the stories of Ajax and Bellerophon, of whom the former became insane, while the latter sought out habitations in desert places; that is why Homer writes,

And since of all the gods he was hated,  
Verily o’er the Aleïan plain alone he would wander,  
Eating his own heart out, avoiding the pathway of mortals.<sup>1</sup> [25]

And many others of the heroes seem to have been similarly afflicted, and among men of recent times Empedocles, Plato, and Socrates, and numerous other well-known men, and also most of the poets. For many such persons have bodily afflictions as the result of this kind of temperament, while some of them obviously [30] possess a natural inclination to affections of this kind; in a word, they all, as has been said, are naturally atrabilious. The cause of this may be understood if we first take an example from the effect of wine, which if taken in large quantities appears to produce such qualities as we attribute to the atrabilious, inducing, as it is drunk, [35] many different characteristics, making men for instance irritable, benevolent, compassionate, or reckless; whereas no such results are produced by honey or milk or water or anything similar. One can easily see that wine has a variety of effects by observing how it gradually changes those who drink it; for, finding them chilled and taciturn as the result of abstinence, a small quantity makes them more

talkative, [953<sup>b</sup>1] while a larger quantity makes them eloquent and bold, and, when they proceed to action, reckless, and a still larger quantity makes them insolent and afterwards frenzied, while outrageous excess enfeebles them and makes them stupid like those [5] who have been epileptic from childhood, and very similar to those who are exceedingly atrabilious. As, therefore, an individual as he drinks and takes wine in different quantities changes his character, so there are men who embody each character. For the temporary condition of one man when he is drunk is the permanent character of another, and one man is loquacious, another emotional, [10] another easily moved to tears; for wine has this effect also on some people and therefore Homer writes,

He says that I swim in tears, like a man that is heavy with drinking.<sup>2</sup>

Others become compassionate or savage or taciturn; for some maintain a complete silence, especially those atrabilious subjects who are out of their minds. Wine also makes men amorous; as is shown by the fact that a man who is drinking is induced [15] to kiss those whom, owing to their appearance or age, no sober person would kiss. Wine then gives a man extraordinary characteristics, but for a short time only, while nature gives them permanently for the period of a lifetime; for some men are [20] bold, others taciturn, others compassionate, and others cowardly by nature. It is therefore clear that each characteristic is produced by wine and by nature by the same means; for the whole body functions under the control of heat. Now both the juice and the atrabilious temperament are full of wind; and that is why the [25] physicians say that flatulence and disorders of the stomach are due to black bile. Now wine has the quality of containing air; so wine and the atrabilious temperament are similar in nature. The froth which forms on wine shows that it contains air; for oil does not produce froth, although it is hot, but wine produces it in large [30] quantities and red wine more than white because it contains more heat and substance. It is for this reason that wine excites sexual desire, and Dionysus and Aphrodite are rightly coupled together, and atrabilious persons are generally lustful. For sexual desire is due to the presence of breath, as is shown by the fact [35] that the penis quickly increases from a small to a large size by inflation; also boys before they are capable of emitting semen find a certain pleasure in rubbing their sexual organs through lust when they are approaching the age of puberty, and the swelling of the organ becomes manifest because breath passes through the passages through which the semen subsequently passes; also the effusion and impetus of the [954<sup>a</sup>1] semen in sexual intercourse is clearly



due to propulsion by the breath. So those foods and liquids which fill the region of the sexual organs with breath are rightly regarded as aphrodisiac. Thus red wine more than anything else produces the [5] condition found in atrabilious persons.<sup>3</sup> This condition is obvious in some individuals; for most atrabilious persons are thin and their veins stand out, the reason being the abundance not of blood but of breath. The reason why all atrabilious persons are [10] not thin<sup>4</sup> or dark, but only those who contain particularly unhealthy humours, is stated elsewhere.

But to return to our previous subject of discussion, this humour, namely, the atrabilious, is originally mingled in the bodily nature, for it is a mixture of heat and cold, of which two things the bodily nature consists. Black bile, therefore, becomes [15] both very hot and very cold, for the same thing naturally admits both heat and cold, like water, which, though cold, yet when it is sufficiently heated (for example, when it boils) is hotter than the actual flame which heats it, and similarly a stone or a piece of iron when thoroughly heated becomes hotter than charcoal, though they [20] are naturally cold. (This subject has been dealt with more clearly in the treatise on fire.) Now black bile, which is naturally cold and not on the surface, being in the condition mentioned above, if it abounds in the body, produces apoplexy or torpor or despondency or fear; but when it is overheated, it produces cheerfulness accompanied [25] by song, and frenzy, and the breaking forth of sores, and the like. In most people then black bile engendered from their daily nutriment does not change their character, but merely produces an atrabilious disease. But those who naturally possess an atrabilious temperament immediately develop diverse characters in [30] accordance with their various temperaments; for example, those who are originally full of cold black bile become dull and stupid, whereas those who possess a large quantity of hot black bile become frenzied or clever or erotic or easily moved to anger and desire, while some become more loquacious. Many too, if this heat approaches the region of the intellect, are affected by diseases of frenzy and [35] possession; and this is the origin of Sibyls and soothsayers and all inspired persons, when they are affected not by disease but by natural temperament. Maracus, the Syracusan, was actually a better poet when he was out of his mind. Those in whom the excessive heat dies down<sup>5</sup> to a mean temperature are atrabilious, but they have [954<sup>b</sup>1] more practical wisdom and are less eccentric and in many respects superior to others either in education or in the arts or in public life. In respect too of facing dangers an atrabilious state causes great variation, in that many of those who are in this condition are inconsistent

under the influence of<sup>6</sup> fears; for they vary from time [5] to time according to the state in which their bodies happen to be in respect of their atrabilious temperament. Now this temperament is itself also inconsistent, just as it produces inconsistency in those suffering from the diseases which it causes; for, like water, it is sometimes cold and sometimes hot. And so the announcement of [10] something alarming, if it occurs at a time when the temperament is rather cold, makes a man cowardly; for it has already prepared a way for the entrance of fear, and fear has a chilling effect (as is shown by the fact that those who are greatly alarmed tremble). If, however, the temperament is inclined to be hot, fear reduces it to a moderate temperature and causes a man to be in his senses and unexcited. So [15] too with the despondency which occurs in everyday life (for we are often in the condition of feeling grief without being able to ascribe any cause for it, while at other times we feel cheerful without knowing why), such feelings and those usually called superficial<sup>7</sup> feelings occur to a slight degree in every one, for something of the force which produces them is mingled in everyone; but those who are thoroughly [20] penetrated by them acquire them as a permanent part of their nature. For as men differ in appearance not because they possess faces but because they possess certain kinds of faces, some handsome, others ugly, others with nothing remarkable about them (those, that is, who are naturally ordinary); so those who possess an atrabilious temperament in a slight degree are ordinary, but those who have much [25] of it are quite unlike the majority of people. For, if their condition is quite complete, they are very atrabilious; but, if they possess a mixed temperament, they are men of genius. If they neglect their health, they have a tendency towards the atrabilious diseases, the part of the body affected varying in different people; in some persons epileptic symptoms declare themselves, in others apoplectic, in others violent [30] despondency or terrors, in others over-confidence, as happened to Archelaus, King of Macedonia. The force which gives rise to such a condition is the temperament according as it contains heat or cold. If it is cold beyond due measure, it produces groundless despondency; hence suicide by hanging occurs most frequently among [35] the young, but sometimes also among older men. Many men too put an end to themselves after drunkenness, and some atrabilious persons continue in a state of despondency after drinking; for the heat of the wine quenches their natural heat. [955<sup>a1</sup>] Heat in the region in which we think and form hopes makes us cheerful; and for this reason all men are eager to drink until they become intoxicated, for abundance of wine makes all men

hopeful, just as their youth makes children sanguine; for old age [5] is despairing but youth is full of hope. There are a few who are seized with despondency while they are drinking, for the same reason as makes others despondent after drinking. Those then who become despondent as the heat in them dies down tend to hang themselves. Hence the young are more likely than the old to hang themselves; for old age makes the heat die down, and so, in the young, does [10] their condition, which is itself natural.<sup>8</sup> When the heat is extinguished suddenly, most men make away with themselves to the general astonishment of all, since they have given no previous sign of any such intention. When the temperament caused by the admixture of black bile is colder, it gives rise, as has been already remarked, to [15] despondency of various kinds, but when it is hotter to cheerfulness. Hence the young are more cheerful, the old more despondent, the former being hot and the latter cold; for old age is a process of cooling. Extinction takes place suddenly from external causes, just as objects which have been heated in the fire are cooled by [20] unnatural processes, as for example when water is poured over hot coals. Hence men sometimes commit suicide after drunkenness; for the heat of the wine is introduced from outside, and when it is extinguished the condition which leads to suicide is set up. Also after sexual intercourse most people tend to be despondent; [25] those, however, who emit a considerable amount of excrement with the semen become more cheerful, for they are relieved of an excess of excrement and breath and heat. But those who indulge in sexual intercourse are often more despondent, for by so doing they become cooled, because they lose something which is valuable, as is shown by the fact that the amount of semen which is emitted is not great.

[30] To sum the matter up, owing to the fact that the effect of black bile is variable, atrabilious persons also show variation; for the black bile becomes very hot and very cold. And because it has an effect upon the character (for heat and cold have such an effect to a greater extent than anything else in us), like wine mingling in a stronger or weaker form in the body, it gives us our own special characters. Now [35] both wine and black bile are full of breath. And since it is possible for a variable state to be well tempered and in a sense a favourable condition, and since it is possible for the condition to be hotter and then again cold, when it should be so, or to change to the contrary owing to excess, the result is that all atrabilious persons have remarkable gifts, not owing to disease but from natural causes.

[955<sup>b</sup>1] **2** · Why do we say that we acquire a disposition as the result of pursuing some sciences but not others? Are we said to acquire a disposition only by such sciences as enable us to make discoveries, since discovery is the result of a habit?

**3** · Why is it that of all the animals man has most practical wisdom? Is it because he has the smallest head in proportion to his body? Or is it because he is [5] abnormally small in certain parts? For that is why his head is small, and among men those who have smaller heads have more practical wisdom than those who have larger heads.

**4** · Why is it that a journey seems longer when we traverse it without knowing its length than when we know it, all other conditions being equal? Is it [10] because to know its length is to be able to connect a number with it? For that which cannot be numbered is the same as the infinite, and the infinite is always more than the determinate. Just as, therefore, if one knows that a journey is a certain length it must necessarily be finite, so if one does not know its length one as it were converts [15] the proposition and the mind draws a false conclusion, and this journey appears infinite. Furthermore,<sup>9</sup> a quantity is determinate, and that which is determinate is a quantity; therefore when a thing does not appear determinate it will appear to be as it were infinite, because that which is of a nature to be determined, if it is not so, is infinite, and that which appears not to be determined necessarily appears in a sense [20] unlimited.

**5** · Why is it that, whereas we become more intelligent as we grow older, yet the younger we are the more easily we can learn? Is it because God has given us two instruments within ourselves, which enable us to use external instruments, providing the body with the hand and the soul with intelligence? For intelligence is among [25] the things implanted in us by nature, being as it were an instrument; and, whereas the sciences and arts are among the things created by us, intelligence is one of the gifts of nature. So just as we cannot use the hand to the best advantage immediately after birth, but only when nature has perfected it (for the hand can perform its [30] particular function best as age progresses), in like manner of our natural endowments reason is of most assistance to us not in early life but as we get old, and is then at its highest perfection,

unless it becomes incapacitated by anything, as may happen also to the other natural endowments. Intelligence comes to us later than the faculty of using the hands, because the instruments used by the intelligence are [35] posterior to those used by the hands. For science is an instrument of the intelligence (for it is useful to the intelligence just as flutes are useful to the flute-player), and many things in nature are instruments of the hands, but nature itself and its creations are prior to science. Now it is natural that where the instruments are prior, the faculties should also come into being in us first (for it is by using the instruments that we acquire a disposition); and the instrument of each faculty is [956<sup>a</sup>1] related similarly to that faculty, and conversely, as the instruments are to one another, so are the faculties of which<sup>10</sup> they are the instruments to one another. Intelligence then for this reason comes to us when we are older; but we learn more quickly when we are young because we do not yet know anything, and when we [5] know more we are no longer so well able to acquire knowledge,<sup>11</sup> just as we remember best what we come upon early in the day, and then, as the day goes on, are less able to remember what happens, because we have come into contact with a [10] number of incidents.

6 · Why should man be obeyed more than any other animal? Is it because, as Plato answered Neocles, he alone of all the animals can count? Or is it because he is the only animal that believes in gods? Or is it because he is the most imitative (for it is for this reason that he can learn)?

[15] 7 · Why is it that we feel no pleasure in the contemplation or anticipation of the fact that the interior angles of a triangle are equal to two right angles, and similar geometrical truths—except in so far as we enjoy the speculation, and the pleasure of this is always the same and would be equally great if these angles were equal to three or more right angles—but we rejoice at the recollection of an [20] Olympic victory or the sea-battle at Salamis, and at the anticipation of such events, but not in their opposites? Is it because<sup>12</sup> we rejoice in such events as having taken place or taking place, but as regards what happens in the course of nature the contemplation of the real state of affairs alone causes us pleasure, whereas actions [25] give rise to the pleasure caused by their results? Since, then, actions are various, their results too are sometimes painful and sometimes pleasant; and we avoid and pursue anything in accordance

with pleasure and pain.

8 · Why do doctors continue their treatment only until health is restored? For the doctor reduces the patient, and next dries his body, then creates a healthy [30] condition and at that point stops. Is it because it is impossible for any other condition to be produced from health? Or, if it is possible, is it the task of another science, and will what is produced from health be something different? Now, if health is produced from conditions which are its opposite or are intermediate between health and sickness, it is obvious that the patient is sick because he is too moist or too dry or something else. The doctor, then, from a state of cold creates a [35] less extreme condition and, finally, a condition of a certain heat or dryness or moisture by change from the opposite or intermediate condition, until he achieves a state which is such as to constitute a condition of health; and from this no condition can be produced except one which is intermediate between health and sickness. The possessor of the art can, then, create some new condition; for, when he has reached a certain point, he can retrace his steps and undo his work; but the doctor's *art* has nothing to do with such a course, for its aim is always to create a better condition. So neither the doctor's art nor any other art will create anything else out of health; for [956<sup>b</sup>1] either nothing would be being produced, or else the opposite of health, if the same science were being employed (so too out of a house nothing could make its contrary): nor is there any other art<sup>13</sup> which can make anything out of health, except as making a whole out of a part, as, for example, when the cobbler's art makes a shoe out of the front part of a shoe; for these two things can be produced out of one another by two processes, one of composition and the other of destruction. [5]

9 · Why is it generally considered that the philosopher is superior to the orator? Is it because the philosopher spends his time in studying the actual forms of things, while the orator deals with what participates in them—the former considering what injustice and tyranny are, the latter urging that a certain individual is unjust or dealing with the character of a tyrant? [10]

10 · Why are theatrical artists generally persons of bad character? Is it because they partake but little of reason and wisdom,<sup>14</sup> because most of

their life is spent in the pursuit of the arts which provide their daily needs, and because the greater part of their life is passed in incontinence and often in want, and both these things prepare the way to villainy? [15]

**11** · Why did the men of old institute prizes for physical contests but none for wisdom? Is it because in all fairness the judges should in the intellectual sphere be either the superiors or at any rate not the inferiors of the competitors? Now if those who were pre-eminent in wisdom had to compete and a prize had been offered, [20] they would have no one to act as judges. In athletic contests, however, anyone can judge by merely using his eyes. Further, the original institutor of the games did not wish to propose to the Greeks such a contest<sup>15</sup> as would be likely to produce violent disputes and enmity; for when one is rejected or accepted in a contest of bodily [25] strength, men do not altogether harbour any grievance nor feel sentiments of enmity towards the judges, but they feel great wrath and indignation against those who decide their relative wisdom or worthlessness; and this is a quarrelsome and bad state of affairs. Furthermore, the prize ought to be better than the contest; for [30] in athletic games the prize is more desirable than, and superior to, the contest. But what prize could be found superior to wisdom?

**12** · Why is it that man in particular thinks one thing and does another? Is it because the same science deals with contraries? Or is it because the intelligence has many objects, desire one? Now man usually lives by the intelligence, the animals by [35] appetite, passion, and desire.

**13** · Why is it that some prudent men spend their time acquiring rather than using? Is it because they are following the habit of doing so? Or is it due to the pleasure of anticipation?

**14** · Why do those who sleep deeply and most pleasantly see no visions? Is it because sensation and thought function because the mind is at rest? And this seems [957<sup>a</sup>1] to be knowledge because knowledge brings the soul to rest; for when it is in motion and being carried along it can neither have sensation nor think. Hence it is that children and those

who are drunk and the insane are senseless; for, owing to the abundance of heat present in them, they are in a state of considerable and very [5] violent movement, but when this ceases they become more sensible; for, when the thought is undisturbed, they can control it better. Those who have visions during their sleep dream because thought is checked, and in proportion as it is at rest. For the mind is greatly moved during sleep, since, when heat collects in the interior from [10] the rest of the body, there is very considerable and violent movement; and it is not true, as most people suppose, that it is most at rest and by itself, and especially so when no vision is seen. The contrary is really true; for because it is in considerable movement and never rests for a moment, it cannot think. And it is naturally in most [15] movement when it sleeps most pleasantly, because it is then in particular that the greatest amount of heat collects in the interior of the body. That, when it is in motion, the mind cannot think, not only in its waking hours but also in sleep, is proved by the fact that one is least likely to see visions during the sleep which [20] follows the taking of food; now this is the time when the mind is most disturbed owing to the nourishment which has been introduced into the body. A vision occurs when sleep comes over us while we are thinking or letting things pass before our eyes. Hence we usually see things which we are doing or intend or wish to do; for it is [25] on these things that our thoughts and fancies most often dwell. And the better men are, the better are their dreams, because they think of better things in their waking hours, while those who are less well disposed in mind or body have worse dreams. For there is a close correspondence between the disposition of the body and the [30] images of our dreams; for, when a man is ill, the ideas proposed by his thoughts are bad, and furthermore, owing to the disturbance which reigns in his body, his mind cannot rest. It is for this reason that atrabilious persons start in their sleep, because, owing to the excess of heat, the mind is in a state of too much movement, and, when [35] the movement is too violent, they cannot sleep.



# BOOK XXXI

## PROBLEMS CONNECTED WITH THE EYES

1 · Why does rubbing the eye stop sneezing? Is it because by this means evaporation is given to the moisture? For the eye sheds tears after friction, and [957<sup>b</sup>1] sneezing is due to an abundance of moisture. Or is it because the lesser heat is destroyed by the greater? Now the eye when it is rubbed acquires more heat than is contained in the nose; and for this reason even if we rub the nose itself the sneezing stops.

2 · Why can one see more accurately with one eye than with both eyes? Is it [5] because more movements are set up by the two eyes, as certainly happens in those who squint? The movement of the two eyes, therefore, is not one, but that of a single eye is one; therefore one sees less accurately with both eyes.

3 · Why do the eyes tend to become very red in those who are angry, and the ears in those who are ashamed? Is it because the eyes are chilled in those who are [10] ashamed (for 'shame dwells in the eyes'), so that<sup>1</sup> they cannot look straight in front of them? (Cowardice also involves a cooling in the same region.) Now the heat<sup>2</sup> travels in a direction away from the forepart of the head, and the ears are situated in the opposite part of the head, and therefore they redden most under the emotion of shame. But under the influence of provocation assistance is sent to the more [15] sensitive and easily affected part, as though it were suffering violence; for in those who are frightened it fails altogether there.

4 · Why is it that, if one eye is held down, the other has a more intent gaze? Is it because the origins of sight in the two eyes are connected at one source? So when one eye moves, the common source of sight is also set in motion; and when this [20] moves, the other eye moves also. When one eye therefore is held down, all the movement will be concentrated on the other eye, which consequently will be able to gaze more intently.

5 · Why is it that those who are blind from birth do not become bald? Is it because the eye is injured by the presence of a large quantity of moisture in the region of the head? This is why they cauterize the veins round the temples of those [25] who suffer from running at the eyes (thus closing the ducts through which the humours flow), and scrape the head, cutting into the skin upon it. Since, therefore, it is the excretion gathering in the head which injures the eyes, this same excretion by collecting in too great quantities in the head might prevent the eyes from originally coming into being at all. And since the hair grows from excretions, and [30] the excretion in the head of those who are blind from birth is abundant, it is only natural that they are not bald.

6 · Why are those whose eyes protrude affected more than others by smoke? Is it because smoke reaches the projecting parts most quickly?

7 · Why is it that we can turn the gaze of both eyes simultaneously towards [35] the right and the left and in the direction of the nose, and that of one eye to the left or to the right, but cannot direct them simultaneously one to the right and the other to the left? Similarly, we can direct them downwards and upwards; for we can turn them simultaneously in the same direction, but not separately. Is it because the eyes, though two, are connected at one point, and under such conditions, when one [958<sup>a</sup>1] extremity moves, the other must follow in the same direction, for one extremity becomes the source of movement to the other extremity? Since, therefore, it is impossible for one thing to move simultaneously in contrary directions, it is impossible also for the eyes to do so; for the extremities would move in opposite [5] directions if one moved up and the other down, and the source of the movement of both of them would have to make corresponding movements, which is impossible. The squinting of the eyes is due to the fact that the eyeballs possess a moving principle and turn, to a certain extent,<sup>3</sup> upwards and downwards and sideways. When, therefore, being so placed that they are in a similar position to one another [10] and midway between an upward and a downward and an oblique movement, the two eyeballs catch the visual ray on corresponding points of themselves, they do not have a squint and their gaze is perfectly steady (though when they catch the visual rays on corresponding points of themselves, although the vision does not squint they [15] differ.) Yet, if you turn up the whites of the

eyes, part of the pupil is obscured, as for example in those who are about to sneeze; others have oblique vision, madmen for example; in others the gaze is turned towards the nose, as in tragic masks and in those who are nervous, for their glance denotes concentrated thought. But those who keep their gaze fixed on one point without having their eyeballs similarly situated, or who have them similarly situated but do not keep them fixed on the [20] same point, both these have squints; they therefore scowl and screw up the eyes, for they try to fix one eyeball in the same position as the other; so they leave one eye alone and try to bring the other into position. If the vision of both eyes does not rest on the same point,<sup>4</sup> they must squint; for the same thing happens as in those to [25] whom, when they press under the eye, a single object appears double, for in these too the source of vision is disturbed. If, therefore, the eye is moved upwards, the terminus of the vision is lowered; if downwards, it is raised. And if the position of [30] one eye is changed, the object of the vision therefore seems to move up or down, because the vision also does so, but it does not appear double unless the vision of both eyes is in use. A similar squint<sup>5</sup> occurs also in one whose eyes do not correspond, causing him to see double; but this is due to the position of the vision, because it is not in the middle of the eye.

[35] **8** · Why do those who are short-sighted write in small characters? For it is strange that those who have not acute vision should do what requires such vision. Is it because small things appear large when they are near at hand, and the short-sighted hold what they are writing close to their eyes? Or is it because they screw up their eyes when they write? For owing to the feebleness of their sight, if [958<sup>b</sup>1] they write with their eyes wide open, the vision, being dispersed, can only see dimly; but when the eyes are screwed up, it all falls on one point, and, since it forms a small angle, it necessarily causes the writing of small characters.

**9** · Why can some people see more clearly after suffering from ophthalmia? Is it because their eyes are thus purged? For often the external thickening blocks [5] the vision, but is dissolved when the eye discharges. Hence also it is beneficial that the eyes should be made to smart, with onion for example; but a substance of the opposite kind, such as marjoram, has an adverse effect.

10 · Why are those who see with only one eye less liable to disturbance of the vision? Is it because their mind is less affected, and so the disturbance of the vision [10] is less felt?

11 · Why do objects appear double to those whose eyes are distorted? Is it because the movement does not reach the same point on each of the eyes? So the mind thinks that it sees two objects when it really sees one twice. A similar phenomenon occurs if one crosses the fingers; for a single object appears to be two to a single person touching it twice. [15]

12 · Why is it that the senses on the right side of the body are not superior to those on the left side, but in all other respects the right side of the body is superior? Is it a question of habit, namely, that we accustom ourselves immediately to perceive equally well with the senses on both sides of the body? And it seems that the superiority of the right-hand parts of the body is due to habit, for we can accustom ourselves to be ambidextrous. Or is it because to feel sensation is to be [20] passive, and the right parts of the body are superior in that they are more active and less passive than the left?

13 · Why is it that in all other respects the right side of the body is superior, but in sensation the two sides are alike? Is it because we habitually practise the equal use of sensation on both sides? Moreover, to feel sensation is to be passive, and [25] the superiority of the right side of the body is shown in activity, not in passivity.

14 · Why is physical exercise detrimental to acuteness of vision? Is it because it makes the eye dry, as it does the rest of the body? Now dryness hardens [30] every kind of skin; so it has that effect also on the skin covering the pupil. This is also the reason why the aged have not acute vision; for their eyes have a hard and wrinkled surface, and so the vision is obscured.

15 · Why do the short-sighted, though they have not acute vision, write in small characters? Yet it is characteristic of acute vision to see

what is small. Is it [35] because, having weak sight, they screw up their eyes? For when the sight proceeds forth in a concentrated glance it sees better, but when the eye is wide open its vision is dispersed. So owing to the feebleness of their sight they bring their eyelids close together, and, because their vision proceeds from a small area, they see magnitude [959<sup>a</sup>1] on a small scale, and the characters which they write are on the same scale as their vision.

**16** · Why do the short-sighted bring their eyelids close together when they look at anything? Is it due to the weakness of their sight, so that, just as a man in [5] looking at a distant object puts his hand up to his eyes, they close the eyelids to look at objects near at hand? They do so in order that the vision may proceed forth in a more concentrated form, since it passes through a narrower opening, and that it may not be immediately dispersed by passing out through a wide aperture. A wider vision, however, covers a larger field.

**17** · Why is it that if the eye be moved sideways a single object does not [10] appear double? Is it because the source of sight is still in the same line? It can only appear double when the line is altered upwards or downwards; and it makes no difference if it is altered sideways, unless it is also at the same time altered upwards. Why, then, is it possible in sight for a single object to appear double if the eyes are in a certain position in relation to one another, but impossible in the other senses? Is it [15] not the case also in touch that one thing becomes two if the fingers are crossed? But with the other senses this does not happen, because they do not perceive objects which extend to a distance away from them, nor are they duplicated like the eyes. It takes place for the same reason as it does with the fingers; for then the touch is imitating the sight.

[20] **18** · Why is it that, though in the rest of the body the left side is weaker than the right, this is not true of the eyes, but the sight of both eyes is equally acute? Is it because the parts of the body on the right side are superior in activity but not in passivity, and the sight is passive?

**19** · Why is it that when we keep our gaze fixed on objects of other colours [25] our vision deteriorates, whereas it improves if we gaze

intently on yellow and green objects, such as herbs and the like? Is it because we are least able to gaze intently on white and black (for they both mar the vision), and the above-mentioned colours come midway between these, so that, the conditions of vision being of the nature of a [30] mean, our sight is not weakened thereby but improved? Perhaps, just as we take harm from over-violent physical exertion but moderate exercise is beneficial, so too is it with the sight; for we over-exert the sight if we gaze intently on solid objects, but we do not strain it in looking at objects which contain moisture, since there is nothing in them to resist the vision. Now green things are only moderately solid and [35] contain a considerable amount of moisture; they therefore do not harm the sight at all, but compel it to rest upon them, because the admixture of their colouring is suited to the vision.

**20** · Why is it that we see other things better with both eyes, but we can judge of the straightness of lines of writing better with one eye, putting it close to the letters? Do both eyes falling on the same point cause confusion, as the writers on [959<sup>b</sup>1] optics say, whereas, when we look with one eye, straightness is more apparent to the straight vision, just as it is when a measuring rod is used?

**21** · Why does smoke make the eyes smart more than any other part of the [5] body? Is it because they alone are very weak, since the inner parts of the body are always the weakest? (This is shown by the fact that vinegar and anything pungent causes not the outer but the inner flesh to smart, because the latter is the rarest flesh in the body and contains most pores.) For the vision finds its exit through certain pores, and so what causes most stinging within is drawn away from the outer flesh. [10] The onion too has a similar effect and anything else which causes the eye to smart, and of liquids olive-oil more than any other, because it is composed of very small particles and so sinks in through the pores. Vinegar is used as a medicament for the rest of the flesh.

**22** · Why is it that the eye, although it is very weak, is the only part of the [15] body which does not feel the cold? Is it because the eye is of a fatty consistency and does not partake of the nature of flesh, and such substances are unaffected by the cold? For if the eye is really a fire, this is not the reason why it does not feel cold, for its fire is not at any rate of

such a character as to engender heat.

**23** · Why are tears warm when we let them fall in weeping, but cold when [20] we shed them owing to an affection of the eyes? Is it because that which is unconcocted is cold, while that which is concocted is hot? Now every malady certainly proceeds from lack of concoction, and the tears of those whose eyes are affected are unconcocted and therefore cold. It is for this reason that physicians [25] regard cold sweating as a sign of serious illness, while on the contrary they consider that hot sweating tends to get rid of disease. For if the excretion is abundant, the internal heat cannot concoct it, so that it must necessarily be cold; but when it is scanty, the internal heat prevails over it. Now all diseases are caused by excretions. [30]

**24** · Why is it that, though the parts of the body on the right side are more easily moved, the left eye can be closed more easily than the right? Is it because the parts of the body on the left always contain more moisture, and things that are moist [35] naturally close up more easily?<sup>6</sup>

**25** · Why is it that though both a short-sighted and an old man are affected by weakness of the eyes, the former places an object, if he wishes to see it, near the eye, while the latter holds it at a distance? Is it because they are afflicted with different forms of weakness? For the old man cannot see the object; he therefore [960<sup>a</sup>1] removes the object at which he is looking to the point at which the vision of his two eyes meets, expecting them to be able to see it best in this position; and this point is at a distance. The short-sighted man, on the other hand, can see the object but cannot proceed to distinguish which parts of the thing at which he is looking are [5] concave and which convex, but he is deceived on these points. Now concavity and convexity are distinguished by means of the light which they reflect; so at a distance the short-sighted man cannot discern how the light<sup>7</sup> falls on the object seen; but near at hand the incidence of light can be more easily perceived.

**26** · Why is man alone, or at any rate more than the other animals, liable to [10] squinting? Is it because he alone, or more than the other animals, suffers from epilepsy in his youth, at which time squinting

always begins?

**27** · Why are men alone among the animals liable to squinting? Is it because they have the smallest distance between their eyes and their eyes are in a straight [15] line, so that any distortion is very obvious? Or is it because the eyes of the other animals tend to be of one colour only, and if the eyes were of uniform colour there could be no squinting? Or is it because man alone in the animal world is liable to epilepsy, and epilepsy, whenever it occurs, causes squinting as in the other parts of the body? Squinting, however, sometimes occurs quite late in life, namely, in those [20] to whom the illness comes late.

**28** · Why is it that we can see better against the light of a lamp or the sun, if we place the hand in front of the light? Is it because the light of the sun or of the lamp falling on our vision makes it weaker by its excess of brightness, since by this [25] excess it destroys those very things which are akin to it? But if the light is shaded by the hand, it does not hurt the sight, and the object seen is equally in the light; so the sight sees<sup>8</sup> better and the object seen is just as visible.

**29** · Why is there a difference between the left and the right hand and foot, [30] while this is not so with the eyes and ears? Is it because the elements, when they are pure, show no variation, but variations occur where the elements are compounded? Now these senses consist of pure elements—the sight of fire and the hearing of air.



# BOOK XXXII

## PROBLEMS CONNECTED WITH THE EARS

[35] 1 · Why is it that, though the ears are the most bloodless part of the face, they are most affected by blushing in those who feel shame? Is it because extraneous moisture naturally makes its way most easily into a void, and so, when the moisture is dissolved by the heat engendered in those who feel shame, it collects [960<sup>b</sup>1] in the ears? Or is it because the ears are near the temples, where the moisture most collects? Now under the emotion of shame the moisture flows into the face and causes blushing. But the ears have less depth than any other part of the face and are naturally very warm and fresh coloured, unless they have been long numbed by the cold; they are then the most fresh coloured of all the parts of the face, and so the [5] heat, when it is dispersed, being nearest the surface in the ears, makes them red.

2 · Why is it that the ear-drums of divers burst in the sea? Is it because the ear, as it fills with water, is subject to violent pressure, because it retains the breath? Surely, if this is the reason, the same thing ought to happen in the air. Or is it [10] because a thing breaks more easily if it does not yield, and more readily under pressure from what is hard than from what is soft? Now that which is inflated is less yielding, and the ears, as has been said, are inflated because the breath is retained in them; and so the water, which is harder than the air, when it presses upon them bursts them.

3 · Why do divers tie sponges round their ears? Is it in order that the sea may [15] not rush violently in and burst the ear-drums? For thus the ears do not become full, as they do when the sponges are removed.

4 · Why is the wax in the ears bitter? Is it because sweat is corrupt? It is, therefore, a salty, corrupt substance; and that which is corrupt and salty is bitter. [20]

5 · Why do sponge-divers slit their ears and nostrils? Is it in order

that the breath may pass more freely? For it is by this way that the breath seems to pass out;<sup>1</sup> for it is said that they suffer more from difficulty of breathing by being unable to expel the breath, and they are relieved when they can as it were vomit the breath [25] forth. It is strange, then, that they cannot achieve respiration for the sake of its cooling effect; this appears to be a greater necessity. Is it not quite natural that the strain should be greater when the breath is held, since then they are swollen and distended? But there appears to be a spontaneous passage of the breath outwards; and we must next consider whether breathing inwards is so also. Apparently it is; [30] for they enable the divers to respire equally well by letting down a cauldron; for this does not fill with water, but retains the air, for it is forced down straight into the water; since, if it inclines at all from an upright position, the water flows in.

6 · Why do some people cough when they scrape their ears? Is it because the [35] hearing is connected with the same duct as the lungs and the wind-pipe? This is shown by the fact that, if these parts are filled up, a man becomes deaf. When, therefore, heat is set up by friction, moisture is caused by melting and flows downwards from the duct<sup>2</sup> into the wind-pipe and causes coughing.

7 · Why is it that, if a hole is pierced in the left ear, it generally closes up [961<sup>a</sup>1] more quickly than in the right ear? It is for this reason that women call the right ear the 'male' and the left the 'female'. Is it because the left parts of the body are moister and hotter, and such things close up very quickly? This is why green plants [5] grow together again; and why wounds close up more readily in the young than in the old. This is a sign that the parts on the left side of the body are moister and, generally speaking, partake rather of feminine characteristics.

8 · Why is it that in those who feel shame the extremities of the ears turn red, but in those who are angry it is the eyes that do so? Is it because shame is a cooling [10] in the eyes accompanied by fear, so that the heat naturally leaves the eyes? So, when it withdraws thence, it travels to the region best adapted to receive it, and this is the extremity of the ears; for the region of the face is otherwise bony. In those who are angry the heat travels in the other direction and makes itself most manifest in [15] the eyes owing to their white colour.

9 · Why is it that buzzing in the ears ceases if one makes a sound? Is it because the greater sound drives out the less?

10 · Why is it that, if water has flowed into the ear, one pours olive oil in, though the moisture in the ear cannot pass out through another liquid? Is it because [20] the oil floats on the surface of the water and, owing to the adhesive nature of the oil, the water clings to it when it comes out, the object being to make the water come out with the oil? Or is it in order that the ear may be lubricated and the water therefore come out? For oil being smooth acts as a lubricant.

11 · Why is it that the ear-drums of divers are less liable to burst if they pour [25] olive-oil beforehand into them? Does the reason for their bursting already mentioned still hold good, but the oil poured into the ears cause the sea-water, which subsequently enters the ear, to glide smoothly over its surface, just as happens on the exterior parts of the bodies of those who anoint themselves? The sea-water gliding smoothly along does not make a violent impact upon the inside of [30] the ear, and so does not break the drum.

12 · Why is it that, although the ears are the most bloodless part of the face, they turn red in those who feel shame? Is everything carried to that part which is most devoid of it? Now in a man who feels shame the blood seems to be carried upwards in a heated condition; it therefore passes into the part which is most devoid of it and causes it to become red. The same thing happens also in the cheeks. A [35] further reason is that the skin of the ears, which is tightly stretched, is very thin and therefore very transparent.

13 · Why is it that no one scrapes out his ears while yawning? Is it because, when one yawns, the drum of the ear, by means of which he hears, is inflated? That this is so is shown by the fact that one hears least well while yawning; for the breath, as happens also in the mouth, finds its way into the interior of the ears and thrusts the membrane outwards and prevents the sound from entering. If, therefore, one [961<sup>b</sup>1] touches the seat of hearing when in this condition in such a way as to scrape it, one might cause considerable damage to it; for the impact would be against a

resisting and unyielding surface inflated by the breath, and it is obvious that the skin and the membrane are far from being solid; and so great pain is caused and a wound might [5] result.

# BOOK XXXIII

## PROBLEMS CONCERNING THE NOSE

1 · Why is it that sneezing stops hiccuping but does not stop belching? Is it because they are not affections of the same region, but belching is a cooling and lack [10] of concoction in the stomach, while hiccuping is a similar affection of breath and moisture in the region of the lungs? Now the regions about the head (the ears,<sup>1</sup> for example) are closely connected with the lungs. This is proved by the facts that deafness and dumbness are found together, and that the diseases of the ears become diverted into affections of the lungs; also in some persons coughing results when the [15] ears are scratched. That there is a connection between the region of the nose, in which the sneeze takes place, and the lungs is shown by the fact that both share in respiration; and so, while the nose sneezes when that region becomes hot, the lower region, where hiccuping takes place, also sneezes in sympathy. Now heat causes concoction; hence vinegar stops hiccups, as also does holding the breath if the [20] hiccup is only slight, for it heats the breath which is constricted. So too in sneezing the counter-constriction of the breath has this effect and exhalation takes place properly and from the upper region; for it is impossible to sneeze without exhaling. The impetus then dispels the enclosed breath which is the cause of the hiccup. [25]

2 · Why is it that if, when one is about to sneeze, one rubs the eye, one sneezes less? Is it because what causes the sneeze is a kind of heat, and friction produces heat, which, owing to the close proximity to the eyes of the region in which [30] the sneeze occurs, destroys the other heat, just as the lesser fire fades away before the greater?

3 · Why is it that one generally sneezes twice, and not once or many times? Is it because there are two nostrils? The channel, therefore, through which the breath passes is divided between the two. [35]

4 · Why is it that one sneezes more after one has looked at the sun?

Is it because the sun engenders heat and so causes movement, just as does tickling the nose with a feather? For both have the same effect; by setting up movement they cause heat and create breath more quickly from the moisture; and it is the escape of this breath which causes sneezing.

[962<sup>a</sup>1] **5** · Why do sneezing and holding the breath and vinegar stop hiccups? Does sneezing, since it is a displacement of the lower breath, act in the same sort of way as medicines which, though applied in the upper part of the body, affect the lower part of the stomach? Holding the breath stops weak hiccups, because the slight [5] impetus of the breath which comes forth represses and stifles and completely dispels the hiccup, just as happens in coughing, which<sup>2</sup> ceases if you hold it back. Vinegar stops hiccuping because by its heat it vaporizes the surrounding moisture, which prevents belching; for belching takes place when the moisture in the upper part of [10] the stomach is vaporized and concocted, whereas hiccuping occurs when by the action of moisture breath is retained in an excessive quantity in the region of the lungs; for this, gaining impetus and being unable to break through, causes a spasm, and this spasm is called a hiccup. Hence hiccuping seizes those who are cold, because the cold causes the moisture to acquire consistency<sup>3</sup> from the breath, and [15] the rest of the breath, being still enclosed, gives a leap, and its movement is hiccuping.

**6** · Why do we sometimes pour cold water over a person's face when his nose is bleeding? Is it because the heat is thus driven inwards? If, therefore, the blood is [20] near the surface, it tends to liquefy it.

**7** · Why do we regard sneezing as divine, but not coughing or running at the nose? Is it because it comes from the most divine part of us, namely, the head, which is the seat of reasoning? Or is it because the other affections are the results of disease, but sneezing is not?

[25] **8** · Why does rubbing the eye stop sneezing? Is it because by this means evaporation is given to the moisture? For the eye sheds tears after friction, and sneezing is due to an abundance of moisture. Or is it because the lesser heat is destroyed by the greater? Now the eye when rubbed acquires more heat than is [30] contained in the nose; and for this

reason, even if we rub the nose itself, the sneezing stops.

9 · Why is it that the emission of other kinds of breath, e.g. farting and belching, are not regarded as sacred, but that of a sneeze is so regarded? Is it because of the three regions of the body—the head, the thorax, and the lower [35] stomach—the head is the most divine? Now farting is breath from the lower stomach and belching is from the upper stomach, but sneezing is from the head; because, therefore, this region is most sacred, the breath also from it is revered as sacred. Or is it because all discharges of breath show that the above-mentioned parts are in a better state generally (for without any discharge of excrement the breath in its passage out lightens the body), and so too sneezing shows that the [962<sup>b</sup>1] region of the head is in a healthy condition and capable of concoction? For when the heat in the head overcomes the moisture, the breath turns into a sneeze. This is why men test the dying by applying something which will cause sneezing, with the idea that, if this does not affect them, their case is indeed desperate. Thus sneezing is [5] revered as sacred as being a sign of health in the best and most sacred region of the body, and is regarded as a good omen.

10 · Why does man sneeze most of all animals? Is it because in him the ducts are wide through which the breath and scent<sup>4</sup> pass in? For it is with these when they are full of breath that he sneezes. That these ducts are wide is shown by [10] the fact that man has a weaker sense of smell than any other animal, and those who have narrow ducts have a keener sense of smell. If, therefore, the moisture, the evaporation of which causes sneezing, enters in larger quantities and more often into wide ducts, and man more than any other animal has such ducts, he might naturally be expected to sneeze more often. Or is it because<sup>5</sup> his nostrils are [15] particularly short, and so the heated moisture can quickly become breath and be expelled, whereas in other animals owing to the length of their nostrils it cools before it can evaporate?

11 · Why is sneezing between midnight and midday regarded as a bad thing, but between midday and midnight as a good thing? Is it because sneezing [20] seems rather to check those who are commencing anything and are at the beginning? And so, if it occurs when we are intending or beginning something, we are deterred from action.<sup>6</sup> Now

early morning and the period after midnight are as it were a new beginning; therefore we carefully avoid sneezing so as not to hinder the action which has been begun. But towards evening and up to midnight there is [25] as it were an ending and the contrary of the earlier period, so that the same thing that was undesirable becomes, under contrary conditions, desirable.

**12** · Why do the old sneeze with difficulty? Is it because the ducts through which the breath passes have become partially closed? Or is it because they are no longer able to raise the breath up with ease, and, when they have done so, they expel [30] it downwards with a violent effort?

**13** · Why is it that, if one holds the breath, hiccuping ceases? Is it because hiccuping is the result of cooling (hence those who are frightened and those who are chilled hiccup), whereas the breath when it is held back warms the interior region?

[35] **14** · Why do the deaf usually talk through their noses? Is it because they suffer from lung trouble, since deafness is simply a congestion in the region of the lungs? The voice therefore does not easily find a passage; but, just as the breath of those who are panting or gasping accumulates owing to their inability to exhale it, so it is with the voice of the deaf. It therefore forces its way even through the [963<sup>a</sup>1] nostrils, and, as it does so, owing to the friction, causes the echoing sound. For talking through the nose takes place when the upper part of the nose, where the openings to the roof of the mouth are situated, becomes hollow in form; it then resounds like a bell, its lower part being narrow.

[5] **15** · Why is sneezing the only phenomenon which does not occur when we are asleep, but takes place practically always while we are awake? Is it because sneezing is the result of heat of some kind causing motion in the region from which the sneeze proceeds (and this is why we look up at the sun when we want to sneeze)? [10] Or is it because when we are asleep the heat is driven inwards? This is why the lower parts become warm in those who are asleep, and the large quantity of breath which collects there is the cause of the emission of semen during sleep. It



is only natural, therefore, that we do not sneeze; for when the heat (which naturally sets in motion the moisture in the head, the evaporation<sup>7</sup> of which causes the sneeze) is withdrawn [15] from the head, it is only natural that the phenomenon which it causes does not take place. Men fart and belch rather than sneeze when they are asleep rather than awake, because, as the region about the stomach becomes hot during sleep, the moisture there becomes vaporized and, as it does so, is carried into the nearest parts; [20] for it is thrust together there by the breath engendered during sleep. For a man who is asleep is better able to hold than to expel the breath; therefore he collects the heat within him. Now when a man holds his breath he forces it downwards; for a downward course is unnatural to the breath, and that is why it is difficult to hold the [25] breath. The same thing is the cause of sleep also; for since waking is movement and this movement occurs to a great extent in the organs of sensation while we are awake, it is plain that we should go to sleep when our organs of sense are at rest.<sup>8</sup> And since it is fire which creates movement in our parts, and this during sleep is [30] driven inwards and leaves the region of the head, where the seat of sensation is situated, our organs of sense would then be most at rest, and this must be the cause of sleep.

16 · Why do people shiver after sneezing and passing urine? Is it because by both actions the veins are emptied of the warm air which was previously in them, [35] and, when they are empty, other air enters from without, colder than that which was previously in the veins; and such air entering in causes shivering?

17 · Why does sneezing stop hiccuping? Is it because hiccuping (unlike belching, which comes from the stomach when it receives food) comes from the lungs<sup>9</sup> and generally results from cooling as an effect of chill or pain or medicine [963<sup>b</sup>1] entering from above? For the region of the lungs, being naturally hot, when it is cooled does not emit all the breath but forms as it were bubbles. This is why hiccuping stops if the breath is held (for the region then becomes warm); and the application of vinegar, which is heating, has the same effect. Heat then collecting [5] from the heat of the brain also (for the upper regions are connected by passages with the lungs) and the lungs being warm, the holding of the breath which precedes the sneeze, and the downward impetus from above, dissolve the hiccuping.

18 · Why is it that those who have crisp hair and whose hair curls are [10] usually rather snub-nosed? Is it because crispness resides in fatness, and fatness is accompanied by hardness, and the blood being hard is hot, and heat does not produce excrement, and boniness is formed from excrement, and the cartilage of the nose is bony—therefore a scantiness of this part is a natural result? This theory is supported by the fact that young children are always snub-nosed. [15]

# BOOK XXXIV

## PROBLEMS CONCERNING THE MOUTH AND THE PARTS THEREIN

1 · Why is it that those who have widely-spaced teeth are not long-lived? Is it because the long-lived have more teeth, for instance males have more than females, men than women, and rams than ewes? Those men who have widely-spaced teeth [20] apparently resemble those who have fewer teeth.

2 · Why is it that, though the teeth are stronger than the flesh, yet they are more sensitive to cold? Is it because they are closely connected with the pores, in which the heat, because it is small, is quickly overcome by the cold and causes [25] pain?

3 · Why are the teeth more sensitive to cold than to heat, while the contrary is true of the flesh? Is it because the flesh partakes of the mean and is well tempered, but the teeth are cold and therefore more sensitive to cold?<sup>1</sup> Or is it because the teeth consist of narrow pores in which the heat is scanty, so that they are quickly affected by the opposite of heat? Now the flesh is warm, so that it is [30] unaffected by the cold, but is quickly sensitive to heat; for it is a case of 'fire added to fire'.

4 · Why is it that the tongue is indicative of many things? For in acute diseases it indicates fever by the presence of blisters upon it; also the tongues of [35] sheep are particoloured if the sheep are so. Is it because the tongue is capable of taking up moisture and is situated near the lungs, which are the seat of fevers? Now all things which are particoloured are so because their humours are particoloured, and that part first takes on colour through which the humour first passes; and this is what happens to the tongue. Now blisters collect on the tongue because it is spongy; for a blister is as it were an eruption which has not been concocted within.

[964<sup>a</sup>1] 5 · Why is it that the tongue becomes bitter and salty and

acid but never sweet? Is it because these qualities are corruptions and so the tongue cannot perceive its own real nature?

6 · Why is it that the coloration of the tongue corresponds with that of the [5] skin? Is it because it is really an external part of the body, though it is enclosed in the mouth, and is it because the skin on it is thin that even a slight variegation of colour makes itself visible? Or is it because it is liquid that causes change of colour, and the tongue is most affected by what is drunk?

[10] 7 · Why is it that one can emit both hot and cold breath from the mouth? For one can puff out cold breath and huff out warm breath. That the breath is warm can be demonstrated by placing the hand near the mouth. Or is the air which is set in motion warm<sup>2</sup> in both cases, but does he who puffs out breath not set the air in motion all at once but blow through a partly closed mouth, so that, though he emits [15] but little breath, he sets up motion over a large area of the outer air, in which the warmth from his mouth is not apparent owing to its scantiness? But one who huffs emits it all at once, and therefore it is warm. For it is characteristic of puffing out breath to<sup>3</sup> pack the air into a particularly small place; whereas huffing is emitting it all at once.

8 · Why is it that, if one exhales violently and with all the breath at once, it is [20] impossible to exhale again? So too with violent inhalation, which cannot be repeated again immediately. Is it because exhalation is a local dilatation, and inhalation a local contraction, both of which can be carried out within certain limits? Clearly, therefore, the two processes must be carried out one after another, but neither can be performed twice consecutively.

[25] 9 · Why is it that, though there is one passage through which meat and drink pass and another through which we breathe, if we swallow too large a morsel we choke? In this there is nothing strange; for not only do we choke if something penetrates into this passage, but we choke still more if it be blocked. Now the [30] passages through which we take food and through which we breathe are parallel to one another; when, therefore, too large a morsel is swallowed, the respiration is also

blocked, so that there is no way out for the breath.

**10** · Why is it that men are very long-lived who have a line right across the palm? Is it because those animals which are badly articulated are short-lived and weak? As an instance of weakness we may take young animals, and of shortness of [35] life the aquatic creatures. Clearly then those who are well articulated must be the opposite, namely, those in whom even those parts are best articulated which are by nature badly articulated. Now the inside of the hand is the least well articulated part of the body.

**11** · Why is it that, in deep breathing, when we draw in the breath the stomach contracts, but when we exhale it fills out? Now the contrary of this might [964<sup>b1</sup>] be expected to occur. Is it because in breathing the stomach is compressed downwards by the flanks and then appears to expand again, like bellows?

**12** · Why do we respire? Does the breath dissolve into fire, just as the [5] moisture dissolves into breath? The heat, then, of nature, when the greater part of the breath produces fire, causes pain and pressure upon the ducts; and that is why we emit the fire with the breath. Now when the breath and fire go forth,<sup>4</sup> the ducts contract and are cooled, and pain results; we therefore draw the breath in again. [10] Then when we have opened the ducts of the body and given them relief, fire is again engendered and we again feel discomfort, and therefore expel it and continue to do so indefinitely; just as we continually blink as the part round the eye cools and becomes dry. Also we walk without<sup>5</sup> giving attention to the manner of our walking, [15] the intellect by itself<sup>6</sup> guiding us. In like manner, therefore, we carry out the process of breathing; for we do so by contriving to draw in air, and then continue to draw it in.

## PROBLEMS CONNECTED WITH THE EFFECTS OF TOUCH

1 · Why do we shudder more when some one else touches us than when we [20] touch ourselves? Is it because the touch of a part of some one else has more power to produce sensation than that of a part of oneself, since that which is connected by growth with the sense-organ is imperceptible? Also anything which occurs unawares and suddenly is more frightening, and fright is a process of cooling; and both these qualities are possessed by the touch of another as contrasted with one's [25] own touch. And, speaking generally, passive sensation is produced either solely by some one else or at any rate in a greater degree than by oneself; as happens for example in tickling.

2 · Why do we feel tickling in the armpits and on the soles of the feet? Is it [30] owing to the thinness of the skin? And do we feel it most where we are unaccustomed to being touched, as in these parts and the ears?

3 · Why is it that every one does not shudder at the same things? Is it because, just as we do not all feel pleasure or pain at the same things, so we do not shudder at the same things? For the same sort of cooling process takes place. So [35] some people shudder when a garment is torn, others when a saw is being sharpened or drawn through wood, others when pumice-stone is being cut, others when the millstone is grinding on stone.

4 · Why is it that, though the summer is warm and the winter cold, bodies [965<sup>a</sup>1] are colder to the touch in summer than in winter? Is it because perspiration and the act of perspiring cool the body, and this takes place in summer but not in winter? Or [5] is it because cold and heat are driven inwards inversely to the seasons, and in the summer the cold takes refuge within and therefore causes perspiration to be given off, whereas in winter the cold keeps the perspiration in and the body vaporizes it, as does the earth?

5 · Why do the hairs bristle upon the skin? Is it because they naturally stand erect when the skin is contracted, and this contraction occurs owing to cold and [10] certain other conditions?

6 · Why is it that no one can tickle himself? Is it because one also feels tickling by another person less if one knows beforehand that it is going to take place, and more if one does not foresee it? A man will therefore feel tickling least when he is causing it and knows that he is doing so. Now laughter is a kind of derangement [15] and deception (and so men laugh when they are struck in the midriff; for it is not just any part of the body with which one laughs). Now that which comes unawares tends to deceive, and it is this also which causes the laughter, whereas one does not make oneself laugh.

7 · Why is it that we feel tickling in particular on the lips? Is it because the part which feels tickling must be situated not far from the seat of sensation? Now [20] the lips are essentially in this position, and so of all parts of the head the most sensitive to tickling are the lips, which are fleshy, and therefore very easily set in motion.

8 · Why is it that a man bursts out laughing if one scratches the region of his armpits, though he does not do so when any other part is tickled? And why does a [25] man sneeze if he tickles his nostrils with a feather? Is it because these parts are regions where the small veins are situated, and when these are cooled or undergo the opposite process they become moist or dissolve into breath as the result of the moisture? (Similarly, if one compresses the veins in the neck of one who is asleep, an extraordinarily pleasant sensation is caused.<sup>1</sup>) And when the breath is engendered in greater abundance, we emit it in a single mass. Similarly also in sneezing, when [30] we warm the moisture in the nostrils and scratch them with a feather, we dissolve it into breath; and when the breath becomes superabundant we expel it.

9 · Why is it that we often shudder after taking solid food? Is it because when food which is cold enters the body it prevails at first over the natural heat rather than vice versa? [35]

10 · Why is it that an object which is held between two crossed fingers appears to be two? Is it because we touch it with two sense-organs? For when we hold the hand in its natural position we cannot touch<sup>2</sup> an object with the outer<sup>3</sup> sides of the two fingers.



# BOOK XXXVI

## PROBLEMS CONNECTED WITH THE FACE

1 · Why is the face chosen for representation in portraits? Is it because the [965<sup>b</sup>1] face shows best what the character of a person is? Or is it because it is most easily recognized?

2 · Why is it that one perspires most freely on the face, though it is far from being fleshy? Is it because parts which are rather moist and rare perspire freely, and [5] the head has these characteristics? For it contains an abundance of natural moisture; this is shown by the veins which extend from it and the discharges which it produces, and the fluidity of the brain and the numerous pores. That there are numerous pores extending outwards is shown by the presence of the hair. The perspiration then comes not from the lower parts of the body but from the head; and [10] so one perspires most readily and freely on the forehead, for it is highest in position and moisture flows down and not up.

3 · Why do eruptions occur more frequently on the face than elsewhere? Is it because this part contains rarities and moisture? That this is so is shown by the [15] growth of hair on it and by its power of sensation; and an eruption is as it were an efflorescence of unconcocted moisture.

# BOOK XXXVII

## PROBLEMS CONNECTED WITH THE WHOLE BODY

[20] **1** · Why is it that, though the body is in a state of continual flux, and effluvia are given off from the excrements, the body is only lightened if it perspires? Is it because the excretion in the form of effluvia is too little (for when liquid is transformed into air, much air is formed out of little liquid)? For what is excreted is [25] more, which accounts for excretion taking longer to begin.

**2** · And what is the reason for this? Is it because its exit takes place through smaller pores? For the viscous and the adhesive matter is expelled with the moisture because it mingles with it, but it cannot be expelled with the breath; and it is this [30] thick matter in particular which causes pain. Therefore also vomiting lightens the body more than sweating, because that which is vomited, being thicker and more substantial, carries away this viscous matter with it. Or is there a further reason, namely, that the region in which the viscous and the adhesive matter is, is situated at a distance in relation to the flesh (and so it is difficult to make it change its position), but near to the stomach? For it is engendered either in or close to it; and [35] therefore it is difficult to get rid of it in any other way.

**3** · Why is it that friction produces flesh? Is it because heat has great power to increase what is in the body? For the bulk of what already exists in it becomes greater if the body is in continual motion and if our internal humours are carried [966a<sup>1</sup>] upwards and vaporized, and this occurs as a result of friction; whereas in the absence of this, the body wastes away and decreases. Or is it because the flesh increases in bulk by nutriment<sup>1</sup> as the result of heat (for anything which is hot has the power to attract moisture, and the nutriment distributed in the flesh is moist and [5] the flesh takes up nutriment better by being rare, for the rarer a thing is the more it can absorb, like a sponge), whereas friction makes the flesh well ventilated and rare and prevents congestion in the body? Now if there is no congestion, there can be no [10] wasting either; for atrophy and wasting are the result of conglomeration. But the better ventilated and

the rarer and the more homogeneous the parts of the body are, the more likely they are to acquire bulk, for they are better able to take up nutriment and to get rid of excrements, since the flesh must be rarefied and not condensed in order to promote health. For just as a city or locality is healthy which [15] is open to the breezes (and that is why the sea too is healthy), so the body is healthier if the air can circulate in it than when it is in the contrary condition. For either there ought to be no excrement in the body, or else the body ought to be able to get rid of it as soon as possible and be in such a condition that it can reject the excrement as soon as it receives it and be always in a state of motion and never at [20] rest. For that which remains stationary putrefies (standing water, for example), and that which putrefies creates disease; but that which is rejected passes away before it becomes corrupt. This then does not occur if the flesh is dense (the ducts being as it were blocked up), but it does happen if the flesh is rare. One ought not therefore to walk naked in the sun; for the flesh thereby solidifies and acquires an absolutely [25] fleshy consistency; for the internal moisture remains, but the surface moisture is expelled in the form of a vapour, just as in roast meat in the inner portions are moister than in boiled meat. Nor ought one to walk in the sun with the chest bare, [30] for then the sun draws out the moisture from the best constructed parts of the body, which<sup>2</sup> least require to be deprived of it; but it is rather the inner parts which need to be dried, for, because they are remote, it is impossible to produce perspiration except by a violent effort; but it is easy to exhaust the moisture in the chest, because it is near the surface.

4 · Why is it that, when we are chilled, the same heat causes more burning [35] and pain? Is it because owing to its density the flesh holds the heat which comes into contact with it? This is the reason why lead becomes hotter than wool. Or is the passage of the heat violent because the body is congealed by cold?

5 · Why does dry friction render the flesh solid? Is it because heat is [966<sup>b</sup>1] engendered by the friction and the moisture is used up? Furthermore, the flesh when rubbed becomes dense, and everything becomes denser and solider the more it is rubbed. This can be seen in many examples; dough, for instance, and clay and [5] similar substances, if you pour water into them and spread them out, remain moist and fluid, but, if you apply more friction, they quickly become dense, solid and

viscous.

6 · Why does friction produce more flesh than running? Is it because [10] running cools the flesh and makes it less absorbent of nutriment, but part of the nutriment is shaken downwards, while the part on the surface,<sup>3</sup> owing to the exhaustion of the natural heat, becomes quite thin and is expelled in the form of breath? But the hand by friction makes the flesh rare and able to take up nutriment. [15] Moreover, the external contact, opposing by its pressure the natural impetus of the flesh, makes it compact and drives it back upon itself.

# BOOK XXXVIII

## PROBLEMS CONCERNING THE COLORATION OF THE FLESH

1 · Why is it that the sun bleaches wax and olive oil, but darkens the flesh? Is [20] it because it bleaches the former by extracting the water from them (for that which is moist is naturally black owing to the admixture of the earthy element), whereas it scorches the flesh?

[25] 2 · Why have fishermen reddish hair, and divers for murex, and in short all who work on the sea? Is it because the sea is hot and full of dryness because it is salty? Now that which is of this nature, like lye and orpiment, makes the hair reddish. Or is it because they are warmer in their outer parts, but their inner parts [30] are chilled, because, owing to their getting wet, the surrounding parts are always being dried by the sun? And as they undergo this process, the hair being dried becomes fine and reddish. Furthermore all those who live towards the north have fine, reddish hair.

3 · Why is it that running in clothing and anointing the body under the [35] clothing with oil makes men pale skinned, whereas running naked makes them ruddy? Is it because ventilation produces a ruddy colour, while suffocation has the opposite effect and causes pallor, because the moisture on the surface is heated up and does not cool? Now perspiring in clothes and anointing the body under the [967<sup>a</sup>1] clothing both have the same effect, namely, that the heat is enclosed. But running naked makes the flesh ruddy for the opposite reason, because the air cools the excrements which form and ventilates the body. Further, the oil, which is moist and thin, being smeared over the body under the clothing and blocking up the pores, [5] does not allow either the moisture and breath from the body to escape or the external air to penetrate inwards. Therefore the moist excrements being choked in the body decay and produce pallor.

4 · Why is it that the ventilation of the flesh makes it ruddy? Is it

because pallor is as it were a corruption of the flesh? When, therefore, the surface is moist [10] and hot, it becomes yellow unless it is cooled and gives off the heat in the form of breath.

5 · Why is it that those who perspire are ruddy as a result of their exercises, whereas athletes are pale? Is it because as the result of moderate exertion the heat is [15] burnt up and comes to the surface, whereas by constant exertion it is drained off with the perspiration and breath, the body being rarefied by exertion? When, therefore, the heat comes to the surface, a man becomes ruddy, just as he does when he is hot or ashamed; but when the heat fails, he is pallid. Now ordinary persons indulge in moderate exercise, whereas athletes are constantly training.

[20] 6 · Why are men more sunburnt who sit still in the sun than those who take exercise? Is it because those who are in motion are as it were fanned by the breath owing to the movement of the air which they set up, whereas those who are sitting still do not undergo this process?

7 · Why does the sun scorch, while fire does not? Is it because the heat of the [25] sun is finer and can penetrate farther into the flesh? Fire, on the other hand, if it does scorch, only raises the surface of the flesh by creating what we call blisters, and does not penetrate within.

8 · Why is it that fire does not make men black, whereas the sun does so, and [967<sup>b</sup>1] why does fire blacken earthenware, while the sun does not? Or do they produce their effects by dissimilar means, the sun blackening the flesh by scorching it and the fire permeating the earthenware with the soot which it sends up? (Now soot consists of fine coal-dust, formed by the simultaneous breaking-up and burning of [5] the charcoal.) The sun, then, makes men black, while the fire does not do so, because the heat of the sun is gentle and owing to the smallness of its parts it can scorch the flesh itself; and so, because it does not set the flesh on fire, it does not cause pain, but it blackens it because it scorches it. Fire, on the other hand, either does not kindle at all or else penetrates within; for what is burnt by fire also becomes [10] black, but it does not burn merely that part of the body in which the colour is situated.

9 · Why do men become darker complexioned as they become older? Is it because anything which decays becomes blacker, except mildew? And old age and decay are the same thing. Further, since the blood when it dries up becomes blacker, [15] it is only likely that older men are darker; for it is the blood which naturally gives colour to our bodies.

10 · Why is it that, of persons engaged in the preparation of cereals, those who handle barley become pale and are subject to catarrh, while those who handle [20] wheat are healthy? Is it because wheat is more easily concocted than barley, and therefore its emanations are also more easily concocted?

11 · Why is it that sun bleaches olive oil but darkens the flesh? Is it because it extracts the earthy element from the olive oil, and this, like the earthy element in wine, is the black part of it? Now it darkens the flesh because it burns it; for that [25] which is earthy always becomes black when burnt.

<sup>1</sup>Reading αἰτίαι οὔσαι for ὥσπερ.

<sup>2</sup>Reading τὸ μὲν ζεῖ, ὁ δὲ κάει.

<sup>3</sup>Reading συμπήξεις.

<sup>4</sup>Reading χολώδεις.

<sup>5</sup>Reading οἶον.

<sup>6</sup>Reading ὅπως.

<sup>7</sup>Reading μανοῖς.

<sup>8</sup>Reading οὔ.

<sup>9</sup>Reading διὰ τί.

<sup>10</sup>Reading ἐκλούοντα.

<sup>1</sup>Omitting ὃ κωλύει τήκεσθαι.

<sup>2</sup>Reading θέρους for χειμῶνος.

<sup>3</sup>Reading τῷ ἐπιλαβεῖν.

<sup>4</sup>Reading διὰ τὸ μάλλον ἐκθερμαίνεσθαι.

<sup>5</sup>Reading ἢ ὅτι.

<sup>6</sup>Reading στέγει.

<sup>7</sup>Reading συστελλομένοι.

<sup>8</sup>Reading ἰδρῶτες μάλλον.

<sup>1</sup>Reading ὑπερτείνῃ τῇ δυνάμει.

<sup>2</sup>Reading ἐκλείπειν.

<sup>3</sup>Reading πίοι.

<sup>4</sup>Reading σνμβαίνει τὸ ξωτικόν.

<sup>5</sup>Reading ἐπ' εὐθείας φορά.

<sup>6</sup>Reading ἀπολεῖπον.



<sup>7</sup>Reading ταυτό.

<sup>8</sup>Reading ταῦτοῦ for ταῦτα.

<sup>9</sup>Reading χρόνον for τρόπον.

<sup>10</sup>Reading ἀποχυλίζοντες.

<sup>11</sup>Omitting καὶ οὐκ ἀηδές.

<sup>12</sup>Reading ἐνδεῶς.

<sup>13</sup>Reading μή for μέν.

<sup>14</sup>Reading ἢ ὀλίγη.

<sup>15</sup>Reading τοῖς μέγας πυριῶσιν.

<sup>16</sup>Reading ἐκάτερον.

<sup>17</sup>Reading ἐγκρατῶς.

<sup>1</sup>Reading γίνεται ποτέ, διὰ.

<sup>2</sup>Hesiod, *Works and Days* 582.

<sup>3</sup>Ruelle marks a lacuna.

<sup>4</sup>Reading θέρους ταῖς μέν ἐστι.

<sup>5</sup>Reading περιττωματικῶν.

<sup>1</sup>Reading σπῶνται.

<sup>2</sup>Omitting καί.

<sup>3</sup>Reading ἐν τῷ αὐτῷ σχήματι ποιεῖσθαι τὴν κίνησιν, ὃ συμβαίνει ἐν τῇ ἀνωμάλῳ κτλ.

<sup>4</sup>Reading γινόμενον μικρόν.

<sup>5</sup>Reading τὸ κατὰ φύσιν θερμὸν ἔχειν.

<sup>6</sup>Reading τὰ ὅπτα τῶν ἐφθῶν.

<sup>7</sup>Omitting ὑπὸ τοῦ θερμοῦ and reading φερομένους.

<sup>1</sup>Reading πρὸς τὸ ἐναντίον τὸ ἐναντίον σχῆμα.

<sup>1</sup>Reading συνθλασθῆ.

<sup>1</sup>Reading ἐκτός for ἐντός.

<sup>2</sup>Reading κατακέκλινται.

<sup>3</sup>Reading βάρος.

<sup>1</sup>Reading λευκαί.

<sup>2</sup>Homer, *Iliad* V 75.

<sup>3</sup>Reading δὲ ἐξιέναι.

<sup>4</sup>Reading φαίνεται. εἴτα τά.

<sup>1</sup>Reading τὸ ταντῇ εἶναι τὸ δέρμα ἀφεστός.

<sup>2</sup>Reading προσεστός.

<sup>3</sup>Reading ἡ δὲ ὕς ἢ διὰ.

<sup>4</sup>Reading σκληρότεραι.

<sup>5</sup>Reading δύο ἔτι for διότι.

<sup>6</sup>The text is uncertain at this point.

<sup>7</sup>Reading εἶπερ.

<sup>8</sup>Reading ὥς εἰκός.

<sup>9</sup>Reading τὴν ἐπιτέλεσιν τοῦ σώματος for τό γνωρίζειν.

<sup>10</sup>Omitting 忼στε.

<sup>11</sup>Reading κατὰ τὸ ὄνομα οὐδὲν ἢ οὐ.

<sup>12</sup>Reading ἄρτι.

<sup>13</sup>Reading ὅτιοῦν for ὅτι πᾶν.

<sup>14</sup>Omitting τὸ καλὸν καὶ τὸ ἡδύ.

<sup>15</sup>Reading οὐ πρόσ.

<sup>16</sup>Omitting τὸ σῶμα.

<sup>17</sup>Putting a comma after ἀπέπτων, and placing διό ... γίνεται in parentheses.

<sup>18</sup>Putting a comma after instead of before ἔξωθεν.

<sup>19</sup>Omitting πρό.

<sup>20</sup>Reading πάχος ἔχοντα.

<sup>21</sup>Reading τὸ μηδὲν ἐκτὸς δι' αὐτῶν.

<sup>22</sup>Reading ἢ μὴ γίνεσθαι.

<sup>1</sup>Reading (φωνὴ γάρ τις) καὶ τῆς ἀκοῆς, ὥσπερ καὶ ἐκ.

<sup>2</sup>Reading μιμοῦνται καὶ λεπτῇ.

<sup>3</sup>Reading προσπίπτων.

<sup>4</sup>Reading ἢ ὅτι.

<sup>5</sup>Reading ἢ ὅτι.

<sup>6</sup>Retaining γινομένων.

<sup>7</sup>Reading ἢ ὦ.

<sup>8</sup>Reading εὐκρινής.

<sup>9</sup>Reading αὐτῇ.

<sup>10</sup>Reading βραδύτερα.

<sup>11</sup>Reading πόρρω ἰόν.

<sup>12</sup>Reading φερόμενος, διαλύεται.

<sup>13</sup>Reading γεγώνασιν.

<sup>14</sup>Reading διορθᾶται, ὅτι.

<sup>1</sup>Excised by Forster.

<sup>2</sup>Reading εὔπεπτα for λεπτά.

<sup>3</sup>Reading ἥττον for θᾶττον.

<sup>4</sup>Reading εὐπετεστέρον.

<sup>5</sup>Reading ὑπεῖξαι.

<sup>1</sup>Reading τούτῳ for κάτω.

<sup>1</sup>Reading πυρετὸς ἐν ὧ τῶν.

<sup>2</sup>Reading ὁ ἀήρ ὁ ὑγρότερος.

<sup>3</sup>Reading ξηροῦ for θερμοῦ.

<sup>4</sup>Reading θερμότερος for ξηρότερος.

<sup>1</sup>διχάμετρος as from δίχα(‘into two parts’).

<sup>2</sup>Reading διὰ τί for διότι.

<sup>3</sup>A literal translation of the Greek for ‘eleven’ is ‘one-ten’.

<sup>4</sup>Reading οὐ δοκεῖ.

<sup>5</sup>The text of this sentence is quite uncertain.

<sup>6</sup>Reading καὶ ἄς ἐκβαλλόμεναι ποιοῦσιν αἱ ἀκτῖνες.

<sup>7</sup>Reading (here and below) Λ for Α.

<sup>8</sup>Reading ἐν τῇ ΛΘ.

<sup>9</sup>Reading δύνανται.

<sup>10</sup>Reading πλείονος δ’ αὐτοῦ.

<sup>11</sup>Omitting ὥς ἄνισον.

<sup>12</sup>Reading Δ for Γ.

<sup>13</sup>Reading ὅταν for ὅσω.

<sup>14</sup>Reading τοῦ ἄνωθεν κύκλου.

<sup>15</sup>Reading μικραὶ δέ.

<sup>16</sup>Reading ἀσθενῇ.

<sup>17</sup>Reading μεταβάλλοντα.

<sup>18</sup>Reading ἐκεῖνα.

<sup>1</sup>Reading ταύτη.

<sup>2</sup>Reading βάρος.

<sup>3</sup>Reading προσενεχθεῖσαν.

<sup>4</sup>Omitting ισάζειν αὐτὰ.

<sup>5</sup>Reading βάθει.

<sup>6</sup>Omitting διχοτομεῖσθαι . . . συνβήσεται.

<sup>7</sup>Reading ἐφ’ ἧς.

<sup>8</sup>Reading ἥπρωτη.

<sup>9</sup>Reading σάττεσθαι γὰρ εἰς αὐτόν.

<sup>10</sup>Reading κίνησιν.

<sup>11</sup>Reading αὐτόν καί for αὐτοῦ.

<sup>12</sup>The text of this sentence is quite uncertain.

<sup>13</sup>Reading ὡς ἐκίνησεν.

<sup>14</sup>Reading βάρος.

<sup>1</sup>Reading βάθει.

<sup>2</sup>Reading ἡ φορά.

<sup>1</sup>Reading ἴσταται.

<sup>2</sup>Reading οὐ ποιεῖ.

<sup>3</sup>Reading τῇ ἐτέρᾳ κινήσει.

<sup>4</sup>Reading μάλιστα ζῆ for ἔ χει.

<sup>1</sup>Reading ἀναχαλᾶν for ἄνω βάλλειν.

<sup>2</sup>Reading βίαν for μίαν.

<sup>3</sup>The text of the last two sentences is uncertain.

<sup>4</sup>Reading ἦττον ἡδύ.

<sup>5</sup>Reading ἴσχει.

<sup>6</sup>Reading ἴσχει.

<sup>7</sup>Following Monro's text.

<sup>8</sup>Reading εἷς ῥυθμός.

<sup>9</sup>Retaining βαρυτέρω.

<sup>10</sup>Reading αἰσθητός, ὅτι.

<sup>11</sup>Retaining ταχύ.

<sup>12</sup>Ruelle excises this sentence.

<sup>13</sup>Reading μόνον, οὐχί.

<sup>14</sup>Reading μιμητικά.

<sup>15</sup>Omitting καί after ἡγεμών.

<sup>16</sup>Ruelle marks a lacuna here.

<sup>17</sup>Reading διὰ πέντε ἡμιόλιον, τό δ' ἡμιόλιον.

<sup>18</sup>Reading τ' ἐκεῖνο for τεμεῖν ὄ.

<sup>19</sup>There is a lacuna in the text here.

<sup>20</sup>Reading φθειρομέναι.

<sup>21</sup>Reading ἡ κινηθεῖσα μόνη φθείρεται.

<sup>22</sup>Omitting δέ before ἔχειν and ἀπάσαις after μέσην.

<sup>23</sup>Reading ἐκλείπει μόνον.

<sup>24</sup>Reading εὐεκτικοί.

<sup>25</sup>Reading ῥᾶον for κάτω.

<sup>26</sup>Omitting οὐ.

<sup>27</sup>Reading δύναμιν ἔχῃ · τοῦτο δ' ἔχει.

<sup>28</sup>Reading ἀντίφωνον for σύμφωνον.

<sup>29</sup>Omitting τό before ἐκ διαφόρων.

<sup>30</sup>Retaining τριῶν.

<sup>31</sup>Reading λόγον for εὐλογον.

<sup>32</sup>Reading οὔσης ἀντωδῆς τῆς νεάτης.

<sup>33</sup>Reading ἡχώ ἀντωδῆ τις ἐστι φωνῆς, καὶ τῆς.

<sup>34</sup>Reading κινεῖται.

<sup>35</sup>Reading ὅτι οὐ for οὐ.

<sup>36</sup>Reading ἄλλως τε καὶ βραχείας κινήσεως αὐταῖς γεγεννημένης.

<sup>37</sup>Reading ἀκούομεν for ἐστίν.

<sup>38</sup>Reading ἦ ἐὰν πρὸς λύραν.

<sup>39</sup>Reading πᾶν τῷ ἡδίονι μιχθὲν ἡδιον ἐτι ἐστίν.

<sup>40</sup>Reading ἔτι for ἐπεί.

<sup>41</sup>Omitting ὄντες αὐτοῖς.

<sup>42</sup>Omitting τῶν μὲν ὀκτώ.

<sup>43</sup>The text of this sentence is quite uncertain.

<sup>44</sup>Reading μὲν for μέσον.

<sup>45</sup>Reading αὐτό.

<sup>1</sup>Reading εἰλώδεσι.

<sup>2</sup>Omitting μή.

<sup>3</sup>Reading αὐτῷ.

<sup>4</sup>Reading ἔ τι δὲ ἡ περίσσις.

<sup>5</sup>There is a lacuna at this point in the MSS.

<sup>6</sup>Reading ἦ for ἡ.

<sup>7</sup>There is a lacuna in the MSS here.

<sup>8</sup>Omitting δέ.

<sup>9</sup>Omitting οὐθὲν φυτόν.

<sup>10</sup>This sentence is excised by Ruelle.

<sup>1</sup>Reading ἀλλ' ἡ κριθὴ ψαθνρώτερον.

<sup>2</sup>Reading προσέχεσθαι ποιεῖ ἑαυτοῖς.

<sup>3</sup>Reading πρῶτα for ἄλφριτα.

<sup>4</sup>Reading ταυτό.

<sup>5</sup>Omitting δέ.

<sup>6</sup>Reading προΐεται ὑγρὸν. ταὐτὸ οὖν τοῦτο καὶ δίπυρος.

<sup>7</sup>Reading ἐκλιπεῖν.

<sup>8</sup>Reading ἀγγεῖον for αἷτιον.

<sup>9</sup>Reading κενόν for καί.

<sup>10</sup>Reading τὸ δὲ ἐν ὑγρῷ θερμὸν ποιεῖ.

<sup>11</sup>Adding ἔξεισι after ὑπόλοιπον.

<sup>12</sup>Reading πλεῖον καὶ διὰ τοῦτο καί.

<sup>13</sup>Reading ὁ for οὐ.

<sup>14</sup>Reading πλεῖω ἢ ἐλάττω.

<sup>15</sup>Reading συμπιέζεται for συμπιέζει τό.

<sup>1</sup>Placing a comma before οὐχ ὁμολογεῖται.

<sup>2</sup>Reading συνίσταται μᾶλλον ἢ ἐξατμίζει.

<sup>3</sup>Reading γλυκύ.

<sup>1</sup>Omitting ἐκ.

<sup>2</sup>Omitting οὐκ before ἀνακλᾶται and inserting οὐ before διέρχεται.

<sup>3</sup>Reading ἦ for ἡ.

<sup>4</sup>Omitting τό before πνέον.

<sup>5</sup>Reading θάλαττα; ἐνδέχεται γάρ.

<sup>6</sup>Reading ἡ τῆς θαλάττης.

<sup>7</sup>Reading τὸ ξηρότερον. τῇ δὲ θαλάττῃ ἄμφω ταῦτα.

<sup>8</sup>Reading διαρρεῖ.

<sup>9</sup>*Iliad* VII 64.

<sup>10</sup>Reading μιγνυμένου.

<sup>11</sup>Omitting ὅτι μᾶλλον ἔχει γῆν ὃ γλυκύς; ἦ.

<sup>12</sup>Placing a comma after οὐ instead of after μᾶλλον.

<sup>13</sup>Reading ἐφιστάμενον.

<sup>14</sup>Reading τῶν πόρων ἄνω.

<sup>15</sup>Reading Παῖσα λίμνη.

<sup>1</sup>Reading ὑγρόν τι for μὴ ψόφος.

<sup>2</sup>Reading θέρονς for ψύχονς.

<sup>3</sup>Placing a comma before instead of after βίᾱ.



<sup>4</sup>Placing a comma before instead of after τὸ περίξ.

<sup>5</sup>Reading διὰ for καί.

<sup>6</sup>Reading ἐκθνήσκουσι.

<sup>7</sup>Reading ψύχεσθαι καὶ ἔτι ἐπὶ τῷ σώματι ὄν.

<sup>1</sup>Reading ἰέναι for εὔαι.

<sup>2</sup>Omitting ἢ ὅσα ἔλη λιμνάζονται.

<sup>3</sup>Omitting εἰ τρίψει διὰ τοῦ καταδήματος.

<sup>4</sup>Omitting οὐχ.

<sup>5</sup>Omitting καὶ ἀήρ.

<sup>6</sup>Reading πρόωσιν.

<sup>7</sup>Reading ἔξω.

<sup>1</sup>Reading κυρτά.

<sup>2</sup>Reading τοῖς μεὺ ὑψηλοτέρους τοὺς ἐναντίους.

<sup>3</sup>Reading κοῖλα.

<sup>4</sup>Reading τῷ περὶ τήν γῆν ἔχειν τήν τελευτην τῆς φορᾶς.

<sup>5</sup>Omitting καθάπερ ὄρθρος.

<sup>6</sup>Reading οὐχ ἦττον.

<sup>7</sup>Reading οὐ πόρρω.

<sup>8</sup>Reading ἄστροις τὸ ἐπισημαίνειν.

<sup>9</sup>Reading ἐπιδεξίους οὐ μεταβάλλει.

<sup>10</sup>Reading καθ' αὐτόν.

<sup>11</sup>Placing a comma after προσπίπτει and a full stop after πεδιῷ.

<sup>12</sup>Reading λοιπόν for θερμόν.

<sup>13</sup>Reading χώρα θερμή' πρὸς δέ.

<sup>14</sup>Reading κομίζεται.

<sup>15</sup>Odyssey IV 567.

<sup>16</sup>Reading ἐστι for ἐπὶ.

<sup>17</sup>Excised by Ruelle.

<sup>18</sup>Reading ἐκπέττει.

<sup>19</sup>Reading ἀπογέας.

<sup>20</sup>Reading διάθεσιν for τάξιν.

<sup>21</sup>Reading ὕλην.

<sup>22</sup>Reading ἀραχνῶν.

<sup>1</sup>Reading ἵν' ἀναθερμανθῇ.

<sup>2</sup>Omitting τοῖς μέν.

<sup>3</sup>Reading τῶν τοιούτων.

<sup>4</sup>Reading ἄνωθεν τρέμει, διότι τὸ ἄνωθεν κάτω.

<sup>5</sup>Reading μόνον.

<sup>6</sup>Reading συμβαίνει.

<sup>1</sup>Reading δεῖται τοῦ ὑγροῦ τὸ θερμόν ὧ ζῶμεν.

<sup>2</sup>Reading ὁ λέων for ὁ ὄρῶν.

<sup>3</sup>Reading ἀπολαύσει.

<sup>4</sup>Reading ἡδεῖα.

<sup>5</sup>Reading ἡ δ' εὖνοια ἐξαίρει, ὥστε κινεῖ μᾶλλον τὸ γελοῖον.

<sup>1</sup>Reading χρήματα.

<sup>2</sup>Reading οὐδέ for ἀλλά.

<sup>3</sup>Reading αἵσχιον.

<sup>4</sup>Reading μείζω for ἐλάττω.

<sup>5</sup>Reading αὐτῷ.

<sup>6</sup>Omitting τό and ἔχεσθαι.

<sup>7</sup>Reading διώκων for ἀδικῶν.

<sup>8</sup>Reading μεταγνοῦσιν.

<sup>9</sup>The text of this sentence is uncertain.

<sup>10</sup>Reading τό τ'.

<sup>11</sup>Reading πονηροί.

<sup>1</sup>*Iliad* VI 200.

<sup>2</sup>*Odyssey* XIX 122.

<sup>3</sup>Omitting πνευματώδεις.

<sup>4</sup>Reading σκληροί.

<sup>5</sup>Reading ἐπανεθῆ ἢ ἄγαν θερμότης.

<sup>6</sup>Readings ἐν for μέν.

<sup>7</sup>Reading ἐπιπόλαια for παλαιά.

<sup>8</sup>Omitting τὸ μαραινόμενον θερμόν.

<sup>9</sup>Reading ἔτι.

<sup>10</sup>Reading οὕτως ὦν.

<sup>11</sup>Reading δυνάμεθα δέχεσθαι for δυνάμεθα. δυνάμεθα δὲ ἔχεσθαι.

<sup>12</sup>Reading τοιούτοις; ἢ ὅτι.

<sup>13</sup>Reading ἄλλη for ἐν ἄλλῃ.

<sup>14</sup>Reading λόγου καὶ σοφίας.

<sup>15</sup>Reading ἐξ ἧς for ἐξ ὧν.

<sup>1</sup>Reading ὥστ' ἀντιβλέπειν.

<sup>2</sup>Reading τὸ θερμόν.

<sup>3</sup>Reading μέχρι του.

<sup>4</sup>Reading κατὰ ταυτό.

<sup>5</sup>Reading ὥσιν. καὶ διαστροφή.

<sup>6</sup>Omitting the final sentence.

<sup>7</sup>Reading τὴν αὐγὴν.

<sup>8</sup>Reading ὀρθῶς for δρῶς.

<sup>1</sup>Omitting ἀνατέμνουσι δὲ ... εὐπνοίαν.

<sup>2</sup>Reading πόρου.

<sup>1</sup>Reading τὰ ὦτα.

<sup>2</sup>Reading βῆχα ἦ, ἐάν.

<sup>3</sup>Reading συνεστάναι.

<sup>4</sup>Reading ὁσμή for ῥύμη.

<sup>5</sup>Reading ἦ ὅτι for ὅσοις.

<sup>6</sup>Reading ὅταν μέλλουσιν ἦ ἀρχομένοις συμβῇ.

<sup>7</sup>Reading ἐξαερούμενου.

<sup>8</sup>Omitting ἡμῶν.

<sup>9</sup>Reading πνεῦμονος for πνεύματος.

<sup>1</sup>Reading ψυχροῦ for ἐναντίου.

<sup>2</sup>Reading θερμός for ψυχρός.

<sup>3</sup>Reading τό for τῷ.

<sup>4</sup>Ruelle accidentally omits this clause.

<sup>5</sup>Reading οὐ for οὖν.

<sup>6</sup>Reading αὐτῆς for αὐτοῖς, without a lacuna.

<sup>1</sup>Reading καθεύδουσιν ἡμῖν, ἡδονὴ θαυμασία.

<sup>2</sup>Reading θιγεῖν for εἰπεῖν.

<sup>3</sup>Reading ἐκτός for ἐντός.

<sup>1</sup>Reading τῇ τροφῇ.

<sup>2</sup>Reading ᾧ.

<sup>3</sup>Reading ἐπιπολῆς.

# ON INDIVISIBLE LINES\*\*

*H.H. Joachim*

[968<sup>a</sup>1] Are there indivisible lines? And, generally, is there something partless in every class of quanta, as some say?

For if, where 'many' and 'large' apply, so do their opposites, 'few' and 'small'; [5] and if that which admits practically an infinite number of divisions is many not few, then what is few and what is small will clearly admit only a finite number of divisions. But if the divisions are finite in number, there must be a partless magnitude. Hence in all classes of quanta there will be found something partless, since in all of them 'few' and 'small' apply.

Again, if there is an Idea of line, and if the Idea is first of the things called by [10] its name, then, since the parts are by nature prior to their whole, the Ideal Line must be indivisible. And, on the same principle, the Ideal Square, the Ideal Triangle, and all the other Ideal Figures—and, generalizing, the Ideal Plane and the Ideal Solid—must be without parts; for otherwise it will result that there are things prior [15] to each of them.

Again, if body consists of elements, and if there is nothing prior to the elements, and if parts are prior to their whole, then fire and, generally, each of the elements which are the constituents of body must be indivisible. Hence there must be something partless in the objects of sense as well as in the objects of thought.

Again, Zeno's argument proves that there must be partless magnitudes. For it [20] is impossible to touch an infinite number of things in a finite time, touching them one by one; and the moving body must reach the half-way point before it reaches the end; and there always is a half-way point in any non-partless thing.

But even if the body, which is moving along the line, does touch the infinity of points in a finite time; and if the quicker the movement of the moving body, the greater the stretch which it traverses in an equal time; and if the movement of [968<sup>b</sup>1] thought is quickest of all movements:—it follows that thought too will come successively into contact with an

infinity of objects in a finite time. And since thought's coming into contact with objects one-by-one is counting, it is possible to count infinitely many objects in a finite time. But since this is impossible, there must be such a thing as an indivisible line.

[5] Again, the being of indivisible lines (it is maintained) follows from the mathematicians' own statements. For if commensurate lines are those which are measured by the same unit of measurement, and if all commensurate lines are being measured,<sup>1</sup> there will be some length by which all of them will be measured. And this length must be indivisible. For if it is divisible, its parts—since they are commensurate with the whole—will involve some unit of measurement. Thus half [10] of a certain part will be double it. But since this is impossible, there must be an indivisible unit of measurement. And just as all the lines which are compounded of the unit are composed of partless elements, so also are the lines which the unit measures once.

And the same can be shown to follow in the plane figures too. For all which are [15] drawn on the rational lines are commensurate with one another; and therefore their unit of measurement will be partless.

But if any such plane be cut along any prescribed and determinate line, that line will be neither rational nor irrational, nor will any of the other kinds of lines which produce rational squares, such as the 'apotome' or the 'line ex duobus nominibus'. Such lines will have no nature of their own at all; though, relatively to [20] one another, they will be rational or irrational.

Now in the first place, it does not follow that that which admits an infinite number of divisions is not small or few. For we apply the predicate 'small' to place and magnitude, and generally to the continuous (and we apply 'few' where that is [25] applicable); and nevertheless we affirm that these quanta admit an infinite number of divisions.

Moreover, if in the composite magnitude there are contained indivisible lines,<sup>2</sup> the predicate 'small' is applied to these indivisible lines, and each of them contains an infinite number of points. But each of them, *quâ* line, admits of division at a [969<sup>a</sup>1] point, and equally at any and every point: hence each of these non-indivisible lines would admit an infinite number of divisions. Moreover, some amongst the non-indivisible lines are small. The ratios are infinite in number; and every non-indivisible line admits of division in accordance with any prescribed ratio. [5]

Again, since the great is compounded of certain small things, the

great will either be nothing, or it will be identical with that which admits a finite number of divisions. For the whole admits the divisions admitted by its parts. It is unreasonable that, whilst the small admits a finite number of divisions only, the great should admit an infinite number; and yet this is what the advocates of the theory postulate. [10]

It is clear, therefore, that it is not *quâ* admitting a finite and an infinite number of divisions that quanta are called small and great respectively. And to argue that, because *in numbers* what is few admits a finite number of divisions, therefore *in lines* the small line must admit only a finite number of divisions, is childish. For in numbers the development is from partless objects, and there is a determinate something from which the whole series of the numbers starts, and every number [15] which is not infinite admits a finite number of divisions; but in magnitudes the case is not parallel.

As to those who try to establish indivisible lines by arguments drawn from the Ideal Lines, we may perhaps say that, in positing Ideas of these quanta, they are assuming a premiss too narrow to carry their conclusion; and, by arguing thus, they [20] in a sense destroy the premisses which they use to prove their conclusion. For their arguments destroy the Ideas.

Again, as to the corporeal elements, it is childish to postulate them as partless. For even though some do as a matter of fact make this statement about them, yet to assume this for the present inquiry is to assume the point at issue. Or rather, the [25] more obviously the argument would appear to assume the point at issue, the more the opinion is confirmed that solids and lengths are divisible in bulk and distance.

The argument of Zeno does not establish that the moving body comes into contact with the infinite number of points in a finite time in the same way. For the [30] time and the length are called infinite and finite and admit of the same divisions.

Nor is thought's coming into contact with the members of an infinite series one-by-one *counting*, even if it were supposed that thought does come into contact in this way with the members of an infinite series. Such a supposition perhaps assumes what is impossible: for the movement of thought does not, like the movement of [969<sup>b</sup>1] moving bodies, essentially involve *continua* and *substrata*.

If, however, the possibility of thought moving in this fashion be admitted, still this moving is not counting; for counting is movement combined with pausing.

It is surely absurd that, because you are unable to solve Zeno's

argument, you [5] should make yourselves slaves of your inability, and should commit yourselves to still greater errors, in the endeavour to support your incompetence.

As to what they say about commensurate lines—that all lines are measured by one and the same unit of measurement—this is sheer sophistry; nor is it in the least in accordance with the mathematical assumption as to commensurability. For the mathematicians do not make the assumption in this form, nor is it of any use to them.

[10] Moreover, it is actually inconsistent to postulate both that every line becomes commensurate, and that there is a common measure of all commensurate lines.

Hence their procedure is ridiculous, since, whilst professing that they are going to demonstrate their thesis in accordance with<sup>3</sup> the opinions of the mathematicians, and by premisses drawn from the mathematicians' own statements, they lapse into an argument which is a mere piece of contentious and sophistical dialectic—and [15] such a feeble piece of sophistry too! For it is feeble in many respects, and totally unable to escape paradox and refutation.

Moreover, it would be absurd for people to be led astray by Zeno's arguments, and to be persuaded—because they cannot refute it—to invent indivisible lines; and yet because of the movement of a straight line to make a semicircle, which must [20] touch infinitely many arcs and distances in between, and because of its movement to form a circle, which readily shows that it must move at every point if it moves to make a semicircle, and because of other similar considerations about lines—to refuse to accept that a movement can be generated such that in it the moving thing does *not* fall successfully on each of the intervening points before reaching the [25] end-point. For the theorems in question are more generally admitted, than the arguments of Zeno.

It is clear, then, that the being of indivisible lines is neither demonstrated nor rendered plausible—at any rate by the arguments which we have quoted. And this conclusion will grow clearer in the light of the following considerations.

In the first place, our result will be confirmed by reflection on the conclusions proved in mathematics, and on the assumptions there laid down—conclusions and [30] assumptions which must either stand or be overthrown by more convincing arguments.

For neither the definition of line, nor that of straight line, will apply to the indivisible line, since the latter is not between any terminal points,



and does not possess a middle.

Secondly, all lines will be commensurate. For all lines—both those which are [970<sup>a</sup>1] commensurate in length, and those which produce commensurate squares—will be measured by the indivisible lines.

And the indivisible lines are all of them commensurate in length (for they are all equal to one another), and therefore also they all produce commensurate squares. But if so, then the square on any line will always be rational. [5]

Again, since the line applied to the longer side determines the breadth of the figure, the rectangle, which is equal in area to the square on the indivisible line (e.g. on the line one foot long), will, if applied to a line double the indivisible line, have a breadth determined by a line shorter than the indivisible line: for its breadth will be less than the breadth of the square on the indivisible line.

Again, since any three given straight lines can be combined to form a triangle, [10] a triangle can also be formed by combining three given indivisible lines. But in every equilateral triangle the perpendicular dropped from the apex bisects the base. Hence, it will bisect the indivisible base too.

Again, if the square can be constructed of partless lines, then let its diagonal be drawn, and a perpendicular be dropped. The square on the side will be equal to the square on the perpendicular together with the square on half the diagonal. Hence it will not be the smallest line. [15]

Nor will the area which is the square on the diagonal be double the square on the indivisible line. For if from the diagonal a length equal to the side of the original square be subtracted, the remaining portion of the diagonal will be less than the partless line. For if it were equal the square on the diagonal would have been four times the original square.

And one might collect other similar absurdities to which the doctrine leads; for indeed it conflicts with practically everything in mathematics. [20]

Again, what is partless admits of only one mode of conjunction, but a line admits of two: for one line may be conjoined to another either along the whole length of both lines, or by contact at either of its opposite terminal points.

Further, the addition of a line will not make the whole line any longer; for partless items will not, by being added together, produce an increased total magnitude.

[25] Further, every continuous quantum admits more divisions than

one, and therefore no continuous quantum can be formed out of two partless items. And since every line (other than the indivisible line) is continuous, there can be no indivisible line.

Further, if every line (other than the indivisible line) can be divided both into equal and into unequal parts—every line, even if it consist of three or any odd number of indivisible lines—it will follow that the indivisible line is divisible.

And the same will result if every line admits of bisection; for then every line [30] consisting of an odd number of indivisible lines will admit of bisection.

And if not *every* line, but only lines consisting of an even number of units admit of bisection, and if it is possible to cut the line being bisected any number of times, still, even so, the ‘indivisible’ line will be divided, when the line consisting of an even number of units is divided into unequal parts.

[970<sup>b</sup>1] Again, if a body has been set in motion and takes a certain time to traverse a certain stretch, and half that time to traverse half that stretch, it will traverse less than half the stretch in less than half the time. Hence if the stretch be a length consisting of an odd number of indivisible unit-lines, we shall here again find<sup>4</sup> the [5] bisection of the indivisible lines, since the body will traverse half the stretch in half the time: for the time and the line will be correspondingly divided.

So that none of the composite lines will admit of division both into equal and into unequal parts; and if they are divided in a way corresponding to the division of the times, there will not be indivisible lines. And yet (as we said) the truth is, that [10] the same argument implies that all these things consist of partless items.

Further, every line which is not infinite has two terminal points; for line is defined by these. Now, the indivisible line is not infinite, and will therefore have a terminal point. Hence it is divisible: for the terminal point and that which it terminates are different from one another. Otherwise there will be a third kind of line, which is neither finite nor infinite.

[15] Further, there will not be a point contained in every line. For there will be no point contained in the indivisible line; since, if it contains one point only, a line will be a point, whilst if it contains more than one point it will be divisible. And if there is no point in the indivisible line, neither will there be a point in any line at all: for all the other lines are made up of the indivisible lines.

Moreover, there will either be nothing between the points, or a line. But if [20] there is a line between them, and if all lines contain more points than one, the line will not be indivisible.

Again, it will not be possible to construct a square on every line. For a square will always possess length and breadth, and will therefore be divisible, since each of its dimensions is a determinate something. But if the square is divisible, then so will be the line on which it is constructed.

Again, the limit of the line will be a line and not a point. For it is the ultimate thing which is a limit, and it is the indivisible line which is ultimate. For if the [25] ultimate thing be a point, then the limit to the indivisible line will be a point, and one line will be longer than another by a point. But if the point is contained *within* the indivisible line, because two lines united so as to form a continuous line have one and the same limit at their juncture, then the partless line will after all have a limit belonging to it.

And, indeed, how will a point differ at all from a line on their theory? For the indivisible line will possess nothing characteristic to distinguish it from the point, [30] except the name.

Again, there must, by parity of reasoning, be indivisible planes and solids too. For if one is indivisible, the others will follow suit; for each divides at one of the others. But there is no indivisible solid; for a solid contains depth and breadth. [971<sup>a</sup>1] Hence neither can there be an indivisible line. For a solid is divisible at a plane, and a plane is divisible at a line.

But since the arguments by which they endeavour to convince us are weak and false, and since their opinions conflict with all the most convincing arguments, it is [5] clear that there can be no indivisible line.

And it is further clear from the above considerations that a line cannot be composed of points. For the same arguments, or most of them, will apply.

For it will necessarily follow that the point is divided, when the line composed of an odd number of points is divided into equal parts, or when the line composed of an even number of points is divided into unequal parts. [10]

And it will follow that the part of a line is not a line, nor the part of a plane a plane.

Further it will follow that one line is longer than another by a point; for it is by its constituent elements that one line will exceed another. But that this is impossible is clear both from what is proved in mathematics

and from the following argument. For it would result that a moving body would take a time to traverse a point. For, as [15] it traverses an equal line in an equal time, it will traverse a longer line in a greater time: and that by which the greater time exceeds the equal time is itself a time.

Perhaps, however, time consists of 'nows', and both theses belong to the same way of thinking.

Since, then, the now is a beginning and end of a time, and the point a beginning and end of a line; and since the beginning of anything is not continuous with its end, but they have an interval between them; it follows that neither nows nor points can [20] be continuous with one another.

Again, a line is a magnitude; but the putting together of points constitutes no magnitude, because several points put together occupy no more space than one. For when one line is superimposed on another and coincides with it, the breadth is in no way increased. And if points too are contained in the line, neither would points [25] occupy more space. Hence points would not constitute a magnitude.

Again, whenever one thing is contiguous with another, the contact is either whole-with-whole, or part-with-part, or whole-with-part. But the point is without parts. Hence the contact of point with point must be a contact whole-with-whole.

But if one thing is in contact with another whole-with-whole, the two things must be one. For if either of them is anything in any respect in which the other<sup>5</sup> is [30] not, they would not be in contact whole-with-whole.

But if the partless items are together, then a plurality occupies the same place [971<sup>b</sup>1] which was formerly occupied by one; for if two things are together and neither admits of being extended, just so far<sup>6</sup> the place occupied by both is the same. And since the partless has no dimension, it follows that a continuous magnitude cannot be composed of partless items. Hence neither can a line consist of points nor a time of nows.

[5] Further, if a line consists of points, point will be in contact with point. If, then, from *K* there be drawn the lines *AB* and *CD*, the point in the line *AK* and the point in the line *KD* will both be in contact with *K*. So that they will also be in contact with one another; for what is partless when in contact with what is partless is in contact whole-with-whole. So that the points will occupy the same place as *K*, and, being in [10] contact, will be in the same place with one another. But if they are in the same place with one another, they must also be in contact with one

another; for things which are in the same primary<sup>7</sup> place must be in contact. But, if this is so, one straight line will touch another straight line at two points. For the point in the line *AK* touches both the point *KC*<sup>8</sup> and another. Hence the line *AK* touches the line *CD* at more points than one.

[15] And the same argument would apply not only where two lines were in contact but also if there had been any number of lines touching one another.

Further, the circumference of a circle will touch the tangent at more points than one. For both the point on the circumference and the point in the tangent touch the point of junction and also touch one another. But since this is not possible, neither is it possible for point to touch point. And if point cannot touch point, [20] neither can a line consist of points; for if it did,<sup>9</sup> they would necessarily be in contact.

Moreover, how will there any longer be straight *and* curved lines? For the conjunction of the points in the straight line will not differ in any way from their conjunction in the curved line. For the contact of what is partless with what is partless is contact whole-with-whole, and no other mode of contact is possible. Since, then, the lines are different, but the conjunction of points is the same, clearly [25] a line will not depend on the conjunction: hence neither will a line consist of points.

Further, the points must either touch or not touch one another. Now if the next in a series must touch the preceding term, the same arguments will apply; but if there can be a next without its being in contact yet by the continuous we mean [30] nothing but a composite whose constituents are in contact. So that even so the points must be in contact, in so far as the line must be continuous.<sup>10</sup>

Again, if it is absurd for a point to be by a point, or a line by a point, or a plane [972<sup>a</sup>1] by a line, what they say is impossible.<sup>11</sup> For if the points form a series, the line will be divided not at either of the points, but between them; whilst if they are in contact, a line will be the place of the single point. And this is impossible. [5]

Further, all things would be divided, i.e. be dissolved, into points; and the point would be a part of a solid, since a solid consists of planes, a plane of lines, and lines of points. And since those constituents, of which (as primary immanent factors) the various groups of things are composed, are elements, points would be elements of [10] bodies. Hence elements would be synonymous, and not specifically different.

It is clear, then, from the above arguments that a line does not consist of points.

But neither is it possible to subtract a point from a line. For, if a point can be subtracted, it can also be added. But if anything is added, that to which it was added [15] will be bigger than it was at first, if that which is added be such as to form one whole with it. Hence a line will be bigger than another line by a point. And this is impossible.

But though it is not possible to subtract a point *as such* from a line, one may subtract it *incidentally*, viz. in so far as a point is contained in the line which one is subtracting from another line. For since, if the whole be subtracted, its beginning [20] and its end are subtracted too; and since the beginning and the end of a line are points: then, if it be possible to subtract a line from a line, it will be possible also thereby to subtract a point. But such a subtraction of a point is accidental.

But if the limit *touches* that of which it is the limit (touches either *it* or some [25] one of its parts), and if the point *quâ* limit of the line, touches the line, then the line will be greater than another line by a point, and the point will consist of points. For there is nothing between two things in contact.

The same argument applies in the case of division, since the division is a point and, *quâ* dividing-point,<sup>12</sup> is in contact with something. It applies also in the case of a solid and a plane. And the solid must consist of planes, the plane of lines. [30]

Neither is it true to say of a point that it is the smallest constituent of a line.

For if it be called the smallest of the things contained in the line, what is smallest is also *smaller* than those things of which it is the smallest. But in a line [972<sup>b</sup>1] there is contained nothing but points and lines: and a line is not bigger than a point, for neither is a plane bigger than a line. Hence a point will not be the smallest of the constituents in a line.

And if a point is commensurate with a line, yet, since the smallest involves [5] three degrees of comparison, the point will not be the *smallest* of the constituents of the line; and there are other things in the length besides points and lines; for it will not consist of points. But, since that which is in place is either a point or a length or a plane or a solid, or some compound of these; and since the constituents of a line are [10] in place (for the line is in place); and since neither a solid nor a plane, nor anything compounded of these, is contained in the line:—there can be absolutely nothing in the length except points and lines.

Further, since that which is called greater than that which is in place

is a [15] length or a surface or a solid; then, since the point is in place, and since that which is contained in the length besides points and lines is none of the aforementioned:—the point cannot be the smallest of the constituents of a length.

Further, since the smallest of the things contained in a house is so called, without in the least comparing the house with it,<sup>13</sup> and so in all other cases:—neither [20] will the smallest of the constituents in the line be determined by comparison with the line. Hence the term ‘smallest’ applied to the point will not be suitable.

Further, that which is not in the house is not the smallest of the constituents of the house, and so in all other cases. Hence, since<sup>14</sup> a point can exist by itself, it will [25] not be true to say of it that it is the smallest thing in the line.

Again, a point is not an indivisible joint.

For a joint is always a limit of two things, but a point is a limit of *one* line. Moreover a point is a limit, but a joint is more of the nature of a division.

Again, a line and a plane will be joints; for they are analogous to the point. Again a joint is in a sense on account of movement (which explains the verse of Empedocles ‘a joint binds two’<sup>15</sup>); but a point is found also in immovable [30] things.<sup>16</sup>

Again, nobody has an infinity of joints in his body or his hand, but he has an infinity of points. Moreover, there is no joint of a stone, nor has it any; but it has points.

<sup>1</sup>Reading ὅσαι δ' εἰσὶ σύμμετροι, πᾶσαι εἰσι μετρούμεναι.

<sup>2</sup>Reading ἐν τῷ συνθέτῳ ἄτομοί εἰσι γραμμαί.

<sup>3</sup>Reading κατὰ τὰς ἐκείνων δόξας ... φάσκοντας.

<sup>4</sup>Reading ἀνευρεθήσεται.

<sup>5</sup>Reading ἢ θάτερον.

<sup>6</sup>Retaining ἐπέκτασιν, κατὰ ταῦτα.

<sup>7</sup>Reading πρώτῳ.

<sup>8</sup>Reading καὶ τῆς ΚΓ.

<sup>9</sup>Reading οὕτω γὰρ.

<sup>10</sup>Reading ἢ εἶναι γραμμὴν συνεχῆ.

<sup>11</sup>Reading ἔτι εἰ ἄτοπον στιγμὴν ἐπὶ στιγμῆς εἶναι ἢ γραμμὴν ἐπὶ στιγμῆς ἢ ἐπὶ γραμμῆς ἐπίπεδον. But the text is quite uncertain, even by the standards of the rest of the treatise.

<sup>12</sup>Reading ἢ τομή.

<sup>13</sup>Omitting Apelt's πρὸς τὴν οἰκίαν συμβάλλεται μήτε, and reading μή τι τῆς for μήτε τῆς.

<sup>14</sup>Reading ἐνδέχεται δέ.

<sup>15</sup>Reading δὺω δέει ἄρθρον: frag. 32 Diels-Kranz.

<sup>16</sup>Omitting τό.



# THE SITUATIONS AND NAMES OF WINDS\*\*

*E. S. Forster*

Boreas. At Mallus this wind is called Pagreus; for it blows from the high cliffs [973<sup>a</sup>1] and two parallel ranges known as the Pagrean Mountains. At Caunus it is called Meses; in Rhodes it is known as Caunias, for it blows from Caunus, causing storms [5] in the harbour of that place. At Olbia, near Magydum in Pamphylia, it is called Idyreus; for it blows from an island called Idyris. Some people identify Boreas and Meses, amongst them the Lyrnatians near Phaselis.

Caecias. In Lesbos this wind is called Thebanas; for it blows from the plain of [10] Thebe, north of the Elaitic Gulf in Mysia. It causes storms in the harbour of Mitylene and very violent storms in the harbour of Mallus. In some places it is called Caunias, which others identify with Boreas.

Apeliotes. This wind is called Potameus at Tripolis in Phoenicia; it blows from a plain resembling a great threshing-floor, which lies between the mountains of Libanus and Bapyrus; hence it is called Potameus. It causes storms at Posidonium. [15] In the Gulf of Issus and the neighbourhood of Rosus it is known as Syriandus; it blows from 'the Syrian Gates', the pass between the Taurus and the Rosian Mountains. In the Gulf of Tripolis it is called Marseus, from the village of Marsus. [20] In Proconnesus, Teos, Crete, Euboea, and Cyrene it is known as Hellespontias. It causes storms in particular at Caphereus in Euboea, and in the harbour of Cyrene, which is called Apollonia. It blows from the Hellespont. At Sinope it is called Berecynthias, because it blows from the direction of Phrygia. In Sicily it is known as [973<sup>b</sup>1] Cataporthmias, because it blows from the Straits. Some people identify it with Gaecias, and also call it Thebanas.

Eurus. This wind is called Scopeleus at Aegae, on the borders of Syria, after the cliff at Rosus. In Cyrene it is known as Carbas after the Carbanians in [5] Phoenicia; hence some people call this same wind Phoenicias. Some people identify it with Apeliotes.

Orthonotus. Some call this wind Eurus, others Amneus.

Notus bears the same name everywhere. It is derived from the fact that this wind is unwholesome, while out of doors it brings showers; thus there are two reasons for its name. [10]

Leuconotus likewise derives its name from its effect; for it clears the sky.

Lips. This wind gets its name from Libya, whence it blows.

Zephyrus. This wind is so named because it blows from the west, and the west. . . .

Iapyx. At Tarentum it is called Scylletinus from the place Scylletium. At [15] Dorylaeum in Phrygia.. . . Some people call it Pharangites, because it blows from a certain ravine in Mount Pangaeus. Many call it Argestes.

Thracias is called Strymonias in Thrace, for it blows from the river Strymon; [20] in the Megarid it is known as Sciron, after the Scironian cliffs; in Italy and Sicily it is called Circias, because it blows from Circaeum. In Euboea and Lesbos it goes by the name of Olympias, which is derived from Pierian Olympus; it causes storms at Pyrrha.

I have drawn for you the circle of the earth and indicated the positions of the [25] winds, and the directions in which they blow, so that they may be presented to your vision.

**\*\*TEXT: O. Apelt, Teubner, Leipzig, 1888**

# ON MELISSUS, XENOPHANES, AND GORGIAS\*\*

*T. Loveday and E. S. Forster*

1 · Melissus says that, if anything is, it is eternal, since it is impossible that [974<sup>a</sup>1] anything can come into being from nothing. For suppose that either all things or some things have come into being, in either case they must be eternal; for otherwise, in coming into being, they would do so out of nothing. For if all things come into [5] being, then nothing can pre-exist; whilst if some things were ever and others are added, that which is must have become more and greater, and that by which it is more and greater must have arisen out of nothing; for the more is not originally existent in the less, nor the greater in the smaller.

Since it is eternal, it is unlimited; for it has no beginning from which it has come [10] into being, and no end at which it ever ceased coming into being.

Being all and unlimited it is one; for if it were two or more, these would be limits for one another.

Being one it must be similar throughout; for if it were dissimilar, it would be several and therefore no longer one but many.

Being eternal and unlimited and alike throughout, the One is without motion; [15] for it could not move without passing somewhere else, and it can only pass either into that which is full or into that which is empty; but of these the former could not admit it, while the latter is nothing at all.

Such being the nature of the One, it is unaffected by grief and pain, and is healthy and free from disease, and cannot change either by transposition or by [20] change of form or by mixture with anything else; for under all these circumstances the One becomes many, and what is not is necessarily generated and what is is destroyed; but these are impossibilities. For, indeed, if it were maintained that any One is the result of a mixture of several constituents—suppose, that is, that things [25] were many and moved into one another, and that their mixture were

either by way of the composition of the many in one, or, being due to the constituents fitting in with one another, resulted in their covering one another from view—then in the former case the constituents mixed would be easily discernible, if you separated them; whilst, if they covered one another, rubbing would reveal each constituent, [974<sup>b</sup>1] the successive layers being uncovered as the upper layers were removed. Now neither of these things happens. But according to Melissus it is only in these ways that many things could both be and also appear to us; and since these ways are [5] impossible, that which is cannot be many, and the belief that it is is erroneous, like many other fancies which are due to the senses; but argument does not prove either that things come into being or that what is, is many, but that it is one and eternal and unlimited and similar throughout.

Now surely one ought firstly to begin by taking not any and every opinion, but [10] those which are most firm. If, then, all our opinions are incorrectly conceived, it is perhaps quite wrong to adopt this doctrine too, that nothing can ever come into being out of nothing; for this is but a single opinion and an incorrect one too, which we somehow all of us<sup>1</sup> have often been led to believe from our sense-perceptions. But [15] if not all that appears to us is false, and some beliefs even of objects of sense are correct, either one ought to demonstrate the nature of such a correct belief and then adopt it, or else demonstrate and adopt those which appear most likely to be correct; and these must always be more firm than the conclusions which are apt to follow from the arguments of Melissus. For supposing that we really had to do with two [20] contrary opinions, as Melissus thinks (for if there are many things, he says they must arise from what is not; and if this is impossible, what is, is not many; for, being ungenerated, anything which is, is unlimited, and therefore one), supposing this so, [25] still, if we admit both propositions equally, unity is no more proved than multiplicity, and it is only if one proposition is more firm than the other, that the conclusions following from it are better proved. Now, as a matter of fact, we do entertain both these beliefs, namely, that nothing can come to be out of nothing, and also that existents are many and are in motion; and of the two the latter is more generally credited, and every one would more readily give up the former opinion than this. [975<sup>a</sup>1] Now if it were the case that the two propositions are contrary to one another, and it were impossible that at the same time things should come to be of what is not, and there should fail to be a multiplicity of things, each of these views would refute the other. But why should his premisses be correct? Some one else might

assert the [5] exact opposite. For he has not argued his case either by showing that it is a correct opinion from which he starts, or by taking a more firm opinion than that with which his proof is concerned. For it is usually considered more likely that things come to be from what is not than that there is not a multiplicity of things; it is confidently asserted about existents that things which do not exist come into being, indeed often have come into being, out of non-existents, and those who have asserted this are no [10] ordinary men, but some of those who are looked upon as sages. To being with, Hesiod says:

First of all in the world was Chaos born, and thereafter  
Broad-bosomed earth arose, firm seat of all things forever  
And Love that shineth bright amid the host of Immortals.<sup>2</sup>

All other things, he says, came into being from these, but these came into being out of nothing. Secondly, there are many who say that nothing is but all things [15] become, declaring that whatever becomes does not arise from existents; for then their statement that all things become would be false. So much, therefore, is clear, that there are some people of the opinion that becoming even out of non-existents is possible.

2 · But had we not better leave aside the possibility or impossibility of his conclusions, and confine ourselves to what may very well be a distinct problem—namely, whether these conclusions follow from the premisses which he takes, or [20] whether nothing prevents things from being otherwise. And first of all, granted his first assumption, that nothing can come to be from what is not, does it necessarily follow that all things are ungenerated? Or is there no reason why one thing should not have come to be out of another, and so on in an endless series? Or may it not go [25] on in a circular process, in such a way that one thing has come to be out of another, there thus being always something in existence, and all things having come to be out of one another an endless number of times? In that case, although it be agreed that nothing can come to be out of what is not, everything may very well have come to be. (And none of the attributes which are attached to the One prevents our calling [30] existents unlimited in Melissus's sense of the word. For he himself attributes to the unlimited that it actually is, and is said to be, everything. And even if existents are not unlimited, there is no reason why they should not come to be by the circular process.) Further, if all things come to be and nothing is, as some declare, how can they be

eternal? Yet he certainly argues as though the existence of something were [35] real and agreed. For, he says, if a thing has not come to be but is, it must be eternal, as though being were necessarily inherent in things. Moreover, however impossible it may be for what is not to come to be, or for what is to be destroyed, yet what prevents some existing things from having come to be and others from being eternal, as Empedocles also affirms? For after admitting all this, namely, that [975<sup>b</sup>1]

Out of that which is not can nothing come into being;  
And whatsoever exists, no art nor device can destroy it;  
For it will always abide, where'er 'tis implanted, for ever,<sup>3</sup>

he yet declares that of existents some are eternal, namely, fire, water, earth, and air, [5] but that the rest of things come to be and have come to be out of these. For in his opinion there is no other process whereby existents can come to be,

Save the mingling of things and exchanging of things that are mingled;  
This in the speech of men is called the work of Begetting.<sup>4</sup>

[10] But he denies that the being of the eternal things and of what really is, is the result of a process of coming to be; for this he considers impossible. For he says:

How could aught bring increase to the All and whence have arisen?<sup>5</sup>

But the Many come to be by the mixture and composition of fire and the other elements, and perish again when those elements are exchanged and separated; that [15] is, by mixture and separation many things are at any time, but by nature there are only four apart from the causes, or else only one. Or again if these elements out of the composition of which things come to be, and by the dissolution of which they are destroyed were from the first unlimited—which is what some affirm that Anaxagoras means when he says that things which come to be do so out of things that are always existent and unlimited—even so not all things would be eternal, but there [20] would be some things coming to be and having come to be from things that are, and passing by destruction into other modes of being. Furthermore, there is no reason why one form should not constitute the universe (as Anaximander and Anaximenes say, the former declaring that the universe is water, while Anaximenes says that it is [25] air, and as others say who have contended along these lines that the universe is one), and why this, but assuming various shapes and greater or less bulk—that is, by coming to be in a rare or dense state—should not make up the many unlimited objects which exist and come to be and

compose the whole. Again, Democritus declares that water and air and each of the many things that exist are essentially the [30] same, but differ in their 'rhythm'. Why should not the many come to be and be destroyed in *this* way, the One changing continually from being to being by the above-mentioned differences, and the whole becoming not a whit either greater or less? Furthermore, why should not bodies from time to time come to be from other bodies and be dispersed into bodies, and thus by dissolution the processes of generation and decay always balance one another?

[35] But if one were to make these concessions and allow that what is both exists and is ungenerated, how is its unlimitedness thereby more clearly demonstrated? For Melissus declares it to be unlimited, if it exists but has not come to be; for the beginning and end of the process of coming to be are, he says, limits. Yet what in his argument prevents a thing which is ungenerated from having a limit? For if a thing [976<sup>a</sup>1] has come to be, he contends that it has as a beginning that from which it began coming to be. Now why should it not have a beginning, even if it has not come to be—not, however, one from which it has come to be, but some other—and why should not existents, though eternal, be limited in relation to one another? Again, [5] why should not the whole, being ungenerated, be unlimited, but the things which come to be within it be limited by having a beginning and end of coming to be? Again, as Parmenides says, what prevents the universe, though it be one and ungenerated, from being nevertheless limited and

Like to the mass of a sphere on all sides carefully rounded,  
Everywhere equally far from the midst; for Fate hath appointed  
That neither here nor there should it either be greater or smaller?<sup>6</sup> [10]

Now, if it has a centre and extremities, it has a limit though it is ungenerated; since if it be one and a body, as Melissus himself asserts, it has parts of its own as well, and these all alike. For when he says that the universe is similar, he does not use the term of similarity to something else (this is just the point that Anaxagoras<sup>7</sup> raises in disproving that the unlimited is similar, i.e. that what is similar is similar to [15] something else, so that being two or more it would no longer be one, nor yet unlimited), but perhaps he means similar in relation to itself—in other words, that it is homogeneous, being all water or earth or something else of the kind. For he clearly holds that in this case it would be one; but each of the parts being a body is not unlimited (for it is the whole which is unlimited), and therefore they are limited [20] in relation to one



another, although they are ungenerated.

Further, if it is both eternal and unlimited, how could it be one, being a body? For if it were heterogeneous,<sup>8</sup> it would be many. Melissus himself contends that it would then be many. But if it is all water or all earth, or whatever this being is, it would have many parts (as Zeno, too, attempts to prove of that which is one in this [25] sense); its parts would then be many, being some of them smaller and less than others; so that in this way it would vary throughout, without any body being added to it or taken away from it. But if it has no body or width or length, how could the One be unlimited? Or why should there not be many, indeed innumerable, existents [30] of this kind? Further, if there are more existents than one, why should they not be unlimited in size, just as Xenophanes asserts that the depth both of the earth and of the air is unlimited? Empedocles shows this; for, as though certain people urged such views, he makes the criticism that, if this is the nature of earth and air, it is impossible for them ever to meet, [35]

If the depths of the earth are unbounded and ample the ether,  
As the words that come forth from the lips of mortals unnumbered,  
Empty and meaningless, say; they have seen of the whole but a little.<sup>9</sup>

Further, if it is one, there is nothing absurd in supposing that it is not similar everywhere. For if the universe is water or fire or something of that kind, there is no [976<sup>b</sup>1] reason why we should not suppose several kinds of this one being, each kind individually similar to itself. For there is no reason why one kind should not be rare and another dense, as long as the rarity does not involve a void. For in the rare there is not a void isolated in particular parts in such a way that of the whole part is dense [5] and part not dense (rarity then meaning that the whole is like this); but rarity is produced when the whole is uniformly full, but uniformly less full than in the dense.

But suppose it exists and is ungenerated, and suppose it were granted that for [10] this reason it is unlimited, and that more than one thing cannot be unlimited, and it must therefore be said to be one, and it is impossible. . . .<sup>10</sup> For how, if what is unlimited is a whole, can the void, not being a whole, exist?

Now Melissus declares that it is without motion, if a void does not exist; for everything moves by changing its place. In the first place, then, this does not agree [15] with the opinion of many, which is that a void does exist, yet it is not a body, but is of the nature of the Chaos, as Hesiod

describes it first coming into being in the birth of things, considering space to be a prime necessity for things which exist; and the void is, as it were, a vessel in which we expect to find an interior space. But even if there [20] is no void, why should it be less likely to move? For Anaxagoras, who devoted his attention to this subject, and for whom it was not enough merely to declare that a void does not exist, declares that things which are, are in motion, although there is no void. Similarly Empedocles says that they are ever in motion continually all through the period of aggregation, but that there is no void; for he says that

[25] Nought of the whole can be void; whence then could any be added?<sup>11</sup>

while when all has been aggregated into a single form, so as to be one,

Emptiness there is none, nor aught that is overflowing.<sup>12</sup>

For why should not things assume one another's position and go through a circle of simultaneous movements, one thing taking the place of another, and that the place [30] of something else, and something else the first position? And what is there in what he has said that precludes a movement taking place in things, consisting in a change of form in an object which remains in the same position (what he, like every one else, terms alteration), as, for example, when white turns into black, or bitter into sweet? For the non-existence of a void and the inability of that which is full to [35] receive any addition does not at all preclude the possibility of alteration.

Thus neither are all things necessarily eternal nor is it necessarily unlimited (but many things are unlimited), nor is it one, nor similar, nor unmoved, whether it be one or whether it be many. If this is admitted, if there would be nothing in what he has said to prevent existents from being either transposed or altered; if there is [977<sup>a</sup>1] one thing, the movement is of the whole, which differs in quantity, and alters without the addition or abstraction of any body; while, if there is a multiplicity of existents, their movement is due to their mutual mixture and segregation. For it is not likely that the process of mixture is either a placing of elements one above [5] another, or a putting of them together, such as he supposes, by which either they are immediately distinct, or else they appear each distinct from one another, if the layers above one another are successively rubbed away; but they are so arranged that any part of that which is mixed comes into such a relation to any part of that with which it is mixed, that even the smallest particles would be found not merely placed together but mixed. For since there is no smallest body, every part is mixed [10] with every other part, just as the whole is mixed.

3 · Xenophanes declares that if anything is, it cannot possibly have come into being, and he argues this with reference to God, for that which has come into [15] being must necessarily have done so either from that which is similar or from that which is dissimilar; and neither alternative is possible. For it is no more possible for like to have been begotten by like than for like to have begotten like (for since they are *equal*, all the same qualities inhere in each and in a similar way in their relations to one another), nor could unlike have come into being from unlike. For if the stronger could come into being from the weaker, or the greater from the less, or the [20] better from the worse, or conversely worse things from better, then what is not could come to be from what is, or what is from what is not; which is impossible. Accordingly for these reasons God is eternal.

Now if God is supreme over all, he says that he must be one. For if there were two or more gods, he would no longer be supreme and the best of all; for then [25] each of the many, being a god, would likewise be supreme. For what God and God's power means is that he is supreme and never inferior, and that he possesses supremacy over all. So far then as he is not superior, he is not God. Now if there were several gods, supposing they were superior to one another in some respects and [30] inferior in others, they would not be gods; for it is the nature of the divine not to be inferior. But supposing they were equal, they would not possess God's nature, for God must be supreme; whereas that which is equal is neither better nor worse than that to which it is equal. So that if God be, and be of this nature, God is one only. For otherwise he could not even do whatsoever he wished; for if there were more [35] gods than one, he could not do so; therefore he is One only.

Being one he is similar in every part, seeing and hearing and possessing the other senses in every part of him. For otherwise the parts of God would be superior and inferior to one another; which is impossible.

Being similar in every part, he is spherical; for he is not of a certain nature in [977<sup>b</sup>1] one part and not in another, but in every part.

Being eternal and one and similar and spherical, he is neither unlimited nor limited. For what is not is unlimited; for it has neither middle nor beginning and end, nor any other parts, and such is the nature of the unlimited. But what is could [5] not be of the same nature as what is not. On the other hand, if things were several, mutual limitation would occur. But the One has no likeness either to what is not or to the many;

for that which is one has nothing in which it can find a limit.

A One, then, of the kind which Xenophanes declares God to be can, he says, be neither moved nor unmoved; for immobility belongs to what is not (for nothing else [10] can go into it, nor can it go into anything else); while movement belongs to a plurality, for one body must move into another's place. Now nothing can ever move into what is not, for what is not is nowhere. On the other hand, if it moved in the way [15] of things changing into one another, than the One would be more than one. For these reasons motion belongs to a pair of things, or any number more than one, while rest and immobility belong to that which is nothing. But the One is neither still nor is it moved; for it is similar neither to what is not nor to the many; but being [20] in every respect of this nature—eternal and one and similar and spherical—God is neither unlimited nor limited, neither at rest nor in motion.

4 · In the first place, then, Xenophanes also, like Melissus, assumes that what comes into being does so from that which already is. Yet why should not that which comes into being do so not from something either similar or dissimilar, but from what is not? Further, God is no more ungenerated than anything else, even if [25] we suppose that all things have come into being from something similar or dissimilar, which is impossible; so that either there is nothing except God or everything else is also eternal. Further, he assumes that God is supreme, meaning by this that he is most powerful and best. This does not seem to agree with the customary opinion, which holds that some gods are in many respects superior to [30] others. It was not, therefore, from accepted opinion that he took this admission about God. It is said that he understands the supremacy of God in the sense that his nature is superior, not in relation to anything else, but in his own disposition; since surely in relation to something else there would be nothing to prevent his excelling, [35] not by his own goodness and strength, but owing to the weakness of all others. But no one would wish to say that God is supreme in this latter sense, but rather that he is in himself as excellent as possible, and there is nothing lacking in him of what is good and noble; if this is so, his supremacy would perhaps follow. But even if there were more gods than one, nothing would prevent their being of this nature, all [978<sup>a</sup>1] possessing the greatest possible excellence and being superior to all else, but not to one another. Now there are, it seems, other things besides God; for he says that God is supreme, and he must necessarily be supreme over

something.

But supposing that he is one, it does not follow that he sees and hears in every [5] part; for if he does not see in one part, he does not see worse in that part, but does not see at all. But perhaps perceiving in every part means that he would possess the highest excellence if he were similar in every part.

Further, if this were his nature, why should he be spherical, and why should he have that shape rather than any other, just because he hears in every part and is [10] supreme in every part? For just as when we say of white lead that it is white in all its parts, we merely mean that the colour whiteness is present in every portion of it, why should we not say similarly of God that sight and hearing and supremacy are present in every part, in the sense that whatsoever portion of him one takes will be [15] found to be possessed of these characteristics? But God is not necessarily spherical for this reason any more than white lead is.

Further, how is it possible that, being a body and having magnitude, God can be neither unlimited nor limited? For that is unlimited which, being capable of limitation, has no limit, and limit occurs in magnitude and multitude and any kind of quantity; and therefore any magnitude which has no limit is unlimited. Again, if [20] God is spherical, he must have a limit; for he has extremities, if he has a centre within himself from which they are at the greatest distance. But anything which is spherical has a centre; for that is spherical in which the extremities are equidistant from the centre. Now it is the same thing to say that a body has extremities, and that it has limits....<sup>13</sup> For if what is not is unlimited, why should not what is also be [25] unlimited? For why should not some identical attributes be assigned to what is and to what is not? For no one can perceive at this moment what does not exist, while something may exist at this moment without any one's perceiving it;<sup>14</sup> yet both can be the subject of speech and thought....<sup>15</sup> And what is not is not white; either, then, for this reason everything that is is white (this is in order that we may not assign an [30] identical quality to that which exists and to the non-existent), or else, I think, there is nothing to prevent anything which exists from being not white. And so what is would still more easily admit a negative predicate, namely, the unlimited, if, as was said just now, a thing is unlimited owing to its not having a limit; and so what is too either is unlimited or has a limit. But perhaps to attribute unlimitedness to what is [35] not is also absurd; for we do not call everything which has not a limit unlimited, just as we should not say that what is not equal is unequal. Again, why should not God, although he be one, yet be limited,

though not by anything which is God. But if God is one only, then his parts also must be one only. Further, it is also absurd that if in [978<sup>b1</sup>] fact the many are limited in relation to one another, for this reason the One should not have a limit. For many of the same predicates belong to the many and to the One; being, for instance, is common to them both. It would therefore, perhaps, be [5] absurd if we were to declare that God does not exist for the reason that the Many exist, so that he may not be like<sup>16</sup> them in this respect. Again, though God be One, why should he not be limited and have limits? Even as Parmenides says that, being One, he is

Like to the mass of a sphere on all sides carefully rounded [10]  
Everywhere equally far from the midst.<sup>17</sup>

For the limit must be a limit of something, but not necessarily in relation to something else: that which has a limit does not necessarily have it in relation to something else (as when it is limited in relation to the unlimited which comes next to it), but being limited means the possession of extremities, and when a thing has extremities it need not necessarily have them in relation to something else. Some things, therefore, may happen both to be limited and to adjoin something else, while [15] others may be limited, but not in relation to something else.

Again, as regards what is and what is not being unmoved, we must say that to suppose that what is not is unmoved because what is is moved, is perhaps just as absurd as the cases given above. And further, surely one cannot suppose that not-moving and unmoved are the same thing, but the former is the negation of [20] moving (like not-equal, which can be correctly used even of the non-existent), while 'unmoved' is used of an actual state (as 'unequal' is used), and to express the contrary of moving (that is, being at rest), just as words with the negative prefix are generally used to express contraries. Not-moving is therefore true of the non-[25] existent, but being at rest cannot belong to the non-existent; similarly 'unmoved', which means the same thing,<sup>18</sup> cannot belong to it. Yet Xenophanes uses 'not moving' in the sense of 'being at rest', and says that what is not is at rest because it undergoes no change of position. As we said above, it is perhaps absurd, if we attach some predicate to what is not, to assert that it does not apply to what is, especially if [30] the predicate used is a negation, such as 'not moving' and 'not changing its position'. For, as has been said, it would preclude a number of predicates from being used of existing things: for it would not be true to say that many is not one, since the non-existent also is not one. Furthermore, in

some cases the contrary predicates [35] seem to follow from the mere<sup>19</sup> negations; for example, a thing must be either equal or unequal if it is a multitude or magnitude, and odd or even, if it is a number; similarly, perhaps, what is, if it be a body, must be either at rest or in motion. [979<sup>a</sup>1] Further, if God and the One do not move, just because the many move by passing into one another, why should not God also move into something else? For he nowhere states that God is one only, but what he says is that there is only one God. But even supposing God were one only, why should not the parts of God move into [5] one another and God himself thus revolve? For he will not, like Zeno, declare that such a One is many. For he himself asserts that God is a body, whether he calls it the universe or by some other name; for if he were incorporeal, how could he be spherical? Again, it would only be possible for him neither to move nor to be at rest if he were nowhere; but since he is a body, what would prevent this body from [10] moving, as has been said?

5 · Gorgias declares that nothing exists; and if anything exists it is unknowable; and if it exists and is knowable, yet it cannot be indicated to others. To prove that nothing exists he collects the statements of others, who in speaking about what [15] is seem to assert contrary opinions (some trying to prove that what is is one and not many, others that it is many and not one; and some that existents are ungenerated, others that they have come to be), and he argues against both sides. For he says that if anything exists, it must be either one or many, and either be ungenerated or have come to be. If therefore, it cannot be either one or many, ungenerated or having [20] come to be, it would be nothing at all. For if anything were, it would be one of these alternatives. That what is, then, is neither one nor many, neither ungenerated nor having come to be, he attempts to prove by following partly Melissus and partly Zeno, after first stating his own special proof that it is not possible either to be or not to be. For, he says, if not being is not being, then what is not would *be* no less than [25] what is. For what is not *is* what is not and what is *is* what is, so that things no more are than are not. But if not being *is*, then, he argues, being, its opposite, is not; for if not being *is*, it follows that being is not. So that on this showing, he says, nothing [30] could be, unless being and not being are the same thing. And if they are the same thing, even so nothing would be; for what is not is not, nor yet what is since it is the same as what is not. Such, then, is his first argument.

6 · Now it does not at all follow from what he has said that nothing is. For the proof which he and others attempt is thus refuted: if what is not is, it either is [35] simply, or else it is in a similar sense something that is not. But this is not self-evident, nor a necessary deduction; but if there are, as it were, two things of which one is and the other is not, you can truly say of the former that it is, but not of the latter, because that which is, is existent, but that which is not is non-existent. [979<sup>b</sup>1] Why, then, is it not possible either to be or not to be? And why should not both or either be possible? For, he says, not being, if not being were, as he thinks, something, would *be* just as much as being, while no-one allows that not being has any kind of existence. But even if what is not is not, yet it does not follow that what [5] is not is in a similar way to what is; for the former is something that is not, while the latter actually is as well. But even if he could say of it that it is simply (yet how strange it would be to say that what is not is), still granted that it were so, does it any more follow that everything is not rather than is? For the exact opposite seems then to become the consequent; since, if what is not is something that is and what is is something that is, all things are; for both the things which are, and the things which [10] are not, are. For it does not necessarily follow that if what is not is, what is is not. Even if one were to concede the point and allow that what is not is and what is is not, nevertheless, something would be; for the things which are not would be, according to his argument. But if being and not being are the same thing, even so it would not [15] follow that nothing is, rather than that something is. For just as he argues that if what is not and what is are the same thing, what is and what is not alike are not, therefore nothing is; so, reversing the position, it is equally possible to argue that everything is; for what is not is and what is is, therefore everything is.

After this argument Gorgias declares that if anything is, it must either be [20] ungenerated or else have come to be. If it is ungenerated, he assumes by the axioms of Melissus that it is unlimited, and declares that the unlimited cannot exist anywhere. It cannot, he argues, exist in itself, or in anything else (for, on the latter supposition, there would be two unlimiteds, that which is in something else and the something else in which it is); and, being nowhere, it is nothing, according to the argument of Zeno about space. It is not, therefore, ungenerated. Nor, again, has it [25] come to be; for, surely, he argues, nothing could come to be out of either what is or what is not. For if what is were to change, it would no longer be anything that is, just as also, if what is not were to come to be, it would no longer be a thing that is not. Nor, again, could it come to be,



save from what is; for if what is not is not, nothing [30] could come to be out of nothing; while on the other hand, if what is not is, it could not come to be out of what is not for that reason. So if anything that is, necessarily either is ungenerated or else has come to be, and these are impossibilities, it is [35] impossible for anything to be.

Further, if anything is, either one or more things must be; if neither one nor more, nothing is. And there cannot be one thing because what is truly one, insofar as it has no magnitude, is incorporeal. (This he adopts from Zeno's argument.) But if there is not one thing, there will be nothing at all; for if there is not one thing, there cannot be many things. But if there is neither one thing nor many things, he says, there is nothing.<sup>20</sup>

[980<sup>a</sup>1] Nor, he says, can anything move. For if it were to move it would no longer be in the same condition, but what is would not be and what is not would have come to be. And further, if it moves and is transferred to a different position, what is, being no [5] longer continuous, is divided, and, where it is divided, it no longer exists; and so, if it moves in all its parts, it is divided in all its parts, and if this is so, it ceases to exist in all its parts. For where it is divided, he argues, there it lacks being; he uses 'divided' to mean a void, as is written in the so-called 'Arguments of Leucippus'.

These are the proofs which he employs to show that nothing exists....<sup>21</sup> For all [10] objects of cognition must exist, and what is not, if it really does not exist, could not be cognized either. But were this so, nothing could be false, not even (he says) though one should say that chariots are racing on the sea. For all things would be just the same. For the objects of sight and hearing are for the reason<sup>22</sup> that they are [15] in each case cognized. But if this is not the reason—if just as what we see is not the more because we see it, so also what we think is not the more for that<sup>23</sup> (and, were it otherwise, just as in the one case our objects of vision would often be just the same, so in the other our objects of thought would often be just the same) . . . ; but of which kind the true things are is uncertain. So that even if things are, they would be unknowable by us.

[20] But even if they are knowable by us, how, he asks, could any one indicate them to another? For how, he says, could any one communicate by word of mouth that [980<sup>b</sup>1] which he has seen? And how could that which has been seen be indicated to a listener if he has not seen it? For just as the sight does not recognize sounds, so the hearing does not hear colours but sounds; and he who speaks, speaks, but does not speak a colour or a thing. When, therefore, one has not a thing in the mind, how will [5] he get it there from another person by word or any

other token of the thing except by seeing it, if it is a colour, or hearing it, if it is a noise? For he who speaks does not speak a noise at all, or a colour, but a word; and so it is not possible to think a colour, but only to see it, nor a noise, but only to hear it. But even if it is possible to know things, and to express whatever one knows in words, yet how can the hearer have in [10] his mind the same thing as the speaker? For the same thing cannot be present simultaneously in several separate people; for in that case the one would be two. But if, he argues, the same thing *could* be present in several persons, there is no reason why it should not appear dissimilar to them, if they are not themselves entirely similar and are not in the same place; for if they were<sup>24</sup> in the same place they would be one and not two. But it appears that the objects which even one and the same [15] man perceives at the same moment are not all similar, but he perceives different things by hearing and by sight, and differently now and on some former occasion; and so a man can scarcely perceive the same thing as someone else.

Thus nothing exists; and even if anything were to exist, nothing is knowable; and even if anything were knowable, no one could indicate it to another, firstly because things are not words, and secondly because no one can have in his mind the same thing as someone else. This and all his other arguments are concerned with [20] difficulties raised by earlier philosophers, so that in examining their views these questions have to be discussed.

<sup>1</sup>Retaining πάντες.

<sup>2</sup>*Theogony* 116–120.

<sup>3</sup>Frag. 12 Diels-Kranz.

<sup>4</sup>Frag. 8, lines 3–4, Diels-Kranz.

<sup>5</sup>Frag. 14, Diels-Kranz.

<sup>6</sup>Frag. 28, lines 43–5, Diels-Kranz.

<sup>7</sup>Reading ὅπερ Ἀναξαγόρας ἐλέγχει.

<sup>8</sup>Reading ἀνομοιομερές.

<sup>9</sup>Frag. 39 Diels-Kranz.

<sup>10</sup>Diels marks a lacuna. The text here and in the next two lines is far from certain.

<sup>11</sup>Frag. 14 Diels-Kranz.

<sup>12</sup>Frag. 13 Diels-Kranz.

<sup>13</sup>Diels marks a lacuna here.

<sup>14</sup>Reading τό τε γὰρ οὐκ ὄν ... αἰσθάνοιτο νῦν.

<sup>15</sup>Diels marks a lacuna here.

<sup>16</sup>Reading ὅμοιος.

<sup>17</sup>Frag. 8, lines 43–4, Diels-Kranz.

<sup>18</sup>Reading ὁ σημαίνει.

<sup>19</sup>Reading αὐτὰς τὰς ἀποφάσεις.

<sup>20</sup>This paragraph is very corrupt in the MSS. The translation is based on the following tentative restoration: καὶ ἐν μὲν οὐκ ἂν εἶναι ὅτι ἀσώματον ἂν εἶη τὸ ὡς ἀληθῶς ἐν, καθὼ οὐδὲν ἔχον μέγεθος (ὃ λαμβάνει τῷ τοῦ Ζήνωνος λόγῳ).

ἕνος δὲ μὴ ὄντος οὐδ' ἂν ὅλως εἶναι οὐδὲν. μὴ γὰρ ὄντος ἑνὸς μηδὲ πολλὰ εἶναι. εἰ δὲ μήτε ἐν, φησὶν, μήτε πολλὰ ἔστιν, οὐδὲν ἔστιν.

<sup>21</sup>Reading ὅτι μὲν οὖν οὐδὲν ἔστι, ταύτας τὰς ἀποδείξεις λέγει (followed by a lacuna).

<sup>22</sup>Omitting Diels' addition.

<sup>23</sup>Placing a comma after διανοούμεθα.

<sup>24</sup>Reading ε ἴησαν.

# METAPHYSICS\*\*

W. D. Ross

## BOOK I (A)

1 · All men by nature desire to know. An indication of this is the delight we take in our senses; for even apart from their usefulness they are loved for themselves; and above all others the sense of sight. For not only with a view to [980<sup>a</sup>25] action, but even when we are not going to do anything, we prefer sight to almost everything else. The reason is that this, most of all the senses, makes us know and brings to light many differences between things.

By nature animals are born with the faculty of sensation, and from sensation memory is produced in some of them, though not in others. And therefore the former are more intelligent and apt at learning than those which cannot remember; those which are incapable of hearing sounds are intelligent though they cannot be taught, e.g. the bee, and any other race of animals that may be like it; and those [980<sup>b</sup>25] which besides memory have this sense of hearing, can be taught.

The animals other than man live by appearances and memories, and have but little of connected experience; but the human race lives also by art and reasonings. And from memory experience is produced in men; for many memories of the same [981<sup>a</sup>1] thing produce finally the capacity for a single experience. Experience seems to be very similar to science and art, but really science and art come to men *through* [5] experience; for 'experience made art', as Polus says, 'but inexperience luck'. And art arises, when from many notions gained by experience one universal judgement about similar objects is produced. For to have a judgement that when Callias was ill of this disease this did him good, and similarly in the case of Socrates and in many individual cases, is a matter of experience; but to judge that it has done good to all [10] persons of a certain constitution, marked off in one class, when they were ill of this

disease, e.g. to phlegmatic or bilious people when burning with fever,—this is a matter of art.

With a view to action experience seems in no respect inferior to art, and we even see men of experience succeeding more than those who have theory without [15] experience. The reason is that experience is knowledge of individuals, art of universals, and actions and productions are all concerned with the individual; for the physician does not cure a man, except in an incidental way, but Callias or Socrates or some other called by some such individual name, who happens to be a [20] man. If, then, a man has theory without experience, and knows the universal but does not know the individual included in this, he will often fail to cure; for it is the individual that is to be cured. But yet we think that *knowledge* and *understanding* belong to art rather than to experience, and we suppose artists to be wiser than men [25] of experience (which implies that wisdom depends in all cases rather on knowledge); and this because the former know the cause, but the latter do not. For men of experience know that the thing is so, but do not know why, while the others know the ‘why’ and the cause. Hence we think that the master-workers in each craft are more [30] honourable and know in a truer sense and are wiser than the manual workers, because they know the causes of the things that are done (we think the manual [981<sup>b</sup>1] workers are like certain lifeless things which act indeed, but act without knowing what they do, as fire burns,—but while the lifeless things perform each of their functions by a natural tendency, the labourers perform them through habit); thus we view them as being wiser not in virtue of being able to act, but of having the [5] theory for themselves and knowing the causes. And in general it is a sign of the man who knows, that he can teach, and therefore we think art more truly knowledge than experience is; for artists can teach, and men of mere experience cannot.

Again, we do not regard any of the senses as wisdom; yet surely these give the [10] most authoritative knowledge of particulars. But they do not tell us the ‘why’ of anything—e.g. why fire is hot; they only say that it is hot.

At first he who invented any art that went beyond the common perceptions of man was naturally admired by men, not only because there was something useful in [15] the inventions, but because he was thought wise and superior to the rest. But as more arts were invented, and some were directed to the necessities of life, others to its recreation, the inventors of the latter were always regarded as wiser than the inventors of the former, because their branches of knowledge did not aim at utility.

[20] Hence when all such inventions were already established, the sciences which do not aim at giving pleasure or at the necessities of life were discovered, and first in the places where men first began to have leisure. This is why the mathematical arts were founded in Egypt; for there the priestly caste was allowed to be at leisure.

We have said in the *Ethics* what the difference is between art and science and [25] the other kindred faculties; but the point of our present discussion is this, that all men suppose what is called wisdom to deal with the first causes and the principles of things. This is why, as has been said before, the man of experience is thought to be [30] wiser than the possessors of any perception whatever, the artist wiser than the men of experience, the master-worker than the mechanic, and the theoretical kinds of knowledge to be more of the nature of wisdom than the productive. Clearly then [982<sup>a</sup>1] wisdom is knowledge about certain causes and principles.

2 · Since we are seeking this knowledge, we must inquire of what kind are the causes and the principles, the knowledge of which is wisdom. If we were to take [5] the notions we have about the wise man, this might perhaps make the answer more evident. We suppose first, then, that the wise man knows all things, as far as possible, although he has not knowledge of each of them individually; secondly, that [10] he who can learn things that are difficult, and not easy for man to know, is wise (sense-perception is common to all, and therefore easy and no mark of wisdom); again, he who is more exact and more capable of teaching the causes is wiser, in every branch of knowledge; and of the sciences, also, that which is desirable on its [15] own account and for the sake of knowing it is more of the nature of wisdom than that which is desirable on account of its results, and the superior science is more of the nature of wisdom than the ancillary; for the wise man must not be ordered but must order, and he must not obey another, but the less wise must obey *him*.

[20] Such and so many are the notions, then, which we have about wisdom and the wise. Now of these characteristics that of knowing all things must belong to him who has in the highest degree universal knowledge; for he knows in a sense all the subordinate objects. And these things, the most universal, are on the whole the [25] hardest for men to know; for they are furthest from the senses. And the most exact of the sciences are those which deal most with first principles; for those which

involve fewer principles are more exact than those which involve additional principles, e.g. arithmetic than geometry. But the science which investigates causes is also more capable of teaching, for the people who teach are those who tell the [30] causes of each thing. And understanding and knowledge pursued for their own sake are found most in the knowledge of that which is most knowable; for he who chooses to know for the sake of knowing will choose most readily that which is most truly [982<sup>b</sup>1] knowledge, and such is the knowledge of that which is most knowable; and the first principles and the causes are most knowable; for by reason of these, and from these, all other things are known, but these are not known by means of the things [5] subordinate to them. And the science which knows to what end each thing must be done is the most authoritative of the sciences, and more authoritative than any ancillary science; and this end is the good in each class, and in general the supreme good in the whole of nature. Judged by all the tests we have mentioned, then, the name in question falls to the same science; this must be a science that investigates the first principles and causes; for the good, i.e. that for the sake of which, is one of [10] the causes.

That it is not a science of production is clear even from the history of the earliest philosophers. For it is owing to their wonder that men both now begin and at first began to philosophize; they wondered originally at the obvious difficulties, then [15] advanced little by little and stated difficulties about the greater matters, e.g. about the phenomena of the moon and those of the sun and the stars, and about the genesis of the universe. And a man who is puzzled and wonders thinks himself ignorant (whence even the lover of myth is in a sense a lover of wisdom, for myth is composed [20] of wonders); therefore since they philosophized in order to escape from ignorance, evidently they were pursuing science in order to know, and not for any utilitarian end. And this is confirmed by the facts; for it was when almost all the necessities of life and the things that make for comfort and recreation were present, that such [25] knowledge began to be sought. Evidently then we do not seek it for the sake of any other advantage; but as the man is free, we say, who exists for himself and not for another, so we pursue this as the only free science, for it alone exists for itself.

Hence the possession of it might be justly regarded as beyond human power; for in many ways human nature is in bondage, so that according to Simonides 'God [30] alone can have this privilege', and it is unfitting that man should not be content to seek the knowledge that is suited to him. If, then, there is something in what the poets say, and jealousy is



natural to the divine power, it would probably occur in this [983<sup>a</sup>1] case above all, and all who excelled in this knowledge would be unfortunate. But the divine power cannot be jealous (indeed, according to the proverb, ‘bards tell many a lie’), nor should any science be thought more honourable than one of this sort. For the most divine science is also most honourable; and this science alone is, in two [5] ways, most divine. For the science which it would be most meet for God to have is a divine science, and so is any science that deals with divine objects; and this science alone has both these qualities; for God is thought to be among the causes of all things and to be a first principle, and such a science either God alone can have, or God above all others. All the sciences, indeed, are more necessary than this, but [10] none is better.

Yet the acquisition of it must in a sense end in something which is the opposite of our original inquiries. For all men begin, as we said, by wondering that the matter is so (as in the case of automatic marionettes or the solstices or the incommensurability [15] of the diagonal of a square with the side; for it seems wonderful to all men who have not yet perceived the explanation that there is a thing which cannot be measured even by the smallest unit). But we must end in the contrary and, according to the proverb, the better state, as is the case in these instances when men learn the cause; for there is nothing which would surprise a geometer so much as if [20] the diagonal turned out to be commensurable.

We have stated, then, what is the nature of the science we are searching for, and what is the mark which our search and our whole investigation must reach.

**3** · Evidently we have to acquire knowledge of the original causes (for we say we know each thing only when we think we recognize its first cause), and causes are [25] spoken of in four senses. In one of these we mean the substance, i.e. the essence (for the ‘why’ is referred finally to the formula,<sup>1</sup> and the ultimate ‘why’ is a cause and principle); in another the matter or substratum, in a third the source of the change, [30] and in a fourth the cause opposed to this, that for the sake of which and the good (for this is the end of all generation and change). We have studied these causes sufficiently in our work on nature, but yet let us call to our aid those who have [983<sup>b</sup>1] attacked the investigation of being and philosophized about reality before us. For obviously they too speak of certain principles and causes; to go over their views, then, will be of

profit to the present inquiry, for we shall either find another kind of cause, or be more convinced of the correctness of those which we now maintain. [5]

Of the first philosophers, most thought the principles which were of the nature of matter were the only principles of all things; that of which all things that are consist, and from which they first come to be, and into which they are finally [10] resolved (the substance remaining, but changing in its modifications), this they say is the element and the principle of things, and therefore they think nothing is either generated or destroyed, since this sort of entity is always conserved, as we say Socrates neither comes to be absolutely when he comes to be beautiful or musical, [15] nor ceases to be when he loses these characteristics, because the substratum, Socrates himself, remains. So they say nothing else comes to be or ceases to be; for there must be some entity—either one or more than one—from which all other things come to be, it being conserved.

Yet they do not all agree as to the number and the nature of these principles. [20] Thales, the founder of this school of philosophy, says the principle is water (for which reason he declared that the earth rests on water), getting the notion perhaps from seeing that the nutriment of all things is moist, and that heat itself is generated from the moist and kept alive by it (and that from which they come to be is a [25] principle of all things). He got his notion from this fact, and from the fact that the seeds of all things have a moist nature, and that water is the origin of the nature of moist things.

Some think that the ancients who lived long before the present generation, and [30] first framed accounts of the gods, had a similar view of nature; for they made Ocean and Tethys the parents of creation, and described the oath of the gods as being by water, which they themselves call Styx; for what is oldest is most honourable, and the most honourable thing is that by which one swears. It may perhaps be uncertain [984<sup>a</sup>1] whether this opinion about nature is primitive and ancient, but Thales at any rate is said to have declared himself thus about the first cause. Hippo no one would think fit to include among these thinkers, because of the paltriness of his thought.

[5] Anaximenes and Diogenes make air prior to water, and the most primary of the simple bodies, while Hippasus of Metapontium and Heraclitus of Ephesus say this of fire, and Empedocles says it of the four elements, adding a fourth—earth—to those which have been named; for these, he says, always remain and do [10] not come to be, except that they come to be more or fewer, being aggregated into one and segregated

out of one.

Anaxagoras of Clazomenae, who, though older than Empedocles, was later in his philosophical activity, says the principles are infinite in number; for he says almost all the things that are homogeneous are generated and destroyed (as water [15] or fire is) only by aggregation and segregation, and are not in any other sense generated or destroyed, but remain eternally.

From these facts one might think that the only cause is the so-called material cause; but as men thus advanced, the very facts showed them the way and joined in forcing them to investigate the subject. However true it may be that all generation [20] and destruction proceed from some one or more elements, why does this happen and what is the cause? For at least the substratum itself does not make itself change; e.g. neither the wood nor the bronze causes the change of either of them, nor does the [25] wood manufacture a bed and the bronze a statue, but something else is the cause of the change. And to seek this is to seek the second cause, as we should say,—that from which comes the beginning of movement. Now those who at the very beginning set themselves to this kind of inquiry, and said the substratum was one, were not at all dissatisfied with themselves; but some at least of those who maintain it to be one—as though defeated by this search for the second cause—say the one [30] and nature as a whole is unchangeable not only in respect of generation and destruction (for this is an ancient belief, and all agreed in it), but also of all other change; and this view is peculiar to them. Of those who said the universe was one, [984<sup>b</sup>1] none succeeded in discovering a cause of this sort, except perhaps Parmenides, and he only insomuch that he supposes that there is not only one but in some sense two causes. But for those who make more elements it is more possible to state the second [5] cause, e.g. for those who make hot and cold, or fire and earth, the elements; for they treat fire as having a nature which fits it to move things, and water and earth and such things they treat in the contrary way.

When these men and the principles of this kind had had their day, as the latter were found inadequate to generate the nature of things, men were again forced by the truth itself, as we said, to inquire into the next kind of cause. For surely it is not [10] likely either that fire or earth or any such element should be the reason why things manifest goodness and beauty both in their being and in their coming to be, or that those thinkers should have supposed it was; nor again could it be right to ascribe so great a matter to spontaneity and luck. When one man said,

then, that reason was [15] present—as in animals, so throughout nature—as the cause of the world and of all its order, he seemed like a sober man in contrast with the random talk of his predecessors. We know that Anaxagoras certainly adopted these views, but Hermotimus of Clazomenae is credited with expressing them earlier. Those who [20] thought thus stated that there is a principle of things which is at the same time the cause of beauty, and that sort of cause from which things acquire movement.

4 · One might suspect that Hesiod was the first to look for such a thing—or some one else who put love or desire among existing things as a principle, as Parmenides does; for he, in constructing the genesis of the universe, says:—[25]

Love first of all the Gods she planned.

And Hesiod says:—

First of all things was chaos made, and then  
Broad-breasted earth, and love that foremost is  
Among all the immortals,

which implies that among existing things there must be a cause which will move [30] things and bring them together. How these thinkers should be arranged with regard to priority of discovery let us be allowed to decide later; but since the contraries of the various forms of good were also perceived to be present in nature—not only order and the beautiful, but also disorder and the ugly, and bad things in greater [985<sup>a</sup>1] number than good, and ignoble things than beautiful, therefore another thinker introduced friendship and strife, each of the two the cause of one of these two sets of qualities. For if we were to follow out the view of Empedocles, and interpret it according to its meaning and not to its lisping expression, we should find that [5] friendship is the cause of good things, and strife of bad. Therefore, if we said that Empedocles in a sense both mentions, and is the first to mention, the bad and the good as principles, we should perhaps be right, since the cause of all goods is the [10] good itself.

These thinkers, as we say, evidently got hold up to a certain point of two of the causes which we distinguished in our work on nature—the matter and the source of the movement,—vaguely, however, and with no clearness, but as untrained men [15] behave in fights; for they go round their opponents and often strike fine blows, but they do not fight on

scientific principles, and so these thinkers do not seem to know what they say; for it is evident that, as a rule, they make no use of their causes except to a small extent. For Anaxagoras uses reason as a *deus ex machina* for the making of the world, and when he is at a loss to tell for what cause something [20] necessarily is, then he drags reason in, but in all other cases ascribes events to anything rather than to reason. And Empedocles, though he uses the causes to a greater extent than this, neither does so sufficiently nor attains consistency in their use. At least, in many cases he makes friendship segregate things, and strife [25] aggregate them. For when the universe is dissolved into its elements by strife, fire is aggregated into one, and so is each of the other elements; but when again under the influence of friendship they come together into one, the parts must again be segregated out of each element.

Empedocles, then, in contrast with his predecessors, was the first to introduce [30] this cause in a divided form, not positing one source of movement, but different and contrary sources. Again, he was the first to speak of four material elements; yet he [985<sup>b</sup>1] does not *use* four, but treats them as two only; he treats fire by itself, and its opposites—earth, air, and water—as one kind of thing. We may learn this by study of his verses.

This philosopher then, as we say, spoke of the principles in this way, and made [5] them of this number. Leucippus and his associate Democritus say that the full and the empty are the elements, calling the one being and the other non-being—the full and solid being, the empty non-being (that is why they say that what is is no more than what is not, because body no more is than the void); and they make these the [10] material causes of things. And as those who make the underlying substance one generate all other things by its modifications, supposing the rare and the dense to be the sources of the modifications, in the same way these philosophers say the differences in the elements are the causes of all other qualities. These differences, [15] they say, are three—shape and order and position. For they say that what is is differentiated only by ‘rhythm’ and ‘inter-contact’ and ‘turning’; and of these rhythm is shape, inter-contact is order, and turning is position; for A differs from N in shape, AN from NA in order,  $\pm$  from H in position. The question of movement—whence or how it belongs to things—these thinkers, like the others, [20] lazily neglected.

Regarding the two causes, then, as we say, the inquiry seems to have been pushed thus far by the early philosophers.

5 · Contemporaneously with these philosophers and before them, the Pythagoreans, as they are called, devoted themselves to mathematics; they were the first to advance this study, and having been brought up in it they thought its [25] principles were the principles of all things. Since of these principles numbers are by nature the first, and in numbers they seemed to see many resemblances to the things that exist and come into being—more than in fire and earth and water (such and such a modification of numbers being justice, another being soul and reason, another being opportunity—and similarly almost all other things being numerically [30] expressible); since, again, they saw that the attributes and the ratios of the musical scales were expressible in numbers; since, then, all other things seemed in their whole nature to be modelled after numbers, and numbers seemed to be the first things in the whole of nature, they supposed the elements of numbers to be the [986<sup>a</sup>1] elements of all things, and the whole heaven to be a musical scale and a number. And all the properties of numbers and scales which they could show to agree with the attributes and parts and the whole arrangement of the heavens, they collected [5] and fitted into their scheme; and if there was a gap anywhere, they readily made additions so as to make their whole theory coherent. E.g. as the number 10 is thought to be perfect and to comprise the whole nature of numbers, they say that the bodies which move through the heavens are ten, but as the visible bodies are only [10] nine, to meet this they invent a tenth—the ‘counter-earth’. We have discussed these matters more exactly elsewhere.

But the object of our discussion is that we may learn from these philosophers also what they suppose to be the principles and how these fall under the causes we [15] have named. Evidently, then, these thinkers also consider that number is the principle both as matter for things and as forming their modifications and states, and hold that the elements of number are the even and the odd, and of these the former is unlimited, and the latter limited; and the 1 proceeds from both of these (for it is both even and odd), and number from the 1; and the whole heaven, as has [20] been said, is numbers.

Other members of this same school say there are ten principles, which they arrange in two columns of cognates—limit and unlimited, odd and even, one and plurality, right and left, male and female, resting and moving, straight and curved, [25] light and darkness, good and bad, square and oblong. In this way Alcmaeon of Croton seems also to have conceived the matter,<sup>2</sup> and either he got this view from them or they got

it from him; for he expressed himself similarly to them. For he says [30] most human affairs go in pairs, meaning not definite contrarieties such as the Pythagoreans speak of, but any chance contrarieties, e.g. white and black, sweet and bitter, good and bad, great and small. He threw out indefinite suggestions about [986<sup>b</sup>1] the other contrarieties, but the Pythagoreans declared both how many and which their contrarieties are.

From both these schools, then, we can learn this much, that the contraries are the principles of things; and how many these principles are and which they are, we can learn from one of the two schools. But how these principles can be brought [5] together under the causes we have named has not been clearly and articulately stated by them; they seem, however, to range the elements under the head of matter; for out of these as immanent parts they say substance is composed and moulded.

From these facts we may sufficiently perceive the meaning of the ancients who [10] said the elements of nature were more than one; but there are some who spoke of the universe as if it were one entity, though they were not all alike either in the excellence of their statement or in regard to the nature of the entity. The discussion of them is in no way appropriate to our present investigation of causes, for they do not, like some of the natural philosophers, assume what exists to be one and yet [15] generate it out of the one as out of matter, but they speak in another way; those others add change, since they generate the universe, but these thinkers say the universe is unchangeable. Yet this much is appropriate to the present inquiry: Parmenides seems to fasten on that which is one in formula, Melissus on that which [20] is one in matter, for which reason the former says that it is limited, the latter that it is unlimited; while Xenophanes, the first of this school of monists (for Parmenides is said to have been his pupil), gave no clear statement, nor does he seem to have grasped either of these two kinds of unity, but he contemplates the whole heaven [25] and says the One is God. Now these thinkers, as we said, must be neglected for the purposes of the present inquiry—two of them entirely, as being a little too naïve, viz. Xenophanes and Melissus; but Parmenides seems to speak with somewhat more insight. For, claiming that, besides the existent, nothing non-existent exists, he thinks that the existent is of necessity one and that nothing else exists (on this we [30] have spoken more clearly in our work on nature), but being forced to follow the phenomena, and supposing that what is<sup>3</sup> is one in formula but many according to perception, he now posits two causes and two principles, calling them hot and cold, [987<sup>a</sup>1] i.e. fire and earth; and of these he ranges the hot with the existent, and the other with the non-

existent.

From what has been said, then, and from the wise men who have now sat in council with us, we have got this much—both from the earliest philosophers, who regard the first principle as corporeal (for water and fire and such things are [5] bodies), and of whom some suppose that there is one corporeal principle, others that there are more than one, but both put these under the head of matter; and from some others who posit both this cause and besides this the source of movement, which is stated by some as one and by others as two.

[10] Down to the Italian school, then, and apart from it, philosophers have treated these subjects rather obscurely, except that, as we said, they have used two kinds of cause, and one of these—the source of movement—some treat as one and others as two. But the Pythagoreans have said in the same way that there are two principles, but added this much, which is peculiar to them, that they thought finitude and [15] infinity were not attributes of certain other things, e.g. of fire or earth or anything else of this kind, but that infinity itself and unity itself were the substance of the things of which they are predicated. This is why number was the substance of all [20] things. On this subject, then, they expressed themselves thus; and regarding the question of essence they began to make statements and definitions, but treated the matter too simply. For they both defined superficially and thought that the first subject of which a given term would be predicable, was the substance of the thing, as if one supposed that double and 2 were the same, because 2 is the first thing of [25] which double is predicable. But surely to be double and to be 2 are not the same; if they are, one thing will be many—a consequence which they actually drew. From the earlier philosophers, then, and from their successors we can learn this much.

6 · After the systems we have named came the philosophy of Plato, which in most respects followed these thinkers, but had peculiarities that distinguished it [30] from the philosophy of the Italians. For, having in his youth first become familiar with Cratylus and with the Heraclitean doctrines (that all sensible things are ever in a state of flux and there is no knowledge about them), these views he held even in later years. Socrates, however, was busying himself about ethical matters and [987<sup>b</sup>1] neglecting the world of nature as a whole but seeking the universal in these ethical matters, and fixed thought for the first time on definitions; Plato accepted his teaching, but held that the problem applied not to any



sensible thing but to entities [5] of another kind—for this reason, that the common definition could not be a definition of any sensible thing, as they were always changing. Things of this other sort, then, he called Ideas, and sensible things, he said, were apart from these, and were all called after these; for the multitude of things which have the same name as the Form exist by participation in it. Only the name ‘participation’ was new; for the [10] Pythagoreans say that things exist by imitation of numbers, and Plato says they exist by participation, changing the name. But what the participation “or the imitation of the Forms could be they left an open question.

Further, besides sensible things and Forms he says there are the objects of mathematics, which occupy an intermediate position, differing from sensible things [15] in being eternal and unchangeable, from Forms in that there are many alike, while the Form itself is in each case unique.

Since the Forms are the causes of all other things, he thought their elements were the elements of all things. As matter, the great and the small were principles; [20] as substance, the One; for from the great and the small, by participation in the One, come the numbers.<sup>4</sup>

But he agreed with the Pythagoreans in saying that the One is substance and not a predicate of something else; and in saying that the numbers are the causes of the substance of other things, he also agreed with them; but positing a dyad and [25] constructing the infinite out of great and small, instead of treating the infinite as one, is peculiar to him; and so is his view that the numbers exist apart from sensible things, while *they* say that the things themselves are numbers, and do not place the objects of mathematics between Forms and sensible things. His divergence from the [30] Pythagoreans in making the One and the numbers separate from things, and his introduction of the Forms, were due to his inquiries in the region of definitory formulae (for the earlier thinkers had no tincture of dialectic), and his making the other entity besides the One a dyad was due to the belief that the numbers, except those which were prime, could be neatly produced out of the dyad as out of a plastic material.

[988<sup>a</sup>1] Yet what happens is the contrary; the theory is not a reasonable one. For they make many things out of the matter, and the form generates only once, but what we observe is that one table is made from one matter, while the man who applies the [5] form, though he is one, makes many tables. And the relation of the male to the female is similar; for the latter is impregnated by one copulation, but the male impregnates many females; yet these are imitations of those first

principles.

Plato, then, declared himself thus on the points in question; it is evident from what has been said that he has used only two causes, that of the essence and the [10] material cause (for the Forms are the cause of the essence of all other things, and the One is the cause of the essence of the Forms); and it is evident what the underlying matter is, of which the Forms are predicated in the case of sensible things, and the One in the case of Forms, viz. that this is a dyad, the great and the small. Further, he has assigned the cause of good and that of evil to the elements, [15] one to each of the two, as we say some of his predecessors sought to do, e.g. Empedocles and Anaxagoras.

7 · Our account of those who have spoken about first principles and reality and of the way in which they have spoken, has been concise and summary; but yet [20] we have learnt this much from them, that of those who speak about principle and cause no one has mentioned any principle except those which have been distinguished in our work on nature, but all evidently have some inkling of *them*, though only vaguely. For some speak of the first principle as matter, whether they [25] suppose one or more first principles, and whether they suppose this to be a body or to be incorporeal; e.g. Plato spoke of the great and the small, the Italians of the infinite, Empedocles of fire, earth, water, and air, Anaxagoras of the infinity of homogeneous things. These, then, have all had a notion of this kind of cause, and so [30] have all who speak of air or fire or water, or something denser than fire and rarer than air; for some have said the prime element is of this kind. These thinkers grasped this cause only; but certain others have mentioned the source of movement, e.g. those who make friendship and strife, or reason, or love, a principle.

The essence, i.e. the substance of things, no one has expressed distinctly. It is [988<sup>b1</sup>] mentioned chiefly by those who believe in the Forms; for they do not suppose either that the Forms are the matter of sensible things, and the One the matter of the Forms, or that they are the source of movement (for they say these are causes rather of immobility and of being at rest), but they furnish the Forms as the essence of [5] every other thing, and the One as the essence of the Forms.

That for the sake of which actions and changes and movements take place, they assert to be a cause in a way, but not in this way, i.e. not in the way in which it is its *nature* to be a cause. For those who speak of reason or friendship class these causes as goods; they do not speak,

however, as if anything that exists either existed or came into being for the sake of these, but as if movements started from these. In [10] the same way those who say the One or the existent is the good, say that it is the cause of substance, but not that substance either is or comes to be for the sake of this. Therefore it turns out that in a sense they both say and do not say the good is a cause; for they do not call it a cause *qua* good but only incidentally. [15]

All these thinkers, then, as they cannot pitch on another cause, seem to testify that we have determined rightly both how many and of what sort the causes are. Besides this it is plain that when the causes are being looked for, either all four must be sought thus or they must be sought in one of these four ways. Let us next discuss the possible difficulties with regard to the way in which each of these thinkers has spoken, and with regard to his views about the first principles. [20]

8 · Those, then, who say the universe is one and posit one kind of thing as matter, and as corporeal matter which has spatial magnitude, evidently go astray in many ways. For they posit the elements of bodies only, not of incorporeal things, [25] though there are incorporeal things. And in trying to state the causes of generation and destruction, and in giving an account of the nature of all things, they do away with the cause of movement. Further, they err in not positing the substance, i.e. the essence, as the cause of anything, and besides this in lightly calling any of the simple bodies except earth the first principle, without inquiring how they are produced out [30] of one another,—I mean fire, water, earth, and air. For some things are produced out of others by combination, others by separation, and this makes the greatest difference to their priority and posteriority. For in a way the property of being most elementary of all would seem to belong to the first thing from which they are produced by combination, and *this* property would belong to the most fine-grained [989<sup>a</sup>1] and subtle of bodies. Therefore those who make fire the principle would be most in agreement with this argument. But each of the other thinkers agrees that the element of corporeal things is of this sort. At least none of the later philosophers who said the world was one claimed that earth was the element, evidently because of [5] the coarseness of its grain. (Of the other three elements each has found some judge on its side; for some maintain that fire, others that water, others that air is the element. Yet why, after all, do they not name earth also, as most men do—for people say all things are earth. And Hesiod says earth

was produced first of [10] corporeal things; so ancient and popular has the opinion been.) According to this argument, then, no one would be right who either says the first principle is any of the elements other than fire, or supposes it to be denser than air but rarer than water. But if that which is later in generation is prior in nature, and that which is [15] concocted and compounded is later in generation, the contrary of what we have been saying must be true,—water must be prior to air, and earth to water.

Let this suffice, then, as our statement about those who posit one cause such as we mentioned; but the same is true if we suppose more of these, as Empedocles says [20] the matter of things is four bodies. For he too is confronted by consequences some of which are the same as have been mentioned, while others are peculiar to him. For we see these bodies produced from one another, which implies that the same body does not always remain fire or earth (we have spoken about this in our works on [25] nature); and regarding the moving cause and the question whether we must suppose one or two, he must be thought to have spoken neither correctly nor altogether plausibly. And in general those who speak in this way must do away with change of quality, for on their view cold will not come from hot nor hot from cold. For if it did there would be something that accepted those very contraries, and there would be [30] some one entity that became fire and water, which Empedocles denies.

As regards Anaxagoras, if one were to suppose that he said there were two elements, the supposition would accord thoroughly with a view which Anaxagoras himself did not state articulately, but which he must have accepted if any one had developed his view. True, to say that in the beginning all things were mixed is absurd both on other grounds and because it follows that they must have existed [989<sup>b</sup>1] before in an unmixed form, and because nature does not allow any chance thing to be mixed with any chance thing, and also because on this view modifications and accidents could be separated from substances (for the same things which are mixed [5] can be separated); yet if one were to follow him up, piecing together what he means, he would perhaps be seen to be somewhat modern in his views. For when nothing was separated out, evidently nothing could be truly asserted of the substance that then existed. I mean, e.g. that it was neither white nor black, nor grey nor any other colour, but of necessity colourless; for if it had been coloured, it would have had one [10] of these colours. And similarly, by this same argument, it was flavourless, nor had it any similar attribute; for it could not be either of any quality or of any size, nor could it be any definite

kind of thing. For if it were, one of the particular forms would have belonged to it, and this is impossible, since all were mixed together; for the particular form would necessarily have been already separated out, but he says [15] all were mixed except reason, and this alone was unmixed and pure. From this it follows, then, that he must say the principles are the One (for this is simple and unmixed) and the Other, which is of such a nature as we suppose the indefinite to be before it is defined and partakes of some form. Therefore, while expressing himself [20] neither rightly nor clearly, he means something like what the later thinkers say and what is now more clearly seen to be the case.

But these thinkers are, after all, at home only in arguments about generation and destruction and movement; for it is practically only of this sort of substance that they seek the principles and the causes. But those who extend their vision to all [25] things that exist, and of existing things suppose some to be perceptible and others not perceptible, evidently study both classes, which is all the more reason why one should devote some time to seeing what is good in their views and what bad from the stand-point of the inquiry we have now before us.

[30] The 'Pythagoreans' use stranger principles and elements than the natural philosophers (the reason is that they got the principles from non-sensible things, for the objects of mathematics, except those of astronomy, are of the class of things without movement); yet their discussions and investigations are all about nature; for they generate the heavens, and with regard to their parts and attributes and [990<sup>a</sup>1] functions they observe the phenomena, and use up the principles and the causes in explaining these, which implies that they agree with the others, the natural philosophers, that what exists is just all that which is perceptible and contained by the so-called heavens. But the causes and the principles which they mention are, as [5] we said, sufficient to act as steps even up to the higher realms of reality, and are more suited to these than to theories about nature. They do not tell us at all, however, how there can be movement if limit and unlimited and odd and even are the only things assumed, or how without process and change there can be generation [10] and destruction, or how the bodies that move through the heavens can do what they do. Further, if we either granted them that spatial magnitude consists of these elements, or this were proved still how would some bodies be light and others have weight? To judge from what they assume and maintain, they speak no more of [15] mathematical bodies than of perceptible; hence they have said nothing whatever about fire or earth or the other bodies of this sort, I suppose because they have

nothing to say which applies *peculiarly* to perceptible things.

Further, how are we to combine the beliefs that the modifications of number, and number itself, are causes of what exists and happens in the heavens both from [20] the beginning and now, and that there is no other number than this number out of which the world is composed? When in one particular region they place opinion and opportunity, and, a little above or below, injustice and sifting or mixture, and allege as proof of this that each one of these is a number, but when there happens to be [25] already in each place a plurality of the extended bodies composed of numbers, because these modifications of number attach to the various groups of places,—this being so, is this number, which we must suppose each of these abstractions to be, the same number which is exhibited in the material universe, or is it another than this? Plato says it is different; yet even he thinks that both these bodies and their causes [30] are numbers, but that the *intelligible* numbers are causes, while the others are *sensible*.

9 · Let us leave the Pythagoreans for the present; for it is enough to have touched on them as much as we have done. But as for those who posit the Ideas as causes, firstly, in seeking to grasp the causes of the things around us, they [990<sup>b</sup>1] introduced others equal in number to these, as if a man who wanted to count things thought he could not do it while they were few, but tried to count them when he had added to their number. For the Forms are practically equal to or not fewer than the things, in trying to explain which these thinkers proceeded from them to the Forms. [5] For to each set of substances there answers a Form which has the same name and exists apart from the substances, and so also in the case of all other groups in which there is one character common to many things, whether the things are in this changeable world or are eternal.

Further, of the ways in which we prove that the Forms exist, none is convincing; for from some no inference necessarily follows, and from some it follows [10] that there are Forms of things of which we think there are no Forms.

For according to the arguments from the existence of the sciences there will be Forms of all things of which there are sciences, and according to the argument that there is one attribute common to many things there will be Forms even of negations, and according to the argument that there is an object for thought even when the thing has

perished, there will be Forms of perishable things; for we can have an image of these.

[15] Further, of the more accurate arguments, some lead to Ideas of relations, of which we say there is no independent class, and others involve the difficulty of the 'third man'.

And in general the arguments for the Forms destroy the things for whose existence we are more anxious than for the existence of the Ideas; for it follows that [20] not the dyad but number is first, i.e. that the relative is prior to the absolute—besides all the other points on which certain people by following out the opinions held about the Ideas have come into conflict with the principles of the theory.

Further, according to the assumption on which our belief in the Ideas rests, there will be Forms not only of substances but also of many other things (for the [25] concept is single not only in the case of substances but also in the other cases, and there are sciences not only of substance but also of other things, and a thousand other such conclusions also follow). But according to the necessities of the case and the opinions held about the Forms, if they can be shared there must be Ideas of [30] substances only. For they are not shared incidentally, but a thing must share in its Form as in something not predicated of a subject (e.g. if a thing shares in double itself, it shares also in eternal, but incidentally; for eternal happens to be predicable of the double). Therefore the Forms will be substance; and the same terms indicate [991<sup>a</sup>1] substance in this and in the ideal world (or what will be the meaning of saying that there is something apart from the particulars—the one over many?). And if the Ideas and the particulars that share them have the same Form, there will be something common to these; for why should 2 be one and the same in the perishable [5] 2's or in those which are many but eternal, and not the same in the 2 itself as in the particular 2? But if they have not the same Form, they must have only the name in common, and it is as if one were to call both Callias and a wooden image a man, without observing any community between them.

Above all one might discuss the question what on earth the Forms contribute to [10] sensible things, either to those that are eternal or to those that come into being and cease to be. For they cause neither movement nor any change in them. But again they help in no way towards the *knowledge* of the other things (for they are not even the substance of these, else they would have been in them), nor towards their being, if they are not *in* the particulars which share in them; though if they were, they [15] might be thought to be causes, as white causes

whiteness in that with which it is mixed. But this argument, which first Anaxagoras and later Eudoxus and certain others used, is too easily upset; for it is not difficult to collect many insuperable, objections to such a view.

[20] But further all other things cannot come from the Forms in any of the usual senses of 'from'. And to say that they are patterns and the other things share them is to use empty words and poetical metaphors. For what is it that works, looking to the Ideas? Anything can either be, or become, like another without being copied from it, so that whether Socrates exists or not a man might come to be like Socrates; and [25] evidently this might be so even if Socrates were eternal. And there will be several patterns of the same thing, and therefore several Forms, e.g. animal and two-footed and also man himself will be Forms of man. Again, the Forms are patterns not only of sensible things, but of themselves too, e.g. the Form of genus will be a genus of [30] Forms; therefore the same thing will be pattern and copy.

Again it must be held to be impossible that the substance and that of which it is [991<sup>b</sup>1] the substance should exist apart; how, therefore, can the Ideas, being the substances of things, exist apart?

In the *Phaedo* the case is stated in this way—that the Forms are causes both of being and of becoming; yet when the Forms exist, still the things that share in them do not come into being, unless there is some efficient cause; and many other things [5] come into being (e.g. a house or a ring), of which we say there are no Forms. Clearly, therefore, even the other things can both be and come into being owing to such causes as produce the things just mentioned.

Again, if the forms are numbers, how can they be causes? Is it because existing things are other numbers, e.g. one number is man, another is Socrates, another [10] Callias? Why then are the one set of numbers causes of the other set? It will not make any difference even if the former are eternal and the latter are not. But if it is because things in this sensible world (e.g. harmony) are ratios of numbers, evidently there is some one class of things of which they are ratios. If, then, this—the matter—is some definite thing, evidently the numbers themselves too will be ratios [15] of something to something else. E.g. if Callias is a numerical ratio between fire and earth and water and air, his Idea also will be a number of certain other underlying things; and the Idea of man, whether it is a number in a sense or not, will still be a numerical ratio of certain things and not a number proper, nor will it be a number merely because it is a numerical ratio. [20]



Again, from many numbers one number is produced, but how can one Form come from many Forms? And if the number comes not from the many numbers themselves but from the units in them, e.g. in 10,000, how is it with the units? If they are specifically alike, numerous absurdities will follow, and also if they are not alike (neither the units in the same number being like one another nor those in [25] different numbers being all like to all); for in what will they differ, as they are without quality? This is not a plausible view, nor can it be consistently thought out. Further, they must set up a second kind of number (with which arithmetic deals), and all the objects which are called intermediate by some thinkers; and how do these exist or from what principles do they proceed? Or why must they be intermediate between the things in this sensible world and the things-in-themselves? [30] Further, the units in 2 must each come from a prior 2; but this is impossible. Further, why is a number, when taken all together, one? Again, besides [992<sup>a</sup>1] what has been said, if the units are *diverse* they should have spoken like those who say there are four, or two, elements; for each of these thinkers gives the name of element not to that which is common, e.g. to body, but to fire and earth, whether [5] there is something common to them, viz. body, or not. But in fact they speak as if the One were *homogeneous* like fire or water; and if this is so, the numbers will not be substances. Evidently, if there is a One-in-itself and this is a first principle, 'one' is being used in more than one sense; for otherwise the theory is impossible.

[10] When we wish to refer substances to their principles, we state that lines come from the short and long (i.e. from a kind of small and great), and the plane from the broad and narrow, and the solid from the deep and shallow. Yet how then can the plane contain a line, or the solid a line or a plane? For the broad and narrow is a [15] different class of things from the deep and shallow. Therefore, just as number is not present in these, because the many and few are different from these, evidently no other of the higher classes will be present in the lower. But again the broad is not a genus which includes the deep, for then the solid would have been a species of plane. Further, from what principle will the presence of the points in the line be derived? [20] Plato even used to object to this class of things as being a geometrical fiction. He called the indivisible lines the principle of lines—and he used to lay this down often. Yet these must have a limit; therefore the argument from which the existence of the line follows proves also the existence of the point.

In general, though philosophy seeks the cause of perceptible things, we have [25] given this up (for we say nothing of the cause from which

change takes its start), but while we fancy we are stating the substance of perceptible things, we assert the existence of a second class of substances, while our account of the way in which they are the substances of perceptible things is empty talk; for sharing, as we said before, means nothing. Nor have the Forms any connexion with that which we see to be the [30] cause in the case of the sciences, and for whose sake mind and nature produce all that they *do* produce,—with this cause we assert to be one of the first principles; but mathematics has come to be the whole of philosophy for modern thinkers, though they say that it should be studied for the sake of other things. Further, one might [992<sup>b</sup>1] suppose that the substance which according to them underlies as matter is too mathematical, and is a predicate and differentia of the substance, i.e. of the matter, rather than the matter itself; i.e. the great and the small are like the rare and the [5] dense which the natural philosophers speak of, calling these the primary differentiae of the substratum; for these are a kind of excess and defect. And regarding movement, if the great and the small are to *be* movement, evidently the Forms will be moved; but if they are not, whence did movement come? If we cannot answer this the whole study of nature has been annihilated.

[10] And what is thought to be easy—to show that all things are one—is not done; for by ‘exposition’ all things do not come to be one but there comes to be a One-in-itself, if we grant all the assumptions. And not even this follows, if we do not grant that the universal is a class; and this in some cases it cannot be.

Nor can it be explained either how the lines and planes and solids that come [15] after the numbers exist or can exist, or what meaning they have; for these can neither be Forms (for they are not numbers), nor the intermediates (for those are the objects of mathematics), nor the perishable things. This is evidently a distinct fourth class.

In general, if we search for the elements of existing things without distinguishing the many senses in which things are said to exist, we cannot succeed, especially [20] if the search for the elements of which things are made is conducted in this manner. For it is surely impossible to discover what acting or being acted on, or the straight, is made of, but if elements can be discovered at all, it is only the elements of substances; therefore to seek the elements of all existing things or to think one has them is incorrect. And how could we *learn* the elements of all things? Evidently we cannot start by knowing something before. For as he who is learning geometry, [25] though he may know other things before, knows none of the things with which the science deals and about which he is to

learn, so is it in all other cases. Therefore if there is a science of all things, as some maintain, he who is learning this will know [30] nothing before. Yet all learning is by means of premises which are (either all or some of them) known before,—whether the learning be by demonstration or by definitions; for the elements of the definition must be known before and be familiar; and learning by induction proceeds similarly. But again, if the science is innate, it is [993<sup>a</sup>1] wonderful that we are unaware of our possession of the greatest of sciences. Again, how is one to *know* what all things are made of, and how is this to be made *evident*? This also affords a difficulty; for there might be a conflict of opinion, as there is about certain syllables; some say *za* is made out of *s* and *d* and *a*, while others say it [5] is a distinct sound and none of those that are familiar. Further, how could we know the objects of sense without having the sense in question? Yet we should, if the elements of which all things consist, as complex sounds consist of their proper elements, are the same. [10]

10 · It is evident, then, even from what we have said before, that all men seem to seek the causes named in the *Physics*, and that we cannot name any beyond these; but they seek these vaguely; and though in a sense they have all been described before, in a sense they have not been described at all. For the earliest [15] philosophy is, on all subjects, like one who lisps, since in its beginnings it is but a child. For even Empedocles says bone exists by virtue of the ratio in it. Now this is the essence and the substance of the thing. But it is similarly necessary that the ratio should be the substance of flesh and of everything else, or of none; there it is on [20] account of this that flesh and bone and everything else will exist, and not on account of the matter, which *he* names,—fire and earth and water and air. But while he would necessarily have agreed if another had said this, he has not said it clearly.

On such questions our views have been expressed before; but let us return to enumerate the difficulties that might be raised on these same points; for perhaps we [25] may get some help towards our later difficulties.

## BOOK II (a)

1 · The investigation of the truth is in one way hard, in another easy. An indication of this is found in the fact that no one is able to attain the truth adequately, while, on the other hand, no one fails entirely, but every one says [993<sup>b</sup>1] something true about the nature of things, and while individually they contribute little or nothing to the truth, by the union of all a considerable amount is amassed. [5] Therefore, since the truth seems to be like the proverbial door, which no one can fail to hit, in this way it is easy, but the fact that we can have a whole truth and not the particular part we aim at shows the difficulty of it.

Perhaps, as difficulties are of two kinds, the cause of the present difficulty is [10] not in the facts but in us. For as the eyes of bats are to the blaze of day, so is the reason in our soul to the things which are by nature most evident of all.

It is just that we should be grateful, not only to those whose opinions we may share, but also to those who have expressed more superficial views; for these also contributed something, by developing before us the powers of thought. It is true that [15] if there had been no Timotheus we should have been without much of our lyric poetry; but if there had been no Phrynis there would have been no Timotheus. The same holds good of those who have expressed views about the truth; for from the better thinkers we have inherited certain opinions, while the others have been responsible for the appearance of the better thinkers.

[20] It is right also that philosophy should be called knowledge of the truth. For the end of theoretical knowledge is truth, while that of practical knowledge is action (for even if they consider how things are, practical men do not study what is eternal but what stands in some relation at some time). Now we do not know a truth without its cause; and a thing has a quality in a higher degree than other things if in [25] virtue of it the similar quality belongs to the other things (e.g. fire is the hottest of things; for it is the cause of the heat of all other things); so that that which causes derivative truths to be true is most true. Therefore the principles of eternal things must be always most true; for they are not merely sometimes true, nor is there any cause of their being, but they themselves are the cause of the being of other things, [30] so that as each thing is in respect of being, so is it in respect of truth.

[994<sup>a</sup>1] 2 · Evidently there is a first principle, and the causes of things are neither an infinite series nor infinitely various in kind. For, on the one hand, one thing cannot proceed from another, as from matter, *ad infinitum*, e.g. flesh from earth, earth from air, air from fire, and so on without stopping; nor on the other hand can the [5] efficient causes form an endless series, man for instance being acted on by air, air by the sun, the sun by Strife, and so on without limit. Similarly the final causes cannot go on *ad infinitum*,—walking for the sake of health, this for the sake of happiness, [10] happiness for the sake of something else, and so one thing always for the sake of another. And the case of the formal cause is similar. For in the case of an intermediate, which has a last term and a prior term outside it, the prior must be the cause of the later terms. For if we had to say which of the three is the cause, we should say the first; surely not the last, for the final term is the cause of none; nor [15] even the intermediate, for it is the cause only of one. It makes no difference whether there is one intermediate or more, nor whether they are infinite or finite in number. But of series which are infinite in this way, and of the infinite in general, all the parts down to that now present are alike intermediates; so that if there is no first there is no cause at all.

[20] Nor can there be an infinite process downwards, with a beginning in the upper direction, so that water should proceed from fire, earth from water, and so always some other kind should be produced. For one thing comes *from* another in two ways (if we exclude the sense in which ‘from’ means ‘after’, as we say ‘from the Isthmian games come the Olympian’), (a) as the man comes from the boy, by the boy’s [25] changing, or (b) as air comes from water. By ‘as the man comes from the boy’ we mean ‘as that which has come to be from that which is coming to be, or as that which is finished from that which is being achieved’ (for as becoming is between being and not being, so that which is becoming is always between that which is and that which is not; and the learner is a man of science in the making, and this is what is meant when we say that *from* a learner a man of science is being made); on the [30] other hand, coming from another thing as water comes from air implies the destruction of the other thing. This is why changes of the former kind are not reversible,—the boy does not come from the man (for what comes to be *from* the process of coming to be is not what *is* coming to be but what exists *after* the process [994<sup>b</sup>1] of coming to be; for it is thus that the day comes from the morning—in the sense that it comes after the morning; and therefore the morning cannot come from the day); but changes of the other kind are reversible. But in both cases it is impossible that the

number of terms should be infinite. For terms of the former kind being intermediates must have an end, and terms of the latter kind change into *one* [5] another; for the destruction of either is the generation of the other.

At the same time it is impossible that the first cause, being eternal, should be destroyed; for while the process of becoming is not infinite in the upward direction, a first cause by whose destruction something came to be could not be eternal.

Further, the *final cause* is an end, and that sort of end which is not for the sake of something else, but for whose sake everything else is; so that if there is to be a last [10] term of this sort, the process will not be infinite; but if there is no such term there will be no final cause. But those who maintain the infinite series destroy the good without knowing it. Yet no one would try to do anything if he were not going to come to a limit. Nor would there be reason in the world; the reasonable man, at least, always acts for a purpose; and this is a limit, for the end is a limit. [15]

But the *formal cause*, also, cannot be referred always to another definition which is fuller in expression. For the original definition is always more of a definition, and not the later one; and in a series in which the first term is not correct, the next is not so either.—Further, those who speak thus destroy knowledge; for it is [20] not possible to have this till one comes to what is indivisible. And knowledge becomes impossible; for how can one think things that are infinite in this way? For this is not like the case of the line, to whose divisibility there is no stop, but which we cannot think of if we do not make a stop; so that one who is tracing the infinitely divisible line cannot be counting the possibilities of section. [25]

But further, the *matter* in a changeable thing must be cognized.<sup>1</sup>

Again, nothing infinite can exist; and if it could, at least being infinite is not infinite.

But if the *kinds* of causes had been infinite in number, then also knowledge would have been impossible; for we think we know, only when we have ascertained [30] the causes, but that which is infinite by addition cannot be gone through in a finite time.

3 · The effect which lectures produce on a hearer depends on his habits; for [995<sup>a</sup>1] we demand the language we are accustomed to, and that which is different from this seems not in keeping but somewhat unintelligible and foreign because it is not customary. For the customary

is more intelligible. The force of custom is shown by the laws, in whose case, with regard to the legendary and childish elements in them, [5] habit has more influence than our knowledge about them. Some people do not listen to a speaker unless he speaks mathematically, others unless he gives instances, while others expect him to cite a poet as witness. And some want to have everything done accurately, while others are annoyed by accuracy, either because they cannot [10] follow the connexion of thought or because they regard it as pettifoggery. For accuracy has something of this character, so that as in trade so in argument some people think it mean. Therefore one must be already trained to know how to take each sort of argument, since it is absurd to seek at the same time knowledge and the way of attaining knowledge; and neither is easy to get.

[15] The minute accuracy of mathematics is not to be demanded in all cases, but only in the case of things which have no matter. Therefore its method is not that of natural science; for presumably all nature has matter. Hence we must inquire first what nature is: for thus we shall also see what natural science treats of [and whether it belongs to one science or to more to investigate the causes and the principles of [20] things].<sup>2</sup>

## BOOK III (B)

1 · We must, with a view to the science which we are seeking, first recount [25] the subjects that should be first discussed. These include both the other opinions that some have held on certain points, and any points besides these that happen to have been overlooked. For those who wish to get clear of difficulties it is advantageous to state the difficulties well; for the subsequent free play of thought implies the solution of the previous difficulties, and it is not possible to untie a knot [30] which one does not know. But the difficulty of our thinking points to a knot in the object; for in so far as our thought is in difficulties, it is in like case with those who are tied up; for in either case it is impossible to go forward. Therefore one should have surveyed all the difficulties beforehand, both for the reasons we have stated [35] and because people who inquire without first stating the difficulties are like those who do not know where they have to go; besides, a man does not otherwise know even whether he has found what he is looking for or not; for the end is not clear to [995<sup>b</sup>1] such a man, while to him who has first discussed the difficulties it is clear. Further, he who has heard all the contending arguments, as if they were the parties to a case, must be in a better position for judging.

The first problem concerns the subject which we discussed in our prefatory [5] remarks. It is this—whether the investigation of the causes belongs to one or to more sciences, and, if to one, whether this should survey only the first principles of substance, or also the principles on which all men base their proofs, e.g. whether it is possible at the same time to assert and deny one and the same thing or not, and all [10] other such questions. And if the science in question deals with substance, whether does *one* science deal with all substances, or more than one, and if more, whether are all akin, or must some of them be called forms of wisdom and the others something else? And this itself is also one of the things that must be discussed—whether sensible substances alone should be said to exist or others also besides [15] them, and whether these others are of one kind or there are several classes of substances, as is supposed by those who believe both in Forms and in mathematical objects intermediate between these and sensible things. We must inquire, then, as we say, into these questions, and also whether our investigation is concerned only with substances or also with the essential attributes of substances. Further, with [20] regard to the same and other and like and unlike and contrariety, and with regard to prior and posterior and all



other such terms, about which the dialecticians try to inquire, starting their investigation from reputable premises only,—whose business is it to inquire into all these? Further, we must discuss the essential attributes of [25] these themselves; and we must ask not only what each of these is, but also whether one thing always has one contrary. Again, whether the principles and elements of things are the *classes*, or the *parts* present in each thing into which it is divided; and if they are the classes, whether they are the classes that are predicated proximately of the individuals, or the highest classes, e.g. whether animal or man is the first [30] principle and the more independent of the individual instance? And we must inquire and discuss especially whether there is, besides the matter, any thing that is a cause in itself or not, and whether this can exist apart or not, and whether it is one or more in number. Once more, is there something apart from the concrete thing (by the concrete thing I mean the matter with something predicated of it), or is [35] there nothing apart, or is there something in some cases though not in others, and what sort of cases are these? Again we ask whether the principles are limited in [996<sup>a</sup>1] number or in kind, both those in the formulae and those in the substratum; and whether the principles of perishable and of imperishable things are the same or different; and whether they are all imperishable or those of perishable things are perishable. Further, there is the question which is hardest of all and most [5] perplexing, whether unity and being, as the Pythagoreans and Plato said, are not attributes of something else but are the substance of existing things, or this is not the case, but the substratum is something else,—as Empedocles says, love; as someone else says, fire; while one says water and one air. Again we ask whether the [10] principles are universal or like individual things, and whether they exist potentially or actually; further, whether they are potential or actual in any other sense than in reference to movement; for these questions also would present much difficulty. Further, whether numbers and lines and figures and points are a kind of substance [15] or not, and if they are substances whether they are separate from sensible things or present in them? With regard to all these matters not only is it hard to get possession of the truth, but it is not easy even to think out the difficulties well.

2 · First then with regard to what we mentioned first, does it belong to one or to more sciences to investigate all the kinds of causes? How could it belong to one [20] science to know the principles if these are not contrary?

Further, there are many things to which not all the principles pertain. For how can a principle of change or the nature of the good be present in unchangeable things, since everything that in itself and by its own nature is good is an end, and a [25] cause in the sense that for its sake the other things both come to be and are, and since an end or purpose is the end of some action, and all actions imply change; so that in unchangeable things this principle could not exist nor could there be a good-in-itself. This is why in mathematics nothing is proved by means of this kind of [30] cause, nor is there any demonstration of this kind—‘because it is better, or worse’; indeed no one even mentions anything of the kind. And so for this reason some of the Sophists, e.g. Aristippus, ridiculed mathematics; for in the arts, even in handicrafts, e.g. in carpentry and cobbling, the reason always given is ‘because it is better, or worse’, but the mathematical sciences take no account of goods and evils.

[996<sup>b</sup>1] But if there are several sciences of the causes, and a different science for each different principle, which of these sciences should be said to be that which we seek, or which of the people who possess them has the most scientific knowledge of the [5] object in question? The same thing may have all the kinds of causes, e.g. the moving cause of a house is the art or the builder, the final cause is the function it fulfils, the matter is earth and stones, and the form is the definitory formula. To judge from our previous discussion of the question which of the sciences should be called wisdom, there is reason for applying the name to each of them. For inasmuch as it is [10] most architectonic and authoritative and the other sciences, like slave-women, may not even contradict it, the science of the *end* and of the *good* is of the nature of wisdom (for the other things are for the sake of the end). But inasmuch as it was described as dealing with the first causes and that which is in the highest sense knowable, the science of *substance* must be of the nature of wisdom. For as men [15] may know the same thing in many ways, we say that he who knows what a thing is by the characteristics it has knows more fully than he who knows it by the characteristics it has not, and in the former class itself one knows more fully than another, and he knows most fully who knows what a thing is, not he who knows its quantity or quality or what it can by nature do or have done to it; and further in all other cases also (i.e. where demonstration is possible) we think that the knowledge [20] of each thing is present when we know what it is, e.g. what squaring a rectangle is, viz. that it is the finding of a mean; and similarly in all other cases. And we know about becomings and actions and about every change when we know the *source of the movement*; and this is other than and opposed to

the end. Therefore it would seem to belong to different sciences to investigate these causes severally. [25]

But, regarding the starting-points of demonstration also, it is a disputable question whether they are the object of one science or of more. By the starting-points of demonstration I mean the common beliefs, on which all men base their proofs, e.g. that everything must be either affirmed or denied, and that a thing cannot at the same time be and not be, and all other such propositions; the question [30] is whether the same science deals with them as with substance, or a different science, and if it is not one science, which of the two must be identified with that which we now seek.—It is not reasonable that these topics should be the object of one science; for why should it be peculiarly appropriate to geometry or to any other science to understand these matters? If then it belongs to every science alike, and cannot belong to all, it is not peculiar to the science which investigates substances, [997<sup>a</sup>1] any more than to any other science, to know about these topics.—And, at the same time, in what way can there be a *science* of the first principles? For we are aware even now what each of them is; at least even other sciences use them as familiar. And if there is a demonstrative science which deals with them, there will have to be [5] an underlying kind, and some of them must be attributes and others must be axioms (for it is impossible that there should be demonstration about all things); for the demonstration must start from certain premises and be about a certain subject and prove certain attributes. Therefore it follows that all attributes that are proved must belong to one class; for all demonstrative sciences use the axioms.—But if the [10] science of substance and the science which deals with the axioms are different, which of them is more authoritative and prior? The *axioms* are most universal and are principles of all things. And if it is not the business of the philosopher, to whom else will it belong to inquire what is true and what is untrue about them?

In general, do all substances fall under one science or under more than one? If [15] the latter, to what sort of substance is the present science to be assigned? On the other hand, it is not reasonable that one science should deal with all. For then there would be one demonstrative science dealing with all attributes. For every demonstrative science investigates with regard to some subject its essential attributes, [20] starting from the common beliefs. Therefore to investigate the essential attributes of one subject, starting from one set of beliefs, is the business of one science. For the subject belongs to one science, and the premises belong to one, whether to the same or to another; so that the attributes

also are investigated either by these sciences or by one derived from them. [25]

Further, does our investigation deal with substances alone or also with their attributes? I mean for instance, if the solid is a substance and so are lines and planes, is it the business of the same science to know these and to know the attributes of each of these classes (the attributes which the mathematical sciences prove), or of a different science? If of the *same*, the science of substance also must [30] be a demonstrative science; but it is thought that there is *no* demonstration of the essence of things. And *if of another*, what will be the science that investigates the attributes of substance? This is a very difficult question.

Further, must we say that sensible substances alone exist, or that there are others besides these? And are substances of one kind or are there several kinds of [997<sup>b</sup>1] substances, as those say who assert the existence both of the Forms and of the intermediates with which they say the mathematical sciences deal?—In what sense we say the Forms are causes and substances in themselves has been explained in our [5] first remarks about them; while this presents difficulties in many ways, the most paradoxical thing of all is the statement that there are certain things besides those in the material universe, and that these are the same as sensible things except that they are eternal while the latter are perishable. For they say there is a man-in-himself and a horse-in-itself and health-in-itself, with no further qualification—a [10] procedure like that of the people who said there are gods, but in human form. For they were positing nothing but eternal men, nor are they making the Forms anything other than eternal sensible things.—Further, if we are to posit besides the Forms and the sensibles the intermediates between them, we shall have many difficulties. For clearly on the same principle there will be lines besides the [15] lines-in-themselves and the sensible lines, and so with each of the other classes of things; so that since astronomy is one of these mathematical sciences there will also be a heaven besides the sensible heaven, and a sun and a moon (and so with the other heavenly bodies) besides the sensible ones. Yet how are we to believe these things? It is not reasonable even to suppose these bodies immovable, but to suppose [20] their *moving* is quite impossible. And similarly with the things of which optics and mathematical harmonics treat. For these also cannot exist apart from the sensible things, for the same reasons. For if there are sensible things and sensations intermediate between Form and individual, evidently there will also be animals intermediate between animals-in-themselves and the perishable animals.—We [25] might also

raise the question, with reference to *which kind* of existing things we must look for these additional sciences. If geometry is to differ from mensuration only in this, that the latter of these deals with things that we perceive, and the former with things that are not perceptible, evidently there will be a science other than medicine, intermediate between medical-science-in-itself and this individual [30] medical science, and so with each of the other sciences. Yet how is this possible? There would have to be also healthy things besides the perceptible healthy things and the healthy-in-itself. And at the same time not even this is true, that mensuration deals with perceptible and perishable magnitudes; for then it would have perished, when they perished. And astronomy also cannot be dealing with perceptible magnitudes nor with this heaven above us. For neither are perceptible [998<sup>a</sup>1] lines such lines as the geometer speaks of (for no perceptible thing is straight or curved in this way; for a hoop touches a straight edge not at a point, but as Protagoras said it did, in his refutation of the geometers), nor are the movements [5] and complex orbits in the heavens like those of which astronomy treats, nor have geometrical points the same nature as the actual stars.—Now there are some who say that these so-called intermediates between the Forms and the perceptible things exist, not apart from the perceptible things, however, but in these; the impossible [10] results of this view would take too long to enumerate, but it is enough to consider such points as the following:—It is not reasonable that this should be so only in the case of these *intermediates*, but clearly the *Forms* also might be in the perceptible things; for the same account applies to both. Further, it follows from this theory that there are two solids in the same place, and that the intermediates are not immovable, since they are in the moving perceptible things. And in general to what [15] purpose would one suppose them to *exist*, but to exist *in* perceptible things? For the same paradoxical results will follow which we have already mentioned; there will be a heaven besides *the* heaven, only it will be not apart but in the same place; which is still more impossible.

3 · Apart from the difficulty of stating the case truly with regard to these [20] matters, it is hard to say, with regard to the first principles, whether it is the genera that should be taken as elements and principles, or rather the primary constituents of a thing; e.g. it is the primary parts of which all articulate sounds consist that are thought to be elements and principles of articulate sound, not the common genus—articulate sound; and we give the name of ‘elements’ to those geometrical [25]

propositions, the proofs of which are implied in the proofs of the others, either of all or of most. Further, both those who say there are several elements of corporeal things and those who say there is one, say the parts of which bodies consist and are compounded are principles, e.g. Empedocles says fire and water and the rest are the [30] constituent elements of things, but does not describe these as genera of existing things. Besides this, if we want to examine the nature of anything else, we examine [998<sup>b</sup>1] the parts of which, e.g., a bed consists and how they are put together, and then we know its nature. To judge from these arguments, then, the principles of things would not be the genera; but in so far as we know each thing by its definition, and the genera are the principles of definitions, the genera must also be the principles of [5] definable things. And if to get the knowledge of things is to get the knowledge of the species according to which they are named, the genera are at least starting-points of the *species*. And some also of those who say unity and being, or the great and the small, are elements of things, seem to treat them as genera.—But, again, it is not [10] possible to describe the principles in *both* ways. For the formula of the substance is one; but definition by genera will be different from that which states the constituent parts of a thing.

Besides this, even if the genera are in the highest degree principles, should one regard the first of the genera as principles, or those which are predicated directly of [15] the individuals? This also admits of dispute. For if the universal is always more of a principle, evidently the uppermost of the genera are the principles; for these are predicated of all things. There will, then, be as many principles of things as there are primary genera, so that both being and unity will be principles and substances; [20] for these are most of all predicated of all things. But it is not possible that either unity or being should be a genus of things; for the *differentiae* of any genus must each of them both have being and be one, but it is not possible for the genus to be predicated of the *differentiae* taken apart from the species (any more than for the [25] species of the genus to be predicated of the proper *differentiae* of the genus); so that if unity or being is a genus, no *differentia* will either be one or have being. But if unity and being are not genera, neither will they be principles, if the genera are the principles.—Again, the intermediate classes, whose concepts include the *differentiae*, will on this theory be genera, down to the individuals; but as it is, some are [30] thought to be genera and others are not thought to be so. Besides this, the *differentiae* are principles even more than the genera; and if these also are principles,

there comes to be practically an infinite number of principles, especially [999<sup>a</sup>1] if we suppose the highest genus to be a principle.—But again, if unity is more of the nature of a principle, and the indivisible is one, and everything indivisible is so either in quantity or in species, and that which is so in species is prior to the divisible, and [5] genera are divisible into species (for man is not the *genus* of individual men), that which is predicated directly of the individuals will have more unity.—Further, in the case of things in which the distinction of prior and posterior is present, that which is predicable of these things cannot be something apart from them; e.g. if two is the first of numbers, there will not be a number apart from the kinds of numbers; and similarly there will not be a figure apart from the kinds of figures; and if the [10] genera of these things do not exist apart from the species, the genera of other things will scarcely do so; for genera of these things are thought to exist if any do. But in the indivisible species one member is not prior and another posterior. Further, where one is better and another worse, the better is always prior; so that of these [15] also no genus can exist. From these considerations, then, the species predicated of individuals seem to be principles rather than the genera.—But again, it is not easy to say in what sense these are to be taken as principles. For the principle or cause must exist alongside of the things of which it is the principle, and must be capable of existing in separation from them; and for what reason should we suppose any such [20] thing to exist alongside of the individual, except that it is predicated universally and of all? But if this is the reason, the more universal must be supposed to be more of a principle; so that the highest genera would be the principles.

4 · There is a difficulty connected with these, the hardest of all and the most [25] necessary to examine, and to this our argument has now brought us. If, on the one hand, there is nothing apart from individual things, and the individuals are infinite in number, how is it possible to get knowledge of the infinite individuals? For all things that we know, we know in so far as they have some unity and identity, and in so far as some attribute belongs to them universally.—But if this is necessary, and [30] there must be something apart from the individuals, it will be necessary that the genera exist apart from the individuals,—either the lowest or the highest genera; but we found by discussion just now that this is impossible.—Further, if we admit in the fullest sense that something exists apart from the concrete thing, whenever something is predicated of the matter, must there, if there is something apart, be something

corresponding to each set of individuals, or to some and not to others, or [999<sup>b</sup>1] to none? If there is nothing apart from individuals, there will be no object of thought, but all things will be objects of sense, and there will not be knowledge of anything, unless we say that sensation is knowledge. Further, nothing will be eternal [5] or unmovable; for all perceptible things perish and are in movement. But if there is nothing eternal, neither can there be a process of coming to be; for that which comes to be, and that from which it comes to be, must be something, and the ultimate term in this series cannot have come to be, since the series has a limit and nothing can come to be out of that which is not.—Further, if generation and movement exist there must also be a limit; for no movement is infinite, but every movement has an [10] end, and that which is incapable of completing its coming to be cannot be in process of coming to be; and that which has completed its coming to be must *be* as soon as it has come to be.—Further, since the matter exists, because it is ungenerated, it is *a fortiori* reasonable that the substance, that which the matter is at any time coming to be, should exist; for if neither substance nor matter is, nothing will be at all. And [15] since this is impossible there must be something besides the concrete thing, viz. the shape or form.—But again if we are to suppose this, it is hard to say in which cases we are to suppose it and in which not. For evidently it is not possible to suppose it in all cases; we could not suppose that there is a house besides the particular houses.—Besides this, will the substance of all the individuals, e.g. of all men, be [20] one? This is paradoxical, for all the things whose substance is on this view one would be one. But are they many and different? This also is unreasonable.—At the same time, how does the matter become each of the individuals, and how is the concrete thing these two elements?

Again, one might ask the following question also about the first principles. If they are one *in kind* only, nothing will be numerically one, not even unity-itself and [25] being-itself. And how will it be possible to know, if there is not to be something common to a whole set of individuals? But if there is a common element which is *numerically* one, and each of the principles is one, and the principles are not as in the case of perceptible things different for different things (e.g. since this particular syllable is the same in kind whenever it occurs, the elements of it are also the same [30] in kind; only in kind, for these also, like the syllable, are numerically different in different contexts),—if the principles of things are not one in this sense, but are numerically one, there will be nothing else besides the elements; for there is no difference of meaning



between 'numerically one' and 'individual'. For this is just what we mean by the individual—the numerically one, and by the universal we mean that which is predicable of the individuals. Therefore it is just as, if the [1000<sup>a</sup>1] elements of articulate sound were limited in number, all the literature in the world would be confined to the ABC, since there could not be two or more letters of the same kind.

One difficulty which is as great as any has been omitted both by modern [5] philosophers and by their predecessors—whether the principles of perishable and those of imperishable things are the same or different. If they are the same, how are some things imperishable and others perishable, and for what reason? The school of Hesiod and all the mythologists thought only of what was plausible to themselves, [10] and had no regard to us. For asserting the first principles to be gods and born of gods, they say that the beings which did not taste of nectar and ambrosia became mortal; and clearly they are using words which are familiar to themselves, yet what they have said, even about the very application of these causes is above our [15] comprehension. For if the gods taste nectar and ambrosia for their pleasure, these are in no wise the causes of their existence; and if they taste them to maintain their existence, how can gods who need food be eternal?—But into the subtleties of the mythologists it is not worth our while to inquire seriously; those, however, who use [20] the language of proof we must cross-examine and ask why, after all, things which consist of the same elements are, some of them, eternal in nature, while others perish. Since these philosophers mention no cause, and it is unreasonable that things should be as they say, evidently the principles or causes of things cannot be the [25] same. Even the man whom one might suppose to speak most consistently—Empedocles,—even he has made the same mistake; for he maintains that strife is a principle that causes *destruction*, but strife would seem none the less to *produce* everything, except the One; for all things excepting God proceed from strife. At least he says:—

From which grew all that was and is and will be hereafter—

[30] Trees, and men and women, and beasts and birds

And water-nourished fish, and long-aged gods.

The implication is evident even apart from these words; for if strife had not been [1000<sup>b</sup>1] present in things, all things would have been one, as he says—'when they have come together, strife stands outermost'. Hence it also follows on his theory that God most blessed is less wise than all others; for he does not know all the elements; for he has [5] in him no

strife, and knowledge is of the like by the like. 'For by earth,' he says,

we see earth, by water water,  
By ether godlike ether, by fire wasting fire,  
Love by love, and strife by gloomy strife.

But—and this is the point we started from—this at least is evident, that on his [10] theory it follows that strife is as much the cause of existence as of destruction. And similarly friendship is not specially the cause of existence; for in collecting things into the One it destroys all other things.—And at the same time Empedocles mentions no cause of the change itself, except that things are so by nature.

But when strife waxed great in the limbs.  
[15] And sprang to honour as the time was fulfilled  
Which is fixed for them in turn by a mighty oath.

This implies that change was necessary; but he shows no cause of the necessity. But yet so far at least he alone speaks consistently; for he does not make some things perishable and others imperishable, but makes all perishable except the elements. [20] The difficulty we are speaking of now is, why some things are perishable and others are not, if they consist of the same principles.

Let this suffice as proof of the fact that the principles cannot be the same. But if there are different principles, one difficulty is whether these themselves will be imperishable or perishable. For if they are *perishable*, evidently these also must consist of certain elements; for all things that perish, perish by being resolved into [25] the elements of which they consist; so that it follows that prior to the principles there are other principles. And this is impossible, whether the process has a limit or proceeds to infinity. Further, how will perishable things exist, if their principles are to be destroyed? But if the principles are *imperishable*, why will things composed of *some* imperishable principles be perishable, while those composed of the others are [30] imperishable? This is not probable, but is either impossible or needs much proof. Further, no one has even tried to maintain different principles; they maintain the same principles for all things. But they swallow the difficulty we stated first as if [1001<sup>a</sup>1] they took it to be something trifling.

The hardest inquiry of all, and the one most necessary for knowledge of the truth, is whether being and unity are the substances of things, and whether each of [5] them, without being anything else, is being or unity

respectively, *or* whether we must inquire what being and unity are, with the implication that they have some other underlying nature. For some people think they are of the former, others think they are of the latter character. Plato and the Pythagoreans thought being and [10] unity were nothing else, but this was their nature, their substance being just unity and being. But the natural philosophers take a different line; e.g. Empedocles—as though referring it to something more intelligible—says what unity is; for he would seem to say it is love: at least, this is for all things the cause of their being one. [15] Others say this unity and being, of which things consist and have been made, is fire, and others say it is air. A similar view is expressed by those who make the elements more than one; for these also must say that being and unity are precisely all the things which they say are principles. If we do not suppose unity and being to be [20] substances, it follows that none of the other universals is a substance; for these are most universal of all. If there is no unity-itself or being-itself, there will scarcely be in any other case anything apart from what are called the individuals. Further, if unity is not a substance, evidently number also will not exist as an entity separate [25] from the individual things; for number is units, and the unit is something whose essence it is to be one.—But if there is a unity-itself and a being-itself, their substance must be unity and being; for it is not something else that is predicated universally of them, but just unity and being. But if there is to be a being-itself and a unity-itself, there is much difficulty in seeing how there will be anything else besides [30] these—I mean, how things will be more than one in number. For what is different from being does not exist, so that it necessarily follows, according to the argument of Parmenides, that all things that are are one and this is being.—There are [1001<sup>b</sup>1] objections to both views. For whether unity is not a substance or there is a unity-itself, number cannot be a substance. We have already said why this result follows if unity is not a substance: and if it is, the same difficulty arises as arose with regard to being. For whence is there to be another one besides the unity-itself? It [5] must be not-one; but all things are either one or many, and of the many each is one.—Further, if the unity-itself is indivisible, according to Zeno's doctrine it will be nothing. For that which neither when added makes a thing greater nor when subtracted makes it less, he asserts to have no being, evidently assuming that [10] whatever has being is a spatial magnitude. And if it is a magnitude, it is corporeal; for the corporeal has being in every dimension, while the other objects of mathematics, e.g. a plane or a line, added in one way will increase what they are added to, but in another

way will not do so, and a point or a unit does so in no way. But since he argues crudely, an indivisible thing *can* exist, so that the position may [15] be defended even against him; for the indivisible when added will make the number, though not the size, greater. But how can a *magnitude* proceed from one such indivisible or from many? It is like saying that the line is made out of points. But [20] even if one supposes the case to be such that, as some say, number proceeds from the unity-itself and something else which is not one, none the less we must inquire why and how the product will be sometimes a number and sometimes a magnitude, if the not-one was inequality and was the same principle in either case. For it is not evident how magnitudes could proceed either from the one and this principle, or [25] from some number and this principle.

5 · A question connected with these is whether numbers and bodies and planes and points are substances or not. If they are not, it baffles us to say what being is and what the substances of things are. For modifications and movements [30] and relations and dispositions and ratios do not seem to indicate the substance of anything; for all are predicated of a subject, and none is a 'this'. And as to the things which might seem most of all to indicate substance, water and earth and fire and [1002<sup>a</sup>1] air, of which composite bodies consist, heat and cold and the like are modifications of these, not substances, and the body which is thus modified alone persists as something real and as a substance. But, on the other hand, a body is surely less of a [5] substance than a surface, and a surface less than a line, and a line less than a unit and a point. For a body is bounded by these; and they are thought to be capable of existing without body, but a body cannot exist without these. This is why, while most of the philosophers and the earlier among them thought that substance and being were identical with body, and that all other things were attributes of this, so [10] that the first principles of bodies were the first principles of being, the more recent and those who were held to be wiser thought *numbers* were the first principles. As we said, then, if these are not substance, there is no substance and no being at all; for surely it is not proper to call the accidents of these, beings. But if this is admitted, [15] that lines and points are substance more than bodies, but we do not see to what sort of bodies these could belong (for they cannot be in perceptible bodies), there can be no substance.—Further, these are all evidently divisions of body,—one a division in [20] breadth, another in depth, another in length.—Besides this, no sort of shape is present in the

solid more than any other; so that if the Hermes is not in the stone, neither is the half of the cube in the cube as something determinate; therefore the surface is not in it either; for if any sort of surface were in it, the surface which marks off the half of the cube would be in it too. And the same account applies to [25] the line and to the point and the unit. Therefore, if on the one hand body is in the highest degree substance, and on the other hand these things are so more than body, but these are not even instances of substance, it baffles us to say what being is and what the substance of things is.—For besides what has been said, the questions of generation and destruction confront us with further paradoxes. For if substance, not having existed before, now exists, or having existed before, afterwards does not [30] exist, this change is thought to be accompanied by a process of becoming or perishing; but points and lines and surfaces cannot be in process of becoming nor of perishing, though they at one time exist and at another do not. For when bodies come into contact or are separated, their boundaries instantaneously become one at [1002<sup>b</sup>1] one time—when they touch, and two at another time—when they are separated; so that when they have been put together one boundary does not exist but has perished, and when they have been separated the boundaries exist which before did not exist. For it cannot be said that the point (which is indivisible) was divided into two. And if the boundaries come into being and cease to be, from what do they come into [5] being? A similar account may also be given of the ‘now’ in time; for this also cannot be in process of coming into being or of ceasing to be, but yet seems to be always different, which shows that it is not a substance. And evidently the same is true of points and lines and planes; for the same argument applies, as they are all alike [10] either limits or divisions.

6 · In general one might raise the question why, besides perceptible things and the intermediates, we have to look for another class of things, such as the Forms which we posit. If it is for this reason, because the objects of mathematics, while they differ from the things in this world in some other respect, differ not at all in [15] that there are many of the same kind, so that their first principles cannot be limited in number (just as the elements of all the language in this sensible world are not limited in number, but in kind, unless one takes the elements of this individual syllable or of this individual articulate sound—whose elements will be limited even [20] in number—, so is it also in the case of the intermediates; for there also the members of the same kind are infinite in number), so that if there are not—besides perceptible and mathematical

objects—others such as some maintain the Forms to be, there will be no substance which is one in number as well as in kind, nor will the first principles of things be determinate in number, but only in kind—if then this [25] must be so, the Forms also must therefore be held to exist. Even if those who support this view do not express it distinctly, still this is what they mean, and they must be maintaining the Forms just because each of the Forms is a substance and none is by accident. But if we are to suppose that the Forms exist and the principles are one in [30] number, not in kind, the impossible results that we have mentioned necessarily follow.

Closely connected with this is the question whether the elements exist potentially or in some other way. If in some other way, there will be something else prior to the first principles; for the potency is prior to the actual cause, and it is not [1003<sup>a</sup>1] necessary for everything potential to be actual.—But if the elements exist potentially, it is possible that everything that is should not be. For even that which is not yet is capable of being; for that which is not comes to be, but nothing that is incapable of being comes to be. [5]

We must not only raise these questions about the first principles, but also ask whether they are universal or what we call individuals. If they are universal, they will not be substances; for everything that is common indicates not a ‘this’ but a [10] ‘such’, but substance is a ‘this’.—And if we can actually posit the common predicate as a single ‘this’, Socrates will be several animals—himself and man and animal, if each of these indicates a ‘this’ and a single thing.—If, then, the principles are universals, these results follow; if they are not universals but of the nature of individuals, they will not be knowable; for the knowledge of anything is universal. [15] Therefore if there is to be knowledge of the principles there must be other principles prior to them, which are universally predicated of them.

## BOOK IV(Γ)

1 · There is a science which investigates being as being and the attributes which belong to this in virtue of its own nature. Now this is not the same as any of the so-called special sciences; for none of these others deals generally with being as [25] being. They cut off a part of being and investigate the attributes of this part—this is what the mathematical sciences for instance do. Now since we are seeking the first principles and the highest causes, clearly there must be some thing to which these belong in virtue of its own nature. If then our predecessors who sought the elements of existing things were seeking these same principles, it is necessary that the [30] elements must be elements of being not by accident but just because it is being. Therefore it is of being as being that we also must grasp the first causes.

2 · There are many senses in which a thing may be said to 'be', but they are related to one central point, one definite kind of thing, and are not homonymous. [35] Everything which is healthy is related to health, one thing in the sense that it preserves health, another in the sense that it produces it, another in the sense that it is a symptom of health, another because it is capable of it. And that which is [1003<sup>b</sup>1] medical is relative to the medical art, one thing in the sense that it possesses it, another in the sense that it is naturally adapted to it, another in the sense that it is a function of the medical art. And we shall find other words used similarly to these. [5] So, too, there are many senses in which a thing is said to be, but all refer to one starting-point; some things are said to be because they are substances, others because they are affections of substance, others because they are a process towards substance, or destructions or privations or qualities of substance, or productive or generative of substance, or of things which are relative to substance, or negations of [10] some of these things or of substance itself. It is for this reason that we say even of non-being that it is non-being. As, then, there is one science which deals with all healthy things, the same applies in the other cases also. For not only in the case of things which have one common notion does the investigation belong to one science, but also in the case of things which are related to one common nature; for even these in a sense have one common notion. It is clear then that it is the work of one

science [15] also to study all things that are, *qua* being.—But everywhere science deals chiefly with that which is primary, and on which the other things depend, and in virtue of which they get their names. If, then, this is substance, it is of substances that the philosopher must grasp the principles and the causes.

Now for every single class of things, as there is one perception, so there is one science, as for instance grammar, being one science, investigates all articulate [20] sounds. Therefore to investigate all the species of being *qua* being, is the work of a science which is generically one, and to investigate the several species is the work of the specific parts of the science.

If, now, being and unity are the same and are one thing in the sense that they are implied in one another as principle and cause are, not in the sense that they are explained by the same formula (though it makes no difference even if we interpret [25] them similarly—in fact this would strengthen our case); for one man and a man are the same thing and existent man and a man are the same thing, and the doubling of the words in ‘one man’ and ‘one existent man’ does not give any new meaning (it is clear that they are not separated either in coming to be or in ceasing to be); and similarly with ‘one’, so that it is obvious that the addition in these cases means the [30] same thing, and unity is nothing apart from being; and if, further, the essence of each thing is one in no merely accidental way, and similarly is from its very nature something that *is*:—all this being so, there must be exactly as many species of being as of unity. And to investigate the essence of these is the work of a science which is generically one—I mean, for instance, the discussion of the same and the similar [35] and the other concepts of this sort; and nearly all contraries are referred to this source; but let us take them as having been investigated in the ‘Selection of [1004<sup>a</sup>1] Contraries’.—And there are as many parts of philosophy as there are kinds of substance, so that there must necessarily be among them a first philosophy and one which follows this. For being falls immediately into genera; and therefore the [5] sciences too will correspond to these genera. For ‘philosopher’ is like ‘mathematician’; for mathematics also has parts, and there is a first and a second science and other successive ones within the sphere of mathematics.

Now since it is the work of one science to investigate opposites, and plurality is [10] opposite to unity, and it belongs to one science to investigate the negation and the privation because in both cases we are really investigating unity, to which the negation or the privation refers



(for we either say simply that unity is not present, or that it is not present in some particular class; in the latter case the characteristic difference of the class modifies the meaning of 'unity', as compared with the meaning conveyed in the bare negation; for the negation means just the absence of [15] unity, while in privation there is also implied an underlying nature of which the privation is predicated),—in view of all these facts, the contraries of the concepts we named above, the other and the dissimilar and the unequal, and everything else which is derived either from these or from plurality and unity, must fall within the province of the science above-named.—And contrariety is one of these concepts, for [20] contrariety is a kind of difference, and difference is a kind of otherness. Therefore, since there are many senses in which a thing is said to be one, these terms also will have many senses, but yet it belongs to one science to consider them all; for a term belongs to different sciences not if it has different senses, but if its definitions [25] neither are identical nor can be referred to one central meaning. And since all things are referred to that which is primary, as for instance all things which are one are referred to the primary one, we must say that this holds good also of the same and the other and of contraries in general; so that after distinguishing the various senses of each, we must then explain by reference to what is primary in each term, [30] saying how they are related to it; some in the sense that they possess it, others in the sense that they produce it, and others in other such ways.

It is evident then that it belongs to one science to be able to give an account of these concepts as well as of substance. This was one of the questions in our book of problems.

And it is the function of the philosopher to be able to investigate all things. For [1004<sup>b</sup>1] if it is not the function of the philosopher, who is it who will inquire whether Socrates and Socrates seated are the same thing, or whether one thing has one contrary, or what contrariety is, or how many meanings it has? And similarly with [5] all other such questions. Since, then, these are essential modifications of unity *qua* unity and of being *qua* being, not *qua* numbers or lines or fire, it is clear that it belongs to this science to investigate both the essence of these concepts and their properties. And those who study these properties err not by leaving the sphere of philosophy, but by forgetting that substance, of which they have no correct idea, is [10] prior to these other things. For number *qua* number has peculiar attributes, such as oddness and evenness, commensurability and equality, excess and defect, and these belong to numbers either in themselves or in relation to one another. And

similarly the solid and the motionless and that which is in motion and the weightless and that [15] which has weight have other peculiar properties. So too certain properties are peculiar to being as such, and it is about these that the philosopher has to investigate the truth.—An indication of this may be mentioned:—dialecticians and sophists assume the same guise as the philosopher, for sophistic is philosophy which exists [20] only in semblance, and dialecticians embrace all things in their dialectic, and being is common to all things; but evidently their dialectic embraces these subjects because these are proper to philosophy.—For sophistic and dialectic turn on the same class of things as philosophy, but this differs from dialectic in the nature of the faculty required and from sophistic in respect of the purpose of the philosophic life. [25] Dialectic is merely critical where philosophy claims to know, and sophistic is what appears to be philosophy but is not.

Again, in the list of contraries one of the two columns is privative, and all contraries are referred to being and nonbeing, and to unity and plurality, as for instance rest belongs to unity and movement to plurality. And nearly all thinkers [30] agree that being and substance are composed of contraries; at least all name contraries as their first principles—some name odd and even, some hot and cold, some limit and the unlimited, some love and strife. And everything else is evidently referred to unity and plurality (this reference we must take for granted), and the principles stated by other thinkers fall entirely under these as their genera. It is [1005<sup>a</sup>1] obvious then from these considerations too that it belongs to one science to examine being *qua* being. For all things are either contraries or composed of contraries, and unity and plurality are the starting-points of all contraries. And these belong to one [5] science, whether they have or have not one common notion. Probably they have not; yet even if ‘one’ has several meanings, the other meanings will be related to the primary meaning—and similarly in the case of the contraries.—And if being or unity is not a universal and the same in every instance, or is not separable from the particular instances (as in fact it probably is not; the unity is in some cases that of [10] common reference, in some cases that of serial succession),—just for this reason it does not belong to the geometer to inquire what is contrariety or completeness or being or unity or the same or the other, but only to presuppose these concepts.—Obviously then it is the work of one science to examine being *qua* being, and the attributes which belong to it *qua* being, and the same science will examine not only [15] substances but also their attributes, both those above named and what is prior and posterior, genus and

species, whole and part, and the others of this sort.

3 · We must state whether it belongs to one or to different sciences to inquire into the truths which are in mathematics called axioms, and into substance. [20] Evidently the inquiry into these also belongs to one science, and that the science of the philosopher; for these truths hold good for everything that is, and not for some special genus apart from others. And all men use them, for they are true of being *qua* being, and each genus has being. But men use them just so far as to satisfy their [25] purposes; that is, as far as the genus, whose attributes they are proving, extends. Therefore since these truths clearly hold good for all things *qua* being (for this is what is common to them), he who studies being *qua* being will inquire into them too.—And for this reason no one who is conducting a special inquiry tries to say [30] anything about their truth or falsehood,—neither the geometer nor the arithmetician. Some natural philosophers indeed have done so, and their procedure was intelligible enough; for they thought that they alone were inquiring about the whole of nature and of being. But since there is one kind of thinker who is even above the natural philosopher (for nature is only one particular genus of being), the discussion of these truths also will belong to him whose inquiry is universal and deals with primary substance. Natural science also is a kind of wisdom, but it is not the first [1005<sup>b</sup>1] kind.—And the attempts of some who discuss the terms on which truth should be accepted, are due to a want of training in logic; for they should know these things already when they come to a special study, and not be inquiring into them while [5] they are pursuing it.—Evidently then the philosopher, who is studying the nature of all substance, must inquire also into the principles of deduction.

But he who knows best about each genus must be able to state the most certain principles of his subject, so that he whose subject is being *qua* being must be able to [10] state the most certain principles of all things. This is the philosopher, and the most certain principle of all is that regarding which it is impossible to be mistaken; for such a principle must be both the best known (for all men may be mistaken about things which they do not know), and non-hypothetical. For a principle which every [15] one must have who knows anything about being, is not a hypothesis; and that which every one must know who knows anything, he must already have when he comes to a special study. Evidently then such a principle is the most certain of all; which principle this is, we proceed to

say. It is, that the same attribute cannot at the same [20] time belong and not belong to the same subject in the same respect; we must presuppose, in face of dialectical objections, any further qualifications which might be added. This, then, is the most certain of all principles, since it answers to the definition given above. For it is impossible for any one to believe the same thing to [25] be and not to be, as some think Heraclitus says; for what a man says he does not necessarily believe. If it is impossible that contrary attributes should belong at the same time to the same subject (the usual qualifications must be presupposed in this proposition too), and if an opinion which contradicts another is contrary to it, obviously it is impossible for the same man at the same time to believe the same [30] thing to be and not to be; for if a man were mistaken in this point he would have contrary opinions at the same time. It is for this reason that all who are carrying out a demonstration refer it to this as an ultimate belief; for this is naturally the starting-point even for all the other axioms.

4 · There are some who, as we have said, both themselves assert that it is [1006<sup>a</sup>1] possible for the same thing to be and not to be, and say that people can judge this to be the case. And among others many writers about nature use this language. But we have now posited that it is impossible for anything at the same time to be and not to be, and by this means have shown that this is the most indisputable of all [5] principles. —Some indeed demand that even this shall be demonstrated, but this they do through want of education, for not to know of what things one may demand demonstration, and of what one may not, argues simply want of education. For it is impossible that there should be demonstration of absolutely everything; there would be an infinite regress, so that there would still be no demonstration. But if there are [10] things of which one should not demand demonstration, these persons cannot say what principle they regard as more indemonstrable than the present one.

We can, however, demonstrate negatively even that this view is impossible, if our opponent will only say something; and if he says nothing, it is absurd to attempt to reason with one who will not reason about anything, in so far as he refuses to [15] reason. For such a man, as such, is seen already to be no better than a mere plant. Now negative demonstration I distinguish from demonstration proper, because in a demonstration one might be thought to be assuming what is at issue, but if another person is responsible for the assumption we shall have negative proof, not demonstration. The starting-point for all such arguments is not

the demand that our [20] opponent shall say that something either is or is not (for this one might perhaps take to be assuming what is at issue), but that he shall say something which is significant both for himself and for another; for this is necessary, if he really is to say anything. For, if he means nothing, such a man will not be capable of reasoning, either with himself or with another. But if any one grants this, demonstration will be possible; for we shall already have something definite. The person responsible for the proof, [25] however, is not he who demonstrates but he who listens; for while disowning reason he listens to reason. And again he who admits this has admitted that something is true apart from demonstration [so that not everything will be 'so and not so'.]<sup>1</sup>

First then this at least is obviously true, that the word 'be' or 'not be' has a definite meaning, so that not everything will be so and not so.—Again, if 'man' has [30] one meaning, let this be 'two-footed animal'; by having one meaning I understand this: if such and such is a man, then if anything is a man, that will be what being a man is. And it makes no difference even if one were to say a word has several meanings, if only they are limited in number; for to each formula there might be [1006<sup>b</sup>1] assigned a different word. For instance, we might say that 'man' has not one meaning but several, one of which would be defined as 'two-footed animal', while there might be also several other formulae if only they were limited in number; for a special name might be assigned to each of the formulae. If, however, they were not [5] limited but one were to say that the word has an infinite number of meanings, obviously reasoning would be impossible; for not to have one meaning is to have no meaning, and if words have no meaning reasoning with other people, and indeed with oneself has been annihilated; for it is impossible to think of anything if we do not think of one thing; but if this is possible, one name might be assigned to this [10] thing. Let it be assumed then, as was said at the beginning, that the name has a meaning and has one meaning; it is impossible, then, that being a man should mean precisely not being a man, if 'man' is not only predicable of one subject but also has one meaning (for we do not identify 'having one meaning' with 'being predicable of [15] one subject', since on that assumption even 'musical' and 'white' and 'man' would have had one meaning, so that all things would have been one; for they would all have been synonymous).

And it will not be possible for the same thing to be and not to be, except in virtue of an ambiguity, just as one whom we call 'man,' others might call 'not-man'; [20] but the point in question is not this, whether the same thing can at the same time be and not be a man in name, but

whether it can in fact. Now if 'man' and 'not-man' mean nothing different, obviously 'not being a man' will mean nothing different from 'being a man'; so that being a man will be not being a man; for they will be one. [25] For being one means this—what we find in the case of 'raiment' and 'dress'—viz. that the definitory formula is one. And if 'being a man' and 'not being a man' are to be one, they must mean one thing. But it was shown earlier that they mean different things. Therefore, if it is true to say of anything that it is a man, it must be a two-footed animal; for this was what 'man' meant; and if this is necessary, it is [30] impossible that the same thing should not be a two-footed animal; for this is what 'being necessary' means—that it is impossible for the thing not to be. It is, then, impossible that it should be at the same time true to say the same thing is a man and is not a man.

The same account holds good with regard to not being man, for 'being man' [1007<sup>a</sup>1] and 'being not-man' mean different things, since even 'being white' and 'being man' are different; for the former terms are much more opposed, so that they must mean [5] different things. And if any one says that '*white*' means one and the same thing as 'man', again we shall say the same as what was said before, that it would follow that *all* things are one, and not only opposites. But if this is impossible, then what has been said will follow, if our opponent answers our question.

And if, when one asks the question simply, he adds the contradictories, he is [10] not answering the question. For there is nothing to prevent the same thing from being both man and white and countless other things: but still if one asks whether it is true to call this a man or not our opponent must give an answer which means one thing, and not add that it is also white and large. For, besides other reasons, it is [15] impossible to enumerate the accidents, which are infinite in number; let him, then, enumerate either all or none. Similarly, therefore, even if the same thing is a thousand times man and not-man, we must not add, in answering the question whether this is a man, that it is also at the same time not a man, unless we are bound to add also all the other accidents, all that the subject is or is not; and if we do this, [20] we are not observing the rules of argument.

And in general those who use this argument do away with substance and essence. For they must say that all attributes are accidents, and that there is no such thing as being essentially man or animal. For if there is to be any such thing as being essentially man this will not be being not-man or not being man (yet these are [25] negations of it); for there was some one thing which it meant, and this was the substance of something. And

denoting the substance of a thing means that the essence of the thing is nothing else. But if its being essentially man is to be the same as either being essentially not-man or essentially not being man, then its essence *will* be something else. Therefore our opponents must say that there cannot be such [30] a definition of anything, but that all attributes are accidental; for this is the distinction between substance and accident—white is accidental to man, because though he is white, whiteness is not his essence. But if *all* statements are accidental, there will be nothing primary about which they are made, if the accidental always [1007<sup>b</sup>1] implies predication about a subject. The predication, then, must go on *ad infinitum*. But this is impossible; for not even more than two terms can be combined. For an accident is not an accident of an accident, unless it be because both are accidents of the same subject. I mean, for instance, the white is musical and the latter is white, [5] only because both are accidental to man. But Socrates is musical, not in this sense, that both terms are accidental to something else. Since then some predicates are accidental in this and some in that sense, those which are accidental in the latter sense, in which white is accidental to Socrates, cannot form an infinite series in the upward direction,—e.g. Socrates the white has not yet another accident; for no [10] unity can be got out of such a sum. Nor again will white have another term accidental to it, e.g. musical. For this is no more accidental to that than that is to this; and at the same time we have drawn the distinction, that while some predicates are accidental in this sense, others are so in the sense in which musical is accidental [15] to Socrates; and the accident is an accident of an accident not in cases of the latter kind, but only in cases of the other kind, so that not *all* terms will be accidental. There must, then, even in this case be something which denotes substance. And it has been shown that, if this is so, contradictories cannot be predicated at the same time.

Again, if all contradictories are true of the same subject at the same time, evidently all things will be one. For the same thing will be a trireme, a wall, and a [20] man, if it is equally possible to affirm and to deny anything of anything,—and this premise must be accepted by those who share the views of Protagoras. For if any one thinks that the man is not a trireme, evidently he is not a trireme; so that he also is a trireme, if, as they say, the contradictory is true. And we thus get the doctrine of [25] Anaxagoras, that all things are mixed together; so that nothing really exists. They seem, then, to be speaking of the indeterminate, and, while fancying themselves to be speaking of being, they are speaking about non-being; for that which exists potentially and not actually is the

indeterminate. But they must predicate of every subject every attribute and the negation of it indifferently. For it is absurd if of [30] every subject its own negation is to be predicable, while the negation of something else which cannot be predicated of it is not predicable of it; for instance, if it is true to say of a man that he is not a man, evidently it is also true to say that he is either a trireme or not a trireme. If, then, the affirmative can be predicated, the negative must be predicable too; and if the affirmative is not predicable, the negative, at [35] least, will be more predicable than the negative of the subject itself. If, then, even the latter negative is predicable, the negative of 'trireme' will be also predicable; [1008<sup>a1</sup>] and, if this is predicable, the affirmative will be so too.—Those, then, who maintain this view are driven to this conclusion, and to the further conclusion that it is not necessary either to assert or to deny. For if it is true that a thing is man and not-man, evidently also it will be neither man nor not-man. For to the two assertions [5] there answer two negations. And if the former is treated as a single proposition compounded out of two, the latter also is a single proposition opposite to the former.

Again, either the theory is true in all cases, and a thing is both white and not-white, and being and not-being, and all other contradictories are similarly compatible, or the theory is true of some statements and not of others. And if not of [10] all, the exceptions will be agreed upon; but if of all, again either the negation will be true wherever the assertion is, and the assertion true wherever the negation is, or the negation will be true where the assertion is, but the assertion not always true where the negation is. And in the latter case there will be something which fixedly is *not*, [15] and this will be an indisputable belief; and if non-being is indisputable and knowable, the opposite assertion will be more knowable. But if what it is necessary to deny it is equally necessary to assert, it is either true or not true to separate the predicates and say, for instance, that a thing is white, and again that it is not-white. [20] And if it is not true to apply the predicates separately, our opponent is not really applying them, and nothing at all exists; but how could non-existent things speak or walk, as he does? Also all things will on this view be one, as has been already said, and man and God and trireme and their contradictories will be the same. For if [25] contradictories can be predicated alike of each subject, one thing will in no wise differ from another; for if it differ, this difference will be something true and peculiar to it. And if one may with truth apply the predicates separately, the above-mentioned result follows none the less.



Further, it follows that all would then be right and all would be in error, and [30] our opponent himself confesses himself to be in error.—And at the same time our discussion with him is evidently about nothing at all; for he says nothing. For he says neither ‘yes’ nor ‘no’, but both ‘yes’ and ‘no’; and again he denies both of these and says ‘neither yes nor no’; for otherwise there would already be something definite.—Again, if when the assertion is true, the negation is false, and when this is true, the affirmation is false, it will not be possible to assert and deny the same thing [1008<sup>b</sup>1] truly at the same time. But perhaps they might say we had assumed the very thing at issue.

Again, is he in error who judges either that the thing is so or that it is not so, and is he right who judges both? If he is not right, what can they mean by saying [5] that the nature of existing things is of this kind? And if he is not right, but more right than he who judges in the other way, being will already be of a definite nature, and this will be true, and not at the same time also not true. But if all are alike both right and wrong, one who believes this can neither speak nor say anything [10] intelligible; for he says at the same time both ‘yes’ and ‘no’. And if he makes no judgement but thinks and does not think, indifferently, what difference will there be between him and the plants?—Thus, then, it is in the highest degree evident that neither any one of those who maintain this view nor any one else is really in this position. For why does a man walk to Megara and not stay at home thinking he [15] ought to walk? Why does he not walk early some morning into a well or over a precipice, if one happens to be in his way? Why do we observe him guarding against this, evidently not thinking that falling in is alike good and not good? Evidently he judges one thing to be better and another worse. And if this is so, he must judge one [20] thing to be man and another to be not-man, one thing to be sweet and another to be not-sweet. For he does not aim at and judge all things alike, when, thinking it desirable to drink water or to see a man, he proceeds to aim at these things; yet he ought, if the same thing were alike man and not-man. But, as was said, there is no [25] one who does not obviously avoid some things and not others. Therefore, as it seems, all men make unqualified judgements, if not about all things, still about what is better and worse. And if this is not knowledge but opinion, they should be all the more anxious about the truth, as a sick man should be more anxious about his health [30] than one who is healthy; for he who has opinions is, in comparison with the man who knows, not in a healthy state as far as the truth is concerned.

Again, however much all things may be so and not so, still there is a

more and a less in the nature of things; for we should not say that two and three are equally even, nor is he who thinks four things are five equally wrong with him who thinks [35] they are a thousand. If then they are not equally wrong, obviously one is less wrong and therefore more right. If then that which has more of any quality is nearer to it, [1009<sup>a</sup>1] there must be some truth to which the more true is nearer. And even if there is not, still there is already something more certain and true, and we shall have got rid of the unqualified doctrine which would prevent us from determining anything in our thought. [5]

5 · Again, from the same opinion proceeds the doctrine of Protagoras, and both doctrines must be alike true or alike untrue. For on the one hand, if all opinions and appearances are true, all statements must be at the same time true and false. For many men hold beliefs in which they conflict with one another, and all think [10] those mistaken who have not the same opinions as themselves; so that the same thing must be and not be. And on the other hand, if this is so, all opinions must be true; for those who are mistaken and those who are right are opposed to one another in their opinions; if, then, reality is such as the view in question supposes, all will be right in their beliefs. Evidently, then, both doctrines proceed from the same way of [15] thinking.

But the same method of discussion must not be used with all opponents; for some need persuasion, and others compulsion. Those who have been driven to this position by difficulties in their thinking can easily be cured of their ignorance; for it is not their expressed argument but their thought that one has to meet. But those [20] who argue for the sake of argument can be convinced only by emending the argument as expressed in words.

Those who really feel the difficulties have been led to this opinion by observation of the sensible world. They think that contradictions or contraries are true at the same time, because they see contraries coming into existence out of the same thing. If, then, that which is not cannot come to be, the thing must have [25] existed before as both contraries alike, as Anaxagoras says all is mixed in all, and Democritus too; for *he* says the void and the full exist alike in every part, and yet one of these is being, and the other non-being. To those, then, whose belief rests on these [30] grounds, we shall say that in a sense they speak rightly and in a sense they err. For 'that which is' has two meanings, so that in some sense a thing can come to be out of that which is not, while in some sense

it cannot, and the same thing can at the same time be and not be—but not in the same respect. For the same thing can be potentially at the same time two contraries, but it cannot actually. And again we [35] shall ask them to believe that among existing things there is another kind of substance to which neither movement nor destruction nor generation at all belongs.

And similarly some have inferred from the sensible world the truth of [1009<sup>b</sup>1] appearances. For they think that the truth should not be determined by the large or small number of those who hold a belief, and that the same thing is thought sweet by some who taste it, and bitter by others, so that if all were ill or all were mad, and only two or three were well or sane, these would be thought ill and mad, and not the [5] others. And again, many of the other animals receive impressions contrary to ours; and even to the senses of each individual, things do not always seem the same. Which, then, of these impressions are true and which are false is not obvious; for the one set is no more true than the other, but both are alike. And this is why [10] Democritus, at any rate, says that either there is no truth or to us at least it is not evident. And in general it is because these thinkers suppose knowledge to be sensation, and this to be a physical alteration, that they say that what appears to our [15] senses must be true; for it is for these reasons that Empedocles and Democritus and, one may almost say, all the others have fallen victims to opinions of this sort. For Empedocles says that when men change their condition they change their knowledge;

For wisdom increases in men according to their present state

[20] And elsewhere he says:

So far as their nature changes, so far to them always  
Come changed thoughts into mind.

And Parmenides also expresses himself in the same way:

For as in each case the much-bent limbs are composed,  
So is the mind of men; for in each and all men  
Tis one thing thinks—the substance of their limbs:  
[25] For that of which there is more is thought.

A saying of Anaxagoras to some of his friends is also related,—that things would be for them such as they supposed them to be. And they say that Homer also evidently had this opinion, because he made Hector, when he

was unconscious from the blow, [30] lie 'thinking other thoughts',—which implies that even those who are bereft of thought have thoughts, though not the same. Evidently, then, if both are forms of thought, the real things also are at the same time so and not so. And it is in this direction that the consequences are most difficult. For if those who have seen most [35] of what truth is possible for us (and these are those who seek and love it most)—if these have such opinions and express these views about the truth, is it not natural that beginners in philosophy should lose heart? For to seek the truth would be to pursue flying game.

[1010<sup>a</sup>1] But the reason for this opinion is that while these thinkers were inquiring into the truth of that which is, they thought that which is was identical with the sensible world; in this, however, there is largely present the nature of the indeterminate—of that which exists in the peculiar sense which we have explained; and, therefore, [5] while they speak plausibly, they do not say what is true. For it befits us to put the matter so rather than as Epicharmus put it against Xenophanes. And again, they held these views because they saw that all this world of nature is in movement, and that about that which changes no true statement can be made; at least, regarding that which everywhere in every respect is changing nothing could truly be affirmed. [10] It was this belief that blossomed into the most extreme of the views above mentioned, that of the professed Heracliteans, such as was held by Cratylus, who finally did not think it right to say anything but only moved his finger, and criticized Heraclitus for saying that it is impossible to step twice into the same river; for *he* thought one could not do it even once.

But we shall say in answer to this argument also, that there is some real sense [15] in their thinking that the changing, when it is changing, does not exist. Yet it is after all disputable; for that which is losing a quality has something of that which is being lost, and of that which is coming to be, something must already be. And in general if a thing is perishing, there will be present something that exists; and if a thing is [20] coming to be, there must be something from which it comes to be and something by which it is generated, and this process cannot be *ad infinitum*. But leaving these arguments, let us insist on this, that it is not the same thing to change in quantity and in quality. Grant that in quantity a thing is not constant; still it is in respect of its form that we know each thing.—And again, it would be fair to criticize those [25] who hold this view for asserting about the whole material universe what they saw only in a minority even of sensible things. For only that region of the

sensible world which immediately surrounds us is always in process of destruction and generation; but this is—so to speak—not even a fraction of the whole, so that it would have been [30] juster to acquit this part of the world because of the other part, than to condemn the other because of this. And again, obviously we shall make to them also the same reply that we made before; we must show them and persuade them that there is something whose nature is changeless. Indeed, from the assertion that things at the [35] same time are and are not, there follows the assertion that all things are at rest rather than that they are in movement; for there is nothing into which they can change, since all attributes belong already to all subjects.

Regarding the nature of truth, we must maintain that not everything which [1010<sup>b</sup>1] appears is true. Firstly, even if sensation—at least of the object special to the sense in question—is not false; still appearance is not the same as sensation.—Again, it is fair to express surprise at our opponents for raising the question whether magnitudes are as great, and colours are of such a nature, as they appear to people at a [5] distance, or as they appear to those close at hand, and whether they are such as they appear to the sick or to the healthy, and whether those things are heavy which appear so to the weak or those which appear so to the strong, and whether truth is what appears to the sleeping or to the waking. For obviously they do not think these [10] to be open questions; no one, at least, if when he is in Libya he fancies one night that he is in Athens, straightway starts for the Odeum. And again with regard to the future, as Plato says, surely the opinion of the physician and that of the ignorant man are not equally weighty, for instance, on the question whether a man will get well or not.—And again, among sensations themselves the sensation of a foreign [15] object and that of the special object, or that of a kindred object and that of the object of the sense in question, are not equally authoritative, but in the case of colour, sight, not taste, has the authority, and in the case of flavour, taste, not sight; each of which senses never says at the same moment of the same object that it at the same time is so and not so.—But not even at different moments does one sense [20] disagree about the quality, but only about that to which the quality belongs. I mean, for instance, the same wine might seem, if either it or one's body changed, at one time sweet and at another time not sweet; but at least the sweet, such as it is when it exists, has never yet changed, but one is always right about it, and that which is to [25] be sweet must of necessity be of such and such a nature. Yet all these views destroy this distinction, so that as there is no substance of anything, so nothing is of

necessity; for the necessary cannot be in this way and also in that, so that if anything is of necessity, it will not be both so and not so.

[30] And, in general, if only the sensible exists, there would be nothing if animate things were not; for there would be no faculty of sense. The view that neither the objects of sensation nor the sensations would exist is doubtless true (for they are affections of the perceiver), but that the substrata which cause the sensation should [35] not exist even apart from sensation is impossible. For sensation is surely not the sensation of itself, but there is something beyond the sensation, which must be prior [1011<sup>a</sup>1] to the sensation; for that which moves is prior in nature to that which is moved, and if they are correlative terms, this is no less the case.

6 · There are, both among those who have these convictions and among those who merely profess these views, some who raise a difficulty by asking, who is the [5] judge of the healthy man, and in general who is likely to judge rightly on each class of questions. But such inquiries are like puzzling over the question whether we are now asleep or awake. And all such questions have the same meaning. These people demand that a reason shall be given for everything; for they seek a starting-point, [10] and they wish to get this by demonstration, while it is obvious from their actions that they have no conviction. But their mistake is what we have stated it to be; they seek a reason for that for which no reason can be given; for the starting-point of demonstration is not demonstration.

These, then, might be easily persuaded of this truth, for it is not difficult to [15] grasp; but those who seek merely compulsion in argument seek what is impossible; for they demand to be made to contradict themselves, while they are contradicting themselves from the very first.—But if not all things are relative, but some exist in their own right, not everything that appears will be true; for that which appears [20] appears to some one; so that he who says all things that appear are true, makes all things relative. And, therefore, those who ask for an irresistible argument, and at the same time demand to be called to account for their views, must guard themselves by saying that the truth is not that what appears exists, but that what appears exists *for him to whom it appears*, and *when*, and *in the sense in which*, and *in the way in which* it appears. And if they give an account of their view, but do not [25] give it in this way, they will soon find themselves contradicting themselves. For it is possible that a thing may for the same man appear as honey to the

sight, but not to the taste, and that, as we have two eyes, things may not appear the same to each, if the eyes are unlike. For to those who for the reasons named above say that what [30] appears is true, and therefore that all things are alike false and true, for things do not appear either the same to all men or always the same to the same man, but often have contrary appearances at the same time (for touch says there are two objects when we cross our fingers, while sight says there is one),—to these we shall say ‘yes, but not to the same sense and in the same part of it and in the same way and at the same time’, so that what appears is under these qualifications true. But perhaps for [1011<sup>b</sup>1] this reason those who argue thus not because they feel a difficulty but for the sake of argument, should say that this is not true, but true for this man. And as has been already said, they must make everything relative—relative to thought and perception, [5] so that nothing either has come to be or will be without some one’s first thinking so. But if things *have* come to be or will be, evidently not all things will be relative to opinion.—Again, if a thing is one, it is in relation to one thing or to a definite number of things; and if the same thing is both half and equal, still the equal is not correlative to the double. In relation to that which thinks, then, if the same thing is a man, and is that which is thought, that which *thinks* will not be a [10] man, but only that which *is thought*. Again, if each thing is to be relative to that which thinks, that which thinks will be relative to an infinity of specifically different things.

Let this, then, suffice to show that the most indisputable of all beliefs is that contradictory statements are not at the same time true, and what consequences follow from the denial of this belief, and why people do deny it. Now since it is [15] impossible that contradictories should be at the same time true of the same thing, obviously contraries also cannot belong at the same time to the same thing. For of the contraries, no less than of the contradictories, one is a privation—and a privation of substance; and privation is the denial of a predicate to a determinate genus. If, then, it is impossible to affirm and deny truly at the same time, it is also [20] impossible that contraries should belong to a subject at the same time, unless both belong to it in particular relations, or one in a particular relation and one without qualification.

7 · But on the other hand there cannot be an intermediate between contradictories, but of one subject we must either affirm or deny any one predicate. This is clear, in the first place, if we define what the true and

the false are. To say of what is [25] that it is not, or of what is not that it is, is false, while to say of what is that it is, and of what is not that it is not, is true; so that he who says of anything that it is, or that it is not, will say either what is true or what is false; but neither what is nor what is not is said to be or not to be.—Again, either the intermediate between the contradictories [30] will be so in the way in which grey is between black and white, or as that which is neither man nor horse is between man and horse. If it were of the latter kind, it could not change, for change is from not-good to good, or from good to not-good; but as a matter of fact it evidently always does, for there is no change except to opposites and to their intermediate. But if it is really intermediate, in this way too there is a difficulty—there would have to be a change to white, which was not [1012<sup>a</sup>1] from not-white; but as it is, this is never seen.—Again, the understanding either affirms or denies every object of understanding or reason—this is obvious from the definition—whenever it is true or false. When it connects in one way by assertion or negation, it is true, and when it does so in the other way, it is false.—Again, there [5] must be an intermediate between *all* contradictories, if one is not arguing merely for the sake of argument; so that it will be possible for a man to say what is neither true nor untrue. And there will be a middle between that which is and that which is not, so that there will also be a kind of change intermediate between generation and destruction.—Again, in all classes in which the negation of an attribute means the [10] assertion of its contrary, even in these there will be an intermediate; for instance, in the sphere of numbers there will be number which is neither odd nor not-odd. But this is impossible, as is obvious from the definition.—Again, the process will go on *ad infinitum*, and the number of realities will be not only made half as great again, but even greater. For again it will be possible to deny this intermediate with reference both to its assertion and to its negation, and this new term will be some [15] definite thing; for its substance is something different.—Again, when a man, on being asked whether a thing is white, says ‘no’, he has denied nothing except that it is; and its not being is a negation.

Some people have acquired this opinion as other paradoxical opinions have been acquired; when men cannot refute eristical arguments, they give in to the [20] argument and agree that the conclusion is true. This, then, is why some argue in such fashion; others do so because they demand a reason for everything. And the starting-point in dealing with all such people is definition. Now the definition rests on the necessity of their meaning something; for the formula, of which the word is a [25]



sign, becomes its definition.—The doctrine of Heraclitus, that all things are and are not, seems to make everything true, while that of Anaxagoras, that there is an intermediate between the terms of a contradiction, seems to make everything false; for when things are mixed, the mixture is neither good nor not-good, so that one cannot say anything that is true.

8 · In view of these distinctions it is obvious that the one-sided theories which [30] some people express about all things cannot be valid—on the one hand the theory that nothing is true (for, they say, there is nothing to prevent every statement from being like the statement ‘the diagonal of a square is commensurate with the side’),—on the other hand the theory that everything is true.—These views are practically the same as that of Heraclitus; for that which says that all things are true and all are false also makes each of these statements separately, so that since [1012<sup>b</sup>1] they are impossible, the double statement must be impossible too.—Again, there are obviously contradictories which cannot be at the same time true. Nor on the other hand can all statements be false; yet this would *seem* more possible in view of [5] what has been said.—But against all such arguments we must postulate, as we said above, not that something is or is not, but that people mean something, so that we must argue from a definition, having got what falsity or truth means. If that which it is true to affirm is nothing other than that which it is false to deny, it is impossible [10] that all statements should be false; for one side of the contradiction must be true.—Again, if it is necessary with regard to everything either to assert or to deny it, it is impossible that both should be false; for it is *one* side of the contradiction that is false.—Further, all such arguments are exposed to the often-expressed objection, [15] that they destroy themselves. For he who says that everything is true makes the statement contrary to his own also true, so that his own is not true (for the contrary statement denies that it is true), while he who says everything is false makes himself also false.—And if the former person excepts the contrary statement, saying it alone is not true, while the latter excepts his own as being alone not false, none the less they are driven to postulate the truth or falsehood of an infinite number of [20] statements; for that which says the true statement is true, is true, and this process will go on to infinity.

Evidently again those who say all things are at rest are not right, nor are those who say all things are in movement. For if all things are at rest, the same statements will always be true and the same always false,—but

they obviously are not; for he [25] who makes a statement himself at one time was not and again will not be. And if all things are in motion, nothing will be true; everything therefore will be false. But it has been shown that this is impossible. Again, it must be that which is that changes; for change is from something to something. But again it is not the case that all things are at rest or in motion *sometimes*, and nothing *for ever*; for there is [30] something which always moves the things that are in motion, and the first mover must itself be unmoved.



## BOOK V (Δ)

1 · We call an origin<sup>1</sup> (1) that part of a thing from which one would start first, e.g. a line or a road has an origin in either of the contrary directions. (2) That from which each thing would best be originated, e.g. we must sometimes begin to [1013<sup>a</sup>1] learn not from the first point and the origin of the thing, but from the point from which we should learn most easily. (3) That from which (as an immanent part) a thing first arises, e.g. as the keel of a ship and the foundation of a house, while in [5] animals some suppose the heart, others the brain, others some other part, to be of this nature. (4) That from which (*not* as an immanent part) a thing first arises, and from which the movement or the change naturally first proceeds, as a child comes from the father and the mother, and a fight from abusive language. (5) That by whose choice that which is moved is moved and that which changes changes, e.g. the [10] magistracies in cities, and oligarchies and monarchies and tyrannies, are called origins, and so are the arts, and of these especially the architectonic arts. (6) That from which a thing can first be known; for this also is called the origin of the thing, [15] e.g. the hypotheses are the origins of demonstrations. (Causes are spoken of in an equal number of senses; for all causes are origins.) It is common, then, to all to be the first point from which a thing either is or comes to be or is known; but of these some are immanent in the thing and others are outside. Therefore the nature of a thing is an origin, and so are the elements of a thing, and thought and choice, and [20] substance, and that for the sake of which—for the good and the beautiful are the origin both of the knowledge and of the movement of many things.

2 · We call a cause (1) that from which (as immanent material) a thing [25] comes into being, e.g. the bronze of the statue and the silver of the saucer, and the classes which include these. (2) The form or pattern, i.e. the formula of the essence, and the classes which include this (e.g. the ratio 2:1 and number in general are causes of the octave) and the parts of the formula. (3) That from which the change [30] or the freedom from change first begins, e.g. the man who has deliberated is a cause, and the

father a cause of the child, and in general the maker a cause of the thing made and the change-producing of the changing. (4) The end, i.e. that for the sake of which a thing is, e.g. health is the cause of walking. For why does one walk? We [35] say 'in order that one may be healthy', and in speaking thus we think we have given the cause. The same is true of all the means that intervene before the end, when [1013<sup>b</sup>1] something else has put the process in motion (as e.g. thinning or purging or drugs or instruments intervene before health is reached); for all these are for the sake of the end, though they differ from one another in that some are instruments and others are actions.

These, then, are practically all the senses in which causes are spoken of, and as [5] they are spoken of in several senses it follows that there are several causes of the same thing, and in no accidental sense, e.g. both the art of sculpture and the bronze are causes of the statue not in virtue of anything else but *qua* statue; not, however, in the same way, but the one as matter and the other as source of the movement. And [10] things can be causes of one another, e.g. exercise of good condition, and the latter of exercise; not, however, in the same way, but the one as end and the other as source of movement.—Again, the same thing is sometimes cause of contraries; for that which when present causes a particular thing, we sometimes charge, when absent, with the contrary, e.g. we impute the shipwreck to the absence of the steersman, [15] whose presence was the cause of safety; and both—the presence and the privation—are causes as sources of movement.

All the causes now mentioned fall under four senses which are the most obvious. For the letters are the causes of syllables, and the material is the cause of manufactured things, and fire and earth and all such things are the causes of bodies, [20] and the parts are causes of the whole, and the hypotheses are causes of the conclusion, in the sense that they are that out of which these respectively are made; but of these some are cause as *substratum* (e.g. the parts), others as *essence* (the whole, the synthesis, and the form). The semen, the physician, the man who has deliberated, and in general the agent, are all *sources of change* or of rest. The [25] remainder are causes as the *end* and the good of the other things; for that, for the sake of which other things are, is naturally the best and the end of the other things; let us take it as making no difference whether we call it good or apparent good.

These, then, are the causes, and this is the number of their kinds, but the [30] *varieties* of causes are many in number, though when summarized these also are comparatively few. Causes are spoken of in

many senses, and even of those which are of the same kind some are causes in a prior and others in a posterior sense, e.g. both the physician and the professional man are causes of health, and the ratio 2:1 and number are causes of the octave, and the classes that include any particular cause are always causes of the particular effect. Again, there are accidental causes and the classes which include these, e.g. while in one sense the sculptor causes the [35] statue, in another sense Polyclitus causes it, because the sculptor happens to be Polyclitus; and the classes that include the accidental cause are also causes, e.g. a [1014<sup>a</sup>1] man—or in general an animal—is the cause of the statue, because Polyclitus is a man, and a man is an animal. Of accidental causes also some are more remote or nearer than others, as, for instance, if the white and the musical were called causes [5] of the statue, and not only Polyclitus or a man. But besides all these varieties of causes, whether proper or accidental, some are called causes as being able to act, others as acting, e.g. the cause of the house's being built is the builder, or the builder when building.—The same variety of language will be found with regard to the [10] effects of causes, e.g. a thing may be called the cause of this statue or of a statue or in general of an image, and of this bronze or of bronze or of matter in general; and similarly in the case of accidental effects. Again, both accidental and proper causes may be spoken of in combination, e.g. we may say not 'Polyclitus' nor 'the sculptor', [15] but 'Polyclitus the sculptor'.

Yet all these are but six in number, while each is spoken of in two ways; for (1) they are causes either as the individual, or as the class that includes the individual, or as the accidental, or as the class that includes the accidental, and these either as combined, or as taken simply; and (2) all may be taken as acting or as having a capacity. But they differ inasmuch as the acting causes and the individuals exist, or [20] do not exist, simultaneously with the things of which they are causes, e.g. this particular man who is curing, with this particular man who is recovering health, and this particular builder with this particular thing that is being built; but this is not always so with potential causes; for the house does not perish at the same time as the builder. [25]

3 · We call an element that which is the primary component immanent in a thing, and indivisible in kind into other kinds, e.g. the elements of speech are the parts of which speech consists and into which it is ultimately divided, while *they* are no longer divided into other forms

of speech different in kind from them. If they *are* divided, their parts are of the same kind, as a part of water is water (while a part of [30] the syllable is not a syllable). Similarly those who speak of the elements of bodies mean the things into which bodies are ultimately divided, while *they* are no longer divided into other things differing in kind; and whether the things of this sort are one or more, they call these elements. The elements of geometrical proofs, and in [35] general the elements of demonstrations, have a similar character; for the primary demonstrations, each of which is implied in many demonstrations, are called [1014<sup>b</sup>1] elements of demonstrations; and the primary deductions, which have three terms and proceed by means of one middle, are of this nature.

People also transfer the word 'element' from this meaning and apply it to that which, being one and small, is useful for many purposes; for which reason the small [5] and simple and indivisible is called an element. Hence come the facts that the most universal things are elements (because each of them being one and simple is present in a plurality of things, either in all or in as many as possible), and that unity and the point are thought by some to be first principles. Now, since the so-called genera are [10] universal and indivisible (for there is no formula of them), some say the genera are elements, and more so than the differentia, because the genus is more universal; for where the differentia is present, the genus accompanies it, but where the genus is, the differentia is not always. It is common to all the meanings that the element of [15] each thing is the first component immanent in each.

4 · We call nature (1) the genesis of growing things—the meaning which would be suggested if one were to pronounce the υ in φύσις long. (2) The primary immanent element in a thing, from which its growth proceeds. (3) The source from which the primary movement in each natural object is present in it in virtue of its [20] own essence. Those things said to grow which derive increase from something else by contact and organic unity, or organic adhesion as in the case of embryos. Organic unity differs from contact; for in the latter case there need not be anything besides the contact, but in organic unities there is something identical in both parts, which [25] makes them grow together instead of merely touching, and be one in respect of continuity and quantity, though not of quality.—(4) Nature is the primary matter of which any non-natural object consists or out of which it is made, which cannot be modified or changed from its own potency, as e.g. bronze is said to be the

nature of a [30] statue and of bronze utensils, and wood the nature of wooden things; and so in all other cases; for when a product is made out of these materials, the first matter is preserved throughout. In this way people call the elements of *natural* objects also their nature, some naming fire, others earth, others air, others water, others [35] something else of the sort, and some naming more than one of these, and others all of them.—(5) Nature is the substance of natural objects, as with those who say the [1015a1] nature is the primary mode of composition, or as Empedocles says:—

Nothing that is has a nature,  
But only mixing and parting of the mixed,  
And nature is but a name applied to them by men.<sup>2</sup>

Hence as regards the things that are or come to be by nature, though that *from which* they naturally come to be or are is already present, we say they have not their [5] nature yet, unless they have their form or shape. That which comprises both of these exists *by nature*, e.g. the animals and their parts; and nature is both the first matter (and this in two senses, either first, counting from the thing, or first in general, e.g. in the case of works in bronze, bronze is first with reference to them, but in general [10] perhaps water is first, if all things that can be melted are water), and the form or substance, which is the end of the process of becoming. And from this sense of ‘nature’ every substance in general is in fact, by an extension of meaning, called a ‘nature’, because the nature of a thing is one kind of substance.

From what has been said, then, it is plain that nature in the primary and strict sense is the substance of things which have in themselves, as such, a source of movement; for the matter is called the nature because it is qualified to receive this, [15] and processes of becoming and growing are called nature because they are movements proceeding from this. And nature in this sense is the source of the movement of natural objects, being present in them somehow, either potentially or actually.

5 · We call the necessary (1) that without which, as a condition, a thing [20] cannot live, e.g. breathing and food are necessary for an animal; for it is incapable of existing without these.—(2) The conditions without which good cannot be or come to be, or without which we cannot get rid or be freed of evil, e.g. drinking the medicine is necessary in order that we may be cured of disease, and sailing to Aegina is



necessary in order that we may get our money.—(3) The compulsory and [25] compulsion, i.e. that which impedes and hinders contrary to impulse and choice. For the compulsory is called necessary; that is why the necessary is painful, as Evenus says: ‘For every necessary thing is ever irksome’. And compulsion is a form of [30] necessity, as Sophocles says: ‘Force makes this action a necessity’.<sup>3</sup> And necessity is held to be something that cannot be persuaded—and rightly, for it is contrary to the movement which accords with choice and with reasoning.—(4) We say that that which cannot be otherwise is necessarily so. And from this sense of necessary all the [35] others are somehow derived; for as regards the compulsory we say that it is necessary to act or to be acted on, only when we cannot act according to impulse [1015<sup>b</sup>1] because of the compelling force,—which implies that necessity is that because of which the thing cannot be otherwise; and similarly as regards the conditions of life and of good, when in the one case good, in the other life and being, are not possible [5] without certain conditions, these are necessary, and this cause is a kind of necessity.—Again, (5) demonstration is a necessary thing, because the conclusion cannot be otherwise, if there has been demonstration in the full sense; and the causes of this necessity are the first premises, i.e. the fact that the propositions from which the deduction proceeds cannot be otherwise.

Now some things owe their necessity to something other than themselves; [10] others do not, while they are the source of necessity in other things. Therefore the necessary in the primary and strict sense is the simple; for this does not admit of more states than one, so that it does not admit even of one state and another; for it would thereby admit of more than one. If, then, there are certain eternal and unmovable things, nothing compulsory or against their nature attaches to them. [15]

6 · We call one (1) that which is one by accident, (2) that which is one by its own nature. (1) Instances of the accidentally one are Coriscus and musical, and musical Coriscus (for it is the same thing to say ‘Coriscus’ and ‘musical’, and ‘musical Coriscus’), and musical and just, and musical Coriscus and just Coriscus. [20] For all these are called one by accident, just and musical because they are accidents of one substance, musical and Coriscus because the one is an accident of the other; and similarly in a sense musical Coriscus is one with Coriscus, because one of the [25] parts in the formula is an accident of the other, i.e. musical is an accident of Coriscus; and musical Coriscus is one with just Coriscus,

because both have parts which are accidents of one and the same subject. The case is similar if the accident is predicated of a class or of any universal term, e.g. if one says that man is the same [30] as musical man; for this is either because musical is an accident of man, which is one substance, or because both are accidents of some individual, e.g. Coriscus. Both, however, do not belong to him in the same way, but one doubtless as genus and in the substance, the other as a state or affection of the substance.

[35] The things, then, that are called one by accident, are called so in this way. (2) Of things that are called one in virtue of their own nature some (a) are so called [1016<sup>a</sup>1] because they are continuous, e.g. a bundle is made one by a band, and pieces of wood are made one by glue; and a line, even if it is bent, is called one if it is continuous, as each part of the body is, e.g. the leg or the arm. Of these themselves, the continuous by nature are more one than the continuous by art. A thing is called [5] continuous which has by its own nature one movement and cannot have any other; and the movement is one when it is indivisible, and indivisible in time. Those things are continuous by their own nature which are one not merely by contact; for if you put pieces of wood touching one another, you will not say these are one piece of wood or one body or one *continuum* of any other sort. Things, then, that are [10] continuous in any way are called one, even if they admit of being bent, and still more those which cannot be bent, e.g. the shin or the thigh is more one than the leg, because the movement of the leg need not be one. And the straight line is more one than the bent; but that which is bent and has an angle we call both one and not one [15] because its movement may be either simultaneous or not simultaneous; but that of the straight line is always simultaneous, and no part of it which has magnitude rests while another moves, as in the bent line.

(b) Things are called one in another sense because the substratum does not differ in kind; it does not differ in the case of things whose kind is indivisible to the [20] sense. The substratum meant is either the nearest to, or the furthest from, the final state. For, on the one hand, wine is said to be one and water is said to be one, *qua* indivisible in kind; and, on the other hand, *all* juices, e.g. oil and wine, are said to be one, and so are all things that can be melted, because the ultimate substratum of all is the same; for all of these are water or air.

(c) Those things are called one whose genus is one though distinguished by [25] opposite differentiae; and these are all called one because the genus which underlies the differentiae is one (e.g. horse,

man, and dog are one, because all are animals), and in a way similar to that in which the matter is one. These are sometimes called one in this way, but sometimes it is the higher genus that is said to be the same (if [30] they are *infimae species* of their genus)—the genus above the proximate genera, e.g. the isosceles and the equilateral are one and the same *figure* because both are triangles, but they are not the same triangles.

(d) Two things are called one, when the formula which states the essence of one is indivisible from another formula which shows the essence of the other (though *in itself* every formula is divisible). Thus even that which has increased or [35] is diminishing is one, because its formula is one, as, in the case of planes, is the formula of their form. In general those things, the thought of whose essence is [1016<sup>b</sup>1] indivisible and cannot separate them either in time or in place or in formula, are most of all one, and of these especially those which are substances. For in general those things that do not admit of division are one in so far as they do not admit of it, e.g. if something *qua* man does not admit of division, it is one man; if *qua* animal, it [5] is one animal; if *qua* magnitude, it is one magnitude.—Now most things are called one because they do or have or suffer or are related to something else that is one, but the things that are primarily called one are those whose substance is one,—and one either in continuity or in form or in formula; for we count as more than one either things that are not continuous, or those whose form is not one, or those whose [10] formula is not one.

(e) While in a sense we call anything one if it is a quantity and continuous, in a sense we do not unless it is a whole, i.e. unless it has one form; e.g. if we saw the parts of a shoe put together anyhow we should not call them one all the same (unless because of their continuity); we do this only if they are put together so as to be a [15] shoe and have thereby some one form. This is why the circle is of all lines most truly one, because it is whole and complete.

What it is to be one is to be a beginning of number; for the first measure is the beginning, for that by which we first know each class is the first measure of the class; the one, then, is the beginning of the knowable regarding each class. But the [20] one is not the same in all classes. For here it is a quartertone, and there it is the vowel or the consonant; and there is another unit of weight and another of movement. But everywhere the one is indivisible either in quantity or in kind. That which is indivisible in quantity and *qua* quantity is called a unit if it is not divisible [25] in any dimension and is without position, a point if it is not

divisible in any dimension and has position, a line if it is divisible in one dimension, a plane if in two, a body if divisible in quantity in all—i.e. in three—dimensions. And, reversing the order, that which is divisible in two dimensions is a plane, that which is divisible in one a line, that which is in no way divisible in quantity is a point or a unit—that which has not position a unit, that which has position a point. [30]

Again, some things are one in number, others in species, others in genus, others by analogy; in number those whose matter is one, in species those whose formula is one, in genus those to which the same figure of predication applies, by analogy those which are related as a third thing is to a fourth. The latter kinds of unity are always [35] found when the former are, e.g. things that are one in number are one in species, while things that are one in species are not all one in number; but things that are one in species are all one in genus, while things that are so in genus are not all one in [1017<sup>a</sup>1] species but are all one by analogy; while things that are one by analogy are not all one in genus.

Evidently ‘many’ will have uses corresponding to those of ‘one’; some things are many because they are not continuous, others because their matter—either the [5] proximate matter or the ultimate—is divisible in kind, others because the formulae which state their essence are more than one.

7 · Things are said to be (1) in an accidental sense, (2) by their own nature.

(1) In an accidental sense, e.g., we say the just is musical, and the man is [10] musical and the musical is a man, just as we say the musical builds, because the builder happens to be musical or the musical happens to be a builder; for here ‘one thing is another’ means ‘one is an accident of another’. So in the cases we have mentioned; for when we say the man is musical and the musical is a man, or the [15] white is musical or the musical is white, the last two mean that both attributes are accidents of the same thing; the first that the attribute is an accident of that which *is*; while the musical is a man means that musical is an accident of man. In this sense, too, the not-white is said to *be*, because that of which it is an accident *is*. Thus [20] when one thing is said in an accidental sense to be another, this is either because both belong to the same thing, and this *is*, or because that to which the attribute belongs *is*, or because the subject which has as an attribute that of which it is itself predicated, itself *is*.

(2) Those things are said in their own right to be that are indicated by

the figures of predication; for the senses of 'being' are just as many as these figures. [25] Since some predicates indicate what the subject is, others its quality, others quantity, others relation, others activity or passivity, others its place, others its time, 'being' has a meaning answering to each of these. For there is no difference between 'the man is recovering' and 'the man recovers', nor between 'the man is walking' or [30] 'cutting' and 'the man walks' or 'cuts'; and similarly in all other cases.

(3) 'Being' and 'is' mean that a statement is true, 'not being' that it is not true but false,—and this alike in affirmation and negation; e.g. 'Socrates *is* musical' means that this is true, or 'Socrates *is* not-white' means that this is true; but 'the diagonal of the square *is not* commensurate with the side' means that it is false to say it is.

(4) Again, 'being' and 'that which is', in these cases we have mentioned, sometimes [1017<sup>b</sup>1] mean being potentially, and sometimes being actually. For we say both of that which sees potentially and of that which sees actually, that it is seeing, and both of that which can use knowledge and of that which is using it, that it knows, and both [5] of that to which rest is already present and of that which can rest, that it rests. And similarly in the case of substances we say the Hermes is in the stone, and the half of the line is in the line, and we say of that which is not yet ripe that it is corn. When a thing is potential and when it is not yet potential must be explained elsewhere.

[10] **8** · We call substances (1) the simple bodies, i.e. earth and fire and water and everything of the sort, and in general bodies and the things composed of them, both animals and divine beings, and the parts of these. All these are called substance because they are not predicated of a subject but everything else is [15] predicated of them.—(2) That which, being present in such things as are not predicated of a subject, is the cause of their being, as the soul is of the being of animals.—(3) The parts which are present in such things, limiting them and marking them as individuals, and by whose destruction the whole is destroyed, as the body is by the destruction of the plane, as some say, and the plane by the destruction of the line; and in general number is thought by some to be of this [20] nature; for if it is destroyed, they say, nothing exists, and it limits all things.—(4) The essence, the formula of which is a definition, is also called the substance of each thing.

It follows, then, that substance has two senses, (a) the ultimate

substratum, which is no longer predicated of anything else, and (b) that which is a 'this' and separable—and of this nature is the shape or form of each thing. [25]

9 · We call the same (1) that which is the same in an accidental sense, e.g. white and musical are the same because they are accidents of the same thing, and man and musical because the one is an accident of the other; and the musical is man because it is an accident of man. And the complex notion is the same as either of the [30] simple ones and each of these is the same as it; for man and musical are said to be the same as musical man, and this is the same as they. This is why all of these statements are made not universally; for it is not true to say that *every* man is the same as musical; for universal attributes belong to things in virtue of their own nature, but accidents do not belong to them in virtue of their own nature, but are [1018<sup>a</sup>1] predicated without qualification only of the individuals. For Socrates and musical Socrates are thought to be the same; but 'Socrates' is not predicable of more than one subject, and therefore we do not say 'every Socrates' as we say 'every man'.

Some things are said to be the same in this sense; (2) things are said to be the [5] same by their own nature in as many ways as they are said to be one; for both the things whose matter is one either in kind or in number, and those whose substance is one, are said to be the same. Clearly, therefore, sameness is a unity of the being either of more than one thing or of one thing when it is treated as more than one, i.e. when we say a thing is the same as itself; for we treat it as two.

Things are called other if either their kinds or their matters or the formulae of [10] their substance are more than one; and in general 'other' has uses corresponding to those of 'the same'.

We call different (1) those things which though other are the same in some respect, only not in number but either in species or in genus or by analogy; (2) those whose genus is other, and contraries, and all things that have their otherness in their substance.

Those things are called like which have the same attributes in every respect, [15] and those which have more attributes the same than different, and those whose quality is one; and that which shares with another thing the greater number or the more important of the attributes (each of them one of two contraries) in respect of which things are capable of altering, is like that other thing. The uses of 'unlike' correspond to those of 'like'.

10 · We call opposites contradictories, and contraries, and relative terms, [20] and privation and possession, and the extremes from which and into which generation and dissolution take place; and the attributes that cannot be present at the same time in that which is receptive of both, are said to be opposed,—either themselves or their constituents. Grey and white do not belong at the same time to the same thing; therefore their constituents are opposed.

[25] We call contraries (1) those attributes that differ in genus, which cannot belong at the same time to the same subject, (2) the most different of the things in the same genus, (3) the most different of the attributes in the same receptive material, (4) the most different of the things that fall under the same capacity, (5) [30] the things whose difference is greatest either absolutely or in genus or in species. The other things that are called contrary are so called, some because they possess contraries of the above kind, some because they are receptive of such, some because they are productive of or susceptible to such, or are producing or suffering them, or [35] are losses or acquisitions, or possessions or privations, of such. Since 'One' and 'being' have many senses, the other terms which are used with reference to these, and therefore 'same', 'other', and 'contrary', must correspond, so that they must be 'other' for each category.

[1018<sup>b</sup>1] Things are said to be other in species if they are of the same genus but are not subordinate the one to the other, or if, while being in the same genus they have a difference, or if they have a contrariety in their substance; and contraries are other than one another in species (either all contraries or those which are so called in the [5] primary sense), and so are those things whose formulae differ in the *infima species* of the genus (e.g. man and horse are indivisible in genus, but their formulae are different), or which being in the same substance have a difference. 'The same in species' is used correspondingly.

11 · We call things prior and posterior (1) in some cases (on the assumption [10] that there is a first, i.e. a beginning, in each class) because they are nearer some beginning determined either absolutely and by nature, or by reference to something or in some place or by certain people, e.g. things are prior in place because they are nearer either to some place determined by nature, e.g. the middle or the last place, or to some chance object; and that which is further is posterior.—Other things are [15] prior in time; some by being further from the present, i.e. in the case of past events (for the Trojan war is prior to the Persian, because it is

further from the present), others by being nearer the present, i.e. in the case of future events (for the Nemean games are prior to the Pythian, if we treat the present as beginning and first point, because they are nearer the present).—Other things are prior in movement; for the [20] things that are nearer the first mover are prior (e.g. the boy is prior to the man); and the prime mover also is a beginning absolutely.—Others are prior in power; for that which exceeds in power, i.e. the more powerful, is prior; and such is that according to whose choice the other—i.e. the posterior—must follow, so that if the prior does [25] not set it in motion the other does not move, and if it sets it in motion it does move; and here choice is a beginning.—Others are prior in arrangement; these are the things that are placed at certain intervals in reference to some one definite thing according to some rule, e.g. the second member of the chorus is prior to the third, and the second-lowest string is prior to the lowest; for in the one case the leader and in the other the middle string is the beginning.

These, then, are called prior in this sense, but (2) in another sense that which is [30] prior for knowledge is treated as absolutely prior; of these, the things that are prior in formula are different from those that are prior in perception. For in formula universals are prior in perception. For in formula universals are prior, in perception individuals. And in formula also the accident is prior to the whole, e.g. musical to musical man, for the formula cannot exist as a whole without the part; yet [35] musicalness cannot exist unless there is someone who is musical.

(3) The attributes of prior things are called prior, e.g. straightness is prior to smoothness; for one is an attribute of a line as such, and the other of a surface. [1019a1]

Some things then are called prior and posterior in this sense, others (4) in respect of nature and substance, i.e. those which can be without other things, while the others cannot be without *them*—a distinction which Plato used. If we consider the various senses of ‘being’, firstly the subject is prior (so that substance is prior); [5] secondly, according as capacity or actuality is taken into account, different things are prior, for some things are prior in respect of capacity, others in respect of actuality, e.g. in capacity the half line is prior to the whole line and the part to the whole and the matter to the substance, but in actuality these are posterior; for it is only when the whole is dissolved that they will exist in actuality. In a sense, [10] therefore, all things that are called prior and posterior are so called according to this fourth sense; for some things can exist without others in respect of generation, e.g. the whole without the parts, and others in respect of dissolution, e.g. the part without the whole.



And the same is true in all other cases.

12 · We call a capacity (1) a source of movement or change, which is in [15] another thing or in the same thing *qua* other, e.g. the art of building is a capacity which is not in the thing built, while the art of healing, which is a capacity, might be in the man healed, but not in him *qua* healed. Capacity then is the source, in general, of change or movement in another thing or in the same thing *qua* other, and also the source of a thing's being moved by another thing or by itself *qua* other. For [20] in virtue of that principle, in virtue of which the patient suffers anything, we call it capable of suffering; and this we do sometimes if it suffers anything at all, sometimes not in respect of everything it suffers, but only if it suffers a change for the better.—(2) The capacity of performing this well or according to choice; for sometimes we say of those who merely can walk or speak but not well or not as they choose, that they *cannot* speak or walk. The case of passivity is similar.—(3) The [25] states in virtue of which things are absolutely impassive or unchangeable, or not easily changed for the worse, are called capacities; for things are broken and crushed and bent and in general destroyed not by having a capacity but by not having one and by lacking something, and things are impassive with respect to such [30] processes if they are scarcely and slightly affected by them, because of a capacity and because they can do something and are in some positive state.

As capacity is used in so many ways, the capable in one sense will mean that which can begin a movement (or a change in general, for even that which can bring things to rest is a capable thing) in another thing or in itself *qua* other; and in one [1019<sup>b</sup>1] sense that over which something else has such a capacity; and in one sense that which has a capacity of changing into something, whether for the worse or for the better (for even that which perishes is thought to be capable of perishing, for it would not have perished if it has not been capable of it; but, as a matter of fact, it [5] has a certain disposition and cause and principle which fits it to suffer this;—sometimes it is thought to be of this sort because it has something, sometimes because it is deprived of something; but if privation is in a sense having, everything will be capable by having something, so that things are capable both by having something, i.e. a principle, and by having the privation of the positive principle, if it [10] is possible to *have* a privation; and if privation is *not* in a sense having, things are called capable homonymously); and a thing is capable in

another sense because neither any other thing, nor itself *qua* other, has a capacity or principle which can destroy it. Again, all these are capable either merely because the thing might chance to happen or not to happen, or because it might do so *well*. This sort of capacity is found also in lifeless things, e.g. in instruments; for we say one lyre can be made to sound, and another cannot be made to sound at all, if it has not a good [15] tone.

Incapacity is privation of capacity—i.e. of such a principle as has been described—either in general or in the case of something that would naturally have the capacity, or even at the time when it would naturally already have it; for the senses in which we should call a boy and a man and a eunuch incapable of begetting are distinct.—Again, to either kind of capacity there is a corresponding incapacity—both [20] to that which only *can* produce movement and to that which can produce it well.

Some things, then, are called incapable in virtue of this kind of incapacity, while others are so in another sense, i.e. possible and impossible. The impossible is that of which the contrary is of necessity true, e.g. that the diagonal of a square is [25] commensurate with the side is impossible, because such a statement is a falsity such that not only is the contrary true but it is *necessary*; that it is commensurate, then, is not only false but of necessity false. The contrary of this, the possible, is found when it is not necessary that the contrary is false, e.g. that a man should be seated is [30] possible; for that he is not seated is not of necessity false.—The possible, then, in one sense, as has been said, means that which is not of necessity false; in another, that which is true; in another, that which is capable of being true.—A ‘capacity’<sup>4</sup> in geometry is so called by extension of meaning.—These senses of ‘possible’ involve no reference to capacity. But the senses which involve a reference to capacity all [1020<sup>a</sup>1] refer to the primary kind of capacity; and this is a source of change in another thing or in the same thing *qua* other. For other things are called ‘capable’, some because something else has such a capacity over them, some because it has not, some because it has it in a particular way. The same is true of the things that are [5] incapable. Therefore the proper definition of the primary kind of capacity will be a source of change in another thing or in the same thing *qua* other.

**13** · We call a quantity that which is divisible into two or more constituent parts of which each is by nature a one and a ‘this’. A quantity is a plurality if it is numerable, a magnitude if it is measurable. We call a

plurality that which is divisible potentially into non-continuous parts, a magnitude that which is divisible [10] into continuous parts; in magnitude, that which is continuous in one dimension is length, in two breadth, in three depth. Of these, limited plurality is number, limited length is a line, breadth a surface, depth a solid.

Again, some things are called quantities in virtue of their own nature, others [15] accidentally, e.g. the line is a quantity by its own nature, the musical is one accidentally. Of the things that are quantities by their own nature some are so as substances, e.g. the line is a quantity (for a certain kind of quantity is present in the formula which states what it is), and others are modifications and states of this kind of substance, e.g. much and little, long and short, broad and narrow, deep and [20] shallow, heavy and light, and the other terms of this sort. And also great and small, and greater and smaller, both in themselves and when taken relatively to each other, are by their own nature attributes of quantity; but these names are transferred to [25] other things also. Of things that are quantities accidentally, some are so called in the sense in which it was said that musical and white were quantities, viz. because that to which they belong is a quantity, and some are quantities in the way in which movement and time are so; for these are called quantities and continuous because the things of which these are attributes are divisible. I mean not that which is [30] moved, but the space through which it is moved; for because that is a quantity movement also is a quantity, and because this is a quantity time is so.

14 · We call a quality (1) the differentia of the substance, e.g. man is an animal of a certain quality because he is two-footed, and the horse is so because it is four-footed; and a circle is a figure of particular quality because it is without angles—which shows that the differentia with reference to substance is a [1020<sup>b</sup>1] quality.—This, then, is one meaning of quality—differentia of substance, but (2) there is another sense in which it applies to the unmovable objects of mathematics; i.e. the numbers have a certain quality, e.g. the composite numbers which are not in one dimension only, but of which the plane and the solid are copies (these are those [5] which have two or three factors); and in general that which exists in the substance of numbers besides quantity is quality; for the substance of each is what it is once, e.g. that of 6 is not what it is twice or thrice, but what it is once; for 6 is once 6.

(3) All the attributes of substances in motion (e.g. heat and cold,

whiteness and blackness, heaviness and lightness, and others of this sort), in virtue of which, [10] when they change, bodies are said to alter. (4) Quality in respect of excellence and badness and, in general, of good and bad.

Quality, then, seems to have practically two meanings, and one of these is the more proper. The primary quality is the differentia of substance, and of this the [15] quality in numbers is a part; for it is a differentia of substances, but either not of things in motion or not of them *qua* in motion. Secondly, there are the modifications of things in motion *qua* in motion, and the differentiae of movements. Excellence and badness fall among these modifications; for they indicate differentiae of the [20] movement or activity, according to which the things in motion act or are acted on well or badly; for that which can be moved or act in one way is good, and that which can do so in another—the contrary—way is vicious. Good and bad indicate quality [25] especially in living things, and among these especially in those which have choice.

**15** · Things are relative (1) as double to half and treble to a third, and in general that which contains something else many times to that which is contained many times in something else, and that which exceeds to that which is exceeded; (2) as that which can heat to that which can be heated, and that which can cut to that [30] which can be cut, and in general the active to the passive; (3) as the measurable to the measure and the knowable to knowledge and the perceptible to perception.

(1) Relative terms of the first kind are numerically related either indefinitely or definitely, either to various numbers or to 1, e.g. the double is in a definite numerical relation to 1, and that which is many times as great is in a numerical, but not in a definite, relation to 1, i.e. not in this or in that relation to it; the relation of [1021<sup>a</sup>1] that which is  $3/2$  of something else to its reciprocal is a definite numerical relation to a number; that which is 1 and a bit times something else is in an indefinite relation to its reciprocal, as that which is many times as great is in an indefinite relation to 1; the relation of that which exceeds to that which is exceeded is numerically quite [5] indefinite; for number is always commensurable, and number is not said of the non-commensurable; but that which exceeds is, in relation to that which is exceeded, so much and something more; and this something is indefinite; for it can, indifferently, be either equal or not equal to that which is exceeded.—All these relations are numerically expressed and are determinations of number,

and so in [10] another way are the equal and the like and the same, for all refer to unity. Those things are the same whose substance is one; those are like whose quality is one; those are equal whose quantity is one; and 1 is the beginning and measure of number, so that all these relations imply number, though not in the same way.

[15] (2) The active and the passive imply an active and a passive capacity and the actualization of the capacities, e.g. that which is capable of heating is related to that which is capable of being heated, because it *can* heat it, and, again, that which is heating is related to that which is being heated and that which is cutting to that which is being cut, because they are actually doing these things. But *numerical* relations are not actualized except in the sense which has been elsewhere stated; [20] actualizations in the sense of movement they have not. Of relations which imply capacity some further imply particular periods of time, e.g. that which has made is relative to that which has been made and that which will make to that which will be made. For it is in this way that a father is called father of *his son*; for the one has acted, and the other has been acted on in a certain way. Further, some relative [25] terms imply *privation* of capacity, i.e. ‘incapable’ and terms of this sort, e.g. ‘invisible’.

Relative terms which imply number or capacity, therefore, are all relative because their very essence includes in its nature a reference to something else, not because something else is related to it; but (3) that which is measurable or knowable or thinkable is called relative because something else is related to it. For the [30] thinkable implies that there is thought of it, but the thought is not relative to that of which it is the thought; for we should then have said the same thing twice. Similarly sight is the sight of something, not of that of which it is the sight (though of course it [1021<sup>b</sup>1] is true to say this); in fact it is relative to colour or to something else of the sort. But according to the other way of speaking the same thing would be said twice—‘it is the sight of that which is the object of sight’.

Things that are by their own nature called relative are called so sometimes in these senses, sometimes because the classes that include them are of this sort, e.g. medicine is thought to be relative because its genus, knowledge, is thought to be [5] relative. Further, there are the properties in virtue of which the things that have them are called relative, e.g. equality is relative because the equal is, and likeness because the like is. Other things are relative by accident, e.g. a man is relative because he happens to be double of something and double is a relative term; or the [10] white is relative, if the same thing happens to be double and white.

16 · We call complete (1) that outside which it is not possible to find even one of the parts proper to it, e.g. the complete time of each thing is that outside which it is not possible to find any time which is a part proper to it.—(2) That which in respect of excellence and goodness cannot be excelled in its kind, e.g. a doctor is [15] complete and a flute-player is complete, when they lack nothing in respect of their proper kind of excellence. And thus we transfer the word to bad things, and speak of a complete scandal-monger and a complete thief; indeed we even call them good, i.e. a good thief and a good scandal-monger. And excellence is a completion; for each [20] thing is complete and every substance is complete, when in respect of its proper kind of excellence it lacks no part of its natural magnitude.—(3) The things which have attained a good end are called complete; for things are complete in virtue of having attained their end. Therefore, since the end is something ultimate, we transfer the [25] word to bad things and say a thing has been completely spoilt, and completely destroyed, when it in no way falls short of destruction and badness, but is at its last point. This is why death is by a figure of speech called the end, because both are last things. The ultimate thing for the sake of which is also an end.—Things, then, that [30] are called complete in virtue of their own nature are so called in all these senses, some because they lack nothing in respect of goodness and cannot be excelled and no part proper to them can be found outside, others in general because they cannot be exceeded in their several classes and no part proper to them is outside; the others are so called in virtue of these first two kinds, because they either make or have [1022<sup>a</sup>1] something of the sort or are adapted to it or in some way or other are referred to the things that are called complete in the primary sense.

17 · We call a limit the last point of each thing, i.e. the first point beyond which it is not possible to find any part, and the first point within which every part [5] is; it is applied to the form, whatever it may be, of a spatial magnitude or of a thing that has magnitude, and to the end of each thing (and of this nature is that towards which the movement and the action are—not that from which they are, though sometimes it is both, that from which and that to which the movement is—and that for the sake of which), and to the substance of each thing, and the essence of each; [10] for this is the limit of knowledge; and if of knowledge, of the thing also. Evidently, therefore, ‘limit’ has as many senses as ‘beginning’, and yet more; for the beginning is a limit, but not every limit is a

beginning.

**18** · ‘That in virtue of which’ has several meanings, (1) the form or [15] substance of each thing, e.g. that in virtue of which a man is good is the good itself, (2) the proximate subject in which an attribute is naturally found, e.g. colour in a surface. ‘That in virtue of which’, then, in the primary sense is the form, and in a secondary sense the matter of each thing and the proximate substratum of each.—In general ‘that in virtue of which’ will be found in the same number of [20] senses as ‘cause’; for we say ‘in virtue of what has he come?’ or ‘for what end has he come?’ and ‘in virtue of what has he inferred wrongly, or inferred at all?’ or ‘what is the cause of the inference, or of the wrong inference?’—Further (3) ‘that in virtue of which’ is used in reference to position, e.g. ‘in which he stands’ or ‘in which he walks’; for all such phrases indicate place and position.

[25] Therefore ‘in virtue of itself’ must have several meanings. It applies to (1) the essence of each thing, e.g. Callias is in virtue of himself Callias and the essence of Callias; (2) whatever is present in the ‘what’, e.g. Callias is in virtue of himself an animal. For ‘animal’ is present in the formula that defines him; Callias is a [30] particular animal.—(3) Whatever attribute a thing receives in itself directly or in one of its parts, e.g. a surface is white in virtue of itself, and a man is alive in virtue of himself; for the soul, in which life directly resides, is a part of the man.—(4) That which has no cause other than itself; man has more than one cause—animal, two-footed—but man is man in virtue of himself.—(5) Whatever attributes belong [35] to a thing alone and *qua* alone; hence also that which exists separately is ‘in virtue of itself’.

[1022<sup>b</sup>1] **19** · We call a disposition the arrangement of that which has parts, in respect either of place or of capacity or of kind; for there must be a certain position, as the word ‘disposition’ shows.

**20** · We call a having (1) a kind of activity of the haver and the had—something [5] like an action or movement. When one thing makes and one is made, between them there is a making; so too between him who has a garment and the garment which he has there is a having. This sort of having, then, evidently we cannot *have*; for the process will go on to infinity, if we can have the having of what [10] we have.—(2) ‘Having’

means a disposition according to which that which is disposed is either well or ill disposed, either in itself or with reference to something else, e.g. health is a having; for it is such a disposition.—(3) We speak of a having if there is a portion of such a disposition; therefore the excellence of the parts is a having.

**21** · We call an affection (1) a quality in respect of which a thing can be [15] altered, e.g. white and black, sweet and bitter, heaviness and lightness, and all others of the kind.—(2) The already actualized alterations.—(3) Especially, injurious alterations and movements, and, above all, painful injuries.—(4) Experiences [20] pleasant or painful when on a large scale are called affections.

**22** · We speak of privation (1) if something has not one of the attributes which a thing might naturally have, even if this thing itself would not naturally have it, e.g. a plant is said to be deprived of eyes.—(2) If, though either the thing itself or its genus would naturally have an attribute, it has it not, e.g. a blind man and a mole [25] are in different senses deprived of sight; the latter in contrast with its genus, the former in contrast with his own normal nature.—(3) If, though it would naturally have the attribute, and when it would naturally have it, it has it not; for blindness is a privation, but one is not blind at any and every age, but only if one has not sight at the age at which one would naturally have it. Similarly a thing suffers privation when it has not an attribute in those circumstances, or in that respect and in that [30] relation and in that sense, in which it would naturally have it.—(4) The violent taking away of anything is called privation.

There are just as many kinds of privations as there are of words with negative prefixes; for a thing is called unequal because it has not equality though it would naturally have it, and invisible either because it has no colour at all or because it has [35] a poor colour, and footless either because it has no feet at all or because it has imperfect feet. Again, a privative term may be used because the thing has little of the attribute (and this means having it in a sense imperfectly), e.g. kernelless; or [1023<sup>a1</sup>] because it has it not easily or not well (e.g. we call a thing indivisible not only if it cannot be divided but also if it cannot be easily or well divided); or because it has not the attribute at all; for it is not the one-eyed man but he who is sightless in both eyes [5] that is called blind. This is why not every man is good or bad, just or unjust, but there is also



an intermediate state.

**23** · ‘To have’ means many things. (1) To treat a thing according to one’s own nature or according to one’s own impulse, so that fever is said to have a man, [10] and tyrants to have their cities, and people to have the clothes they wear.—(2) That in which a thing is present as in something receptive is said to have the thing, e.g. the bronze has the form of the statue, and the body has the disease.—(3) As that which contains has that which is contained; for a thing is said to be had by that in which it is contained, e.g. we say that the vessel has the liquid and the city has men [15] and the ship sailors; and so too that the whole has the parts.—(4) That which hinders a thing from moving or acting according to its own impulse is said to have it, as pillars have the incumbent weights, and as the poets make Atlas have the heavens, implying that otherwise they would collapse on the earth, as some of the [20] natural philosophers also say. In this way that which holds things together is said to have the things it holds together, since they would otherwise separate, each according to its own impulse.

‘Being in something’ has similar and corresponding meanings to ‘having’. [25]

**24** · To come from something means (1) to come from something as from matter, and this in two senses, either in respect of the highest genus or in respect of the lowest species, e.g. in a sense all things that can be melted come from water, but in a sense the statue comes from bronze.—(2) As from the first moving principle, [30] e.g. what does the fight stem from?—from abusive language, because this is the source of the fight.—(3) From the compound of matter and shape, as the parts come from the whole and the verse from the *Iliad* and the stones from the house; for the form is an end, and only that which attains an end is complete.—(4) As the form from its part, e.g. man from two-footed and syllable from letter; for this is a [1023<sup>b</sup>1] different sense to that in which the statue comes from bronze; for the composite substance comes from the sensible matter, but the form also comes from the matter of the form.—These, then, are some of the meanings of ‘from’, but sometimes (5) one of these senses is applicable only to part of a whole, e.g. the child comes from its [5] father and mother and plants come from the earth, because they come from a part of those things.—(6) It means coming after a thing in time, e.g. night comes from day and storm from fine weather, because the one comes

after the other. Of these things some are so described because they admit of change into one another, as in the cases now mentioned; some merely because they are successive in time, e.g. the [10] voyage took place ‘from’ the equinox, because it took place after the equinox, and the Thargelia come ‘from’ the Dionysia, because after the Dionysia.

**25** · We call a part (1) that into which a quantity can in any way be divided; for that which is taken from a quantity *qua* quantity is always called a part of it, e.g. two is called in a sense a part of three.—(2) It means, of the parts in the first sense, [15] only those which measure the whole; this is why two, though in one sense it is, in another is not, a part of three.—(3) The elements into which the kind might be divided apart from the quantity, are also called parts of it; for which reason we say the species are parts of the genus.—(4) The elements into which the whole is [20] divided, or of which it consists—‘the whole’ meaning either the form or that which has the form; e.g. of the bronze sphere or of the bronze cube both the bronze—i.e. the matter in which the form is—and the characteristic angle are parts.—(5) The elements in the formula which explains a thing are parts of the whole; this is why the genus is called a part of the species, though in another sense the species is part of the [25] genus.

**26** · We call a whole (1) that from which is absent none of the parts of which it is said to be naturally a whole, and (2) that which so contains the things it contains that they form a unity; and this in two senses—either as each and all one, or as making up the unity between them. For (a) that which is true of a whole class [30] and is said to hold good as a whole (which implies that it is a kind of whole) is true of a whole in the sense that it contains many things by being predicated of each, and that each and all of them, e.g. man, horse, god, are one, because all are living things. But (b) the continuous and limited is a whole, when there is a unity consisting of several parts present in it, especially if they are present only potentially, but, failing this, even if they are present actually. Of these things themselves, those which are so by nature are wholes in a higher degree than those which are so by art, as we said in [35] the case of unity also, wholeness being in fact a sort of oneness.

Again, as quantities have a beginning and a middle and an end, those to which [1024<sup>a1</sup>] the position does not make a difference are called totals, and those to which it does, wholes, and those which admit of both

descriptions are both wholes and totals. These are the things whose nature remains the same after transposition, but whose form does not, e.g. wax or a coat; they are called both wholes and totals; for they [5] have both characteristics. Water and all liquids and number are called totals, but 'the whole number' or 'the whole water' one does not speak of, except by an extension of meaning. To things, to which *qua* one the term 'total' is applied, the term 'all' is applied when they are treated as separate; 'this total number', 'all these units'. [10]

27 · It is not any chance quantitative thing that can be said to be mutilated; it must be both divisible and a whole. For two is not mutilated if one of the two ones is taken away (for the part removed by mutilation is never equal to the remainder), nor in general is any number thus mutilated; for it is also necessary that the substance remain; if a cup is mutilated, it must still be a cup; but the number is no [15] longer the same. Further, even if things consist of unlike parts, not even these things can all be said to be mutilated, for in a sense a number has unlike parts, e.g. two and three. But in general of the things to which their position makes no difference, e.g. water or fire, none can be mutilated; to be mutilated, things must be such as in virtue of their substance have a certain position. Again, they must be continuous; [20] for a musical scale consists of unlike parts and has position, but cannot become mutilated. Besides, not even the things that are wholes are mutilated by the privation of *any* part. For the parts removed must be neither those which determine the substance nor any chance parts, irrespective of their position; e.g. a cup is not mutilated if it is bored through; but only if the handle or a projecting part is [25] removed. And a man is mutilated not if the flesh or the spleen is removed, but if an extremity is, and that not every extremity but one which when completely removed cannot grow again. Therefore baldness is not a mutilation.

28 · We call something a kind (1) if there is continuous generation of things which have the same form, e.g. 'while mankind lasts' means 'while the generation of [30] them goes on continuously'.—(2) A kind is that which first brought things into existence; for so some are called Hellenes in kind and others Ionians, because the former proceed from Hellen and the latter from Ion as their first begetter. And the word is used in reference to the begetter more than to the matter, though people also [35] get a kind-name from the female, e.g. the descendants of Pyrrha.—

(3) There are kinds in the sense in which plane is the kind of plane figures and solid of solids; for [1024<sup>b</sup>1] each of the figures is in the one case a plane of such and such a kind, and in the other a solid of such and such a kind; and this is what underlies the differentiae. Again, in formulae their first constituent element, which is included in the essence, is the [5] kind, whose differentiae the qualities are said to be.—Kind then is used in all these ways, (1) in reference to continuous generation of the same sort, (2) in reference to the first mover which is of the same sort as the things it moves, (3) as matter; for that to which the differentia or quality belongs is the substratum, which we call matter.

[10] Those things are said to be other in kind whose ultimate substratum is different, and which are not analysed the one into the other nor both into the same thing (e.g. form and matter are different in kind); and things which belong to different categories of being; for some of the things that are said to be signify essence, others a quality, others the other categories we have before distinguished; [15] these also are not analysed either into one another or into some one thing.

29 · We call false (1) that which is false as a *thing*, and that (a) because it is not put together or cannot be put together, e.g. ‘that the diagonal of a square is [20] commensurate with the side’ or ‘that you are sitting’; for one of these is false always, and the other sometimes; it is in these two senses that they are non-existent, (b) There are things which exist, but whose nature it is to appear either not to be such as they are or to be things that do not exist, e.g. a sketch or a dream; for these are something, but are not the things the appearance of which they produce in us. We [25] call things false in this way, then,—either because they themselves do not exist, or because the appearance which results from them is that of something that does not exist.

(2) A false formula is the formula of non-existent objects, in so far as it is false. Hence every formula is false when applied to something other than that of which it is true, e.g. the formula of a circle is false when applied to a triangle. In a sense there is one formula of each thing, i.e. the formula of its essence, but in a sense there are [30] many, since the thing itself and the thing itself modified in a certain way are somehow the same, e.g. Socrates and musical Socrates. The false formula is not the formula of anything, except in a qualified sense. Hence Antisthenes foolishly claimed that nothing could be described except by its own formula,—one formula to one thing; from which it followed that there

could be no contradiction, and almost [35] that there could be no error. But it is possible to describe each thing not only by its own formula, but also by that of something else. This may be done altogether falsely indeed, but in some ways it may be done truly, e.g. eight may be described as a [1025<sup>a</sup>1] double number by the use of the formula of two.

These things, then, are called false in these senses, but (3) a false *man* is one who is ready at and fond of such formulae, not for any other reason but for their own sake, and one who is good at impressing such formulae on other people, just as we [5] say *things* are false, which produce a false appearance. This is why the proof in the *Hippias* that the same man is false and true is misleading. For it assumes that he is false who can deceive (i.e. the man who knows and is wise); and further that he who [10] is *willingly* bad is better. This is a false result of induction; for a man who limps willingly is better than one who does so unwillingly; by 'limping' Plato means 'mimicking a limp', for if the man were actually lame willingly, he would perhaps be worse in this case as in the corresponding case of character.

**30** · We call an accident that which attaches to something and can be truly asserted, but neither of necessity nor usually, e.g. if one in digging a hole for a plant [15] found treasure. This—the finding of treasure—happens by accident to the man who digs the hole; for neither does the one come of necessity from the other or after the other, nor, if a man plants, does he usually find treasure. And a musical man might be white; but since this does not happen of necessity nor usually, we call it an [20] accident. Therefore since there are attributes and they attach to a subject, and some of them attach in a particular place and at a particular time, whatever attaches to a subject, but not because it is this subject, at this time or in this place, will be an accident. Therefore there is no definite cause for an accident, but a chance cause, [25] i.e. an indefinite one. Going to Aegina was an accident, if the man went not in order to get there, but because he was carried out of his way by a storm or captured by pirates. The accident has happened or exists,—not in virtue of itself, however, but of something else; for the *storm* was the cause of his coming to a place for which he was not sailing, and this was Aegina.

'Accident' has also another meaning, i.e. what attaches to each thing in virtue [30] of itself but is not in its substance, as having its angles equal to two right angles attaches to the triangle. And accidents of this sort may be eternal, but no accident of the other sort is. This is explained

elsewhere.

## BOOK VI (E)

1 · We are seeking the principles and the causes of the things that are, and obviously of things *qua* being. For there is a cause of health and of good condition, and the objects of mathematics have principles and elements and causes, and in [5] general every science which is ratiocinative or at all involves reasoning deals with causes and principles, exact or indeterminate; but all these sciences mark off some particular being—some genus, and inquire into this, but not into being simply nor *qua* being, nor do they offer any discussion of the essence of the things of which they [10] treat; but starting from the essence—some making it plain to the senses, others assuming it as a hypothesis—they then demonstrate, more or less cogently, the essential attributes of the genus with which they deal. It is obvious, therefore, from such a review of the sciences, that there is no demonstration of substance or of the essence, but some other way of revealing it. And similarly the sciences omit the [15] question whether the genus with which they deal exists or does not exist, because it belongs to the same line of thought to show what it is and that it is.

And since natural science, like other sciences, confines itself to one class of beings, i.e. to that sort of substance which has the principle of its movement and rest [20] present in itself, evidently it is neither practical nor productive. For the principle of production is in the producer—it is either reason or art or some capacity, while the principle of action is in the doer—viz. choice, for that which is done and that which is chosen are the same. Therefore, if all thought is either practical or productive or [25] theoretical, natural science must be theoretical, but it will theorize about such being as admits of being moved, and only about that kind of substance which in respect of its formula is for the most part not separable from matter. Now, we must not fail to notice the nature of the essence and of its formula, for, without this, inquiry is but [30] idle. Of things defined, i.e. of essences, some are like snub, and some like concave. And these differ because snub is bound up with matter (for what is snub is a concave *nose*), while concavity is independent of perceptible matter. If then all [1026<sup>a</sup>1] natural things are analogous to the snub in their nature—e.g. nose, eye, face, flesh, bone, and, in general, animal; leaf, root, bark, and, in general, plant (for none of these can be defined without reference to movement—they always have matter), it is clear how we must seek and define the essence in the case of natural objects,

and [5] also why it belongs to the student of nature to study soul to some extent, i.e. so much of it as is not independent of matter.—That natural science, then, is theoretical, is plain from these considerations. Mathematics also is theoretical; but whether its objects are immovable and separable from matter, is not at present clear; it is clear, however, that it considers some mathematical objects *qua* immovable and *qua* [10] separable from matter. But if there is something which is eternal and immovable and separable, clearly the knowledge of it belongs to a theoretical science,—not, however, to natural science (for natural science deals with certain movable things) nor to mathematics, but to a science prior to both. For natural science deals with things which are inseparable from matter but not immovable, and some parts of [15] mathematics deal with things which are immovable, but probably not separable, but embodied in matter; while the first science deals with things which are both separable and immovable. Now all causes must be eternal, but especially these; for they are the causes of so much of the divine as appears to us. There must, then, be three theoretical philosophies, mathematics, natural science, and theology, since it [20] is obvious that if the divine is present anywhere, it is present in things of this sort. And the highest science must deal with the highest genus, so that the theoretical sciences are superior to the other sciences, and this to the other theoretical sciences. One might indeed raise the question whether first philosophy is universal, or deals [25] with one genus, i.e. some one kind of being; for not even the mathematical sciences are all alike in this respect—geometry and astronomy deal with a certain particular kind of thing, while universal mathematics applies alike to all. We answer that if there is no substance other than those which are formed by nature, natural science will be the first science; but if there is an immovable substance, the science of this [30] must be prior and must be first philosophy, and universal in this way, because it is first. And it will belong to this to consider being *qua* being—both what it is and the attributes which belong to it *qua* being.

2 · But since the unqualified term ‘being’ has several meanings, of which one [35] was seen to be the accidental, and another the true (non-being being the false), while besides these there are the figures of predication, e.g. the ‘what’, quality, [1026<sup>b</sup>1] quantity, place, time, and any similar meanings which ‘being’ may have; and again besides all these there is that which is potentially or actually:—since ‘being’ has many meanings, we must first say regarding the *accidental*, that there can be no



scientific treatment of it. This is confirmed by the fact that no science—practical, productive, or theoretical—troubles itself about it. For on the one hand he who [5] produces a house does not produce all the attributes that come into being along with the house; for these are innumerable; the house that is made may be pleasant for some people, hurtful to some, and useful to others, and different—to put it shortly—from all things that are; and the science of building does not aim at producing any of these attributes. And in the same way the geometer does not [10] consider the attributes which attach thus to figures, nor whether a triangle is different from a triangle whose angles are equal to two right angles.—And this happens naturally enough; for the accidental is practically a mere name. And therefore Plato was in a sense not wrong in saying that sophistic deals with that which is not. For the arguments of the sophists deal, we may say, above all with the [15] accidental; e.g. the question whether musical and lettered are different or the same, and whether musical Coriscus and Coriscus are the same, and whether everything which is, but is not eternal, has come to be, with the paradoxical conclusion that if one who was musical has come to be lettered, he must also have been lettered and have come to be musical,—and all the other arguments of this sort; the accidental is [20] obviously akin to non-being. And this is clear also from arguments such as the following; of things which are in another sense there is generation and decay, but of things which are accidentally there is not. But still we must, as far as we can, say, regarding the accidental, what is its nature and from what cause it proceeds; for it [25] will perhaps at the same time become clear why there is no science of it.

Since, among things which are, some are always in the same state and are of necessity (nor necessity in the sense of compulsion but that which means the impossibility of being otherwise), and some are not of necessity nor always, but for [30] the most part, this is the principle and this the cause of the existence of the accidental; for that which is neither always nor for the most part, we call accidental. For instance, if in the dog-days there is wintry and cold weather, we say this is an accident, but not if there is sultry heat, because the latter is always or for the most part so, but not the former. And it is an accident that a man is white (for this is [35] neither always nor for the most part so), but it is not by accident that he is an animal. And that the builder produces health is an accident, because it is the nature not of the builder but of the doctor to do this,—but the builder happened to be a [1027<sup>a</sup>1] doctor. Again, a confectioner, aiming at giving pleasure, may make something wholesome, but not in virtue of the confectioner's art; and therefore we say it was an accident,

and while there is a sense in which he makes it, in the full sense he does not make it.—For some accidental results sometimes tend to be produced by alien [5] capacities, but to others there corresponds no determinate art nor capacity; for of things which are or come to be by accident, the cause also is accidental. Therefore, since not all things are or come to be of necessity and always, but the majority of things are for the most part, the accidental must exist; for instance a white man is not always nor for the most part musical, but since this sometimes happens, it must [10] be accidental. If not, everything will be of necessity. The matter, therefore, which is capable of being otherwise than as it for the most part is, is the cause of the [15] accidental. And we must take as our starting-point the question whether everything is either always or for the most part. Surely this is impossible. There is, then, besides these something which is fortuitous and accidental. But while what is for the most part exists, can nothing be said to be always, or are there eternal things? This must [20] be considered later, but that there is no science of the accidental is obvious; for all science is either of that which is always or of that which is for the most part. For how else is one to learn or to teach another? The thing must be determined as occurring either always or for the most part, e.g. that honey-water is useful for a patient in a fever is true for the most part. But one will not be able to state when that [25] which is contrary to this happens, e.g. ‘on the day of new moon’; for then it will be so on the day of new moon either always or for the most part; but the accidental is contrary to this. We have stated, then, what the accidental is and from what cause it arises, and that there is no science which deals with it.

3 · That there are principles and causes which are generable and destructible [30] without ever being in course of being generated or destroyed, is obvious. For otherwise all things will be of necessity, since that which is being generated or destroyed must have a cause which is not accidentally its cause. Will this be or not?—Yes if *this* happens; and if not, not. And this will happen if something else does. And thus if time is constantly subtracted from a limited extent of time, one [1027<sup>b</sup>1] will obviously come to the present. This man, then, will die by violence, *if he* goes out; and he will do this if he is thirsty; and he will be thirsty if something else happens; and thus we shall come to that which is now present, or to some past event. For instance, he will go out if he is thirsty; and he will be thirsty if he is eating [5] something pungent; and this is either the case or not; so that he will of necessity die, or not die. And similarly if one jumps over to the past, the same account will hold good;

for this—I mean the past condition—is already present in something. Everything, therefore, that is to be, will be of necessity, e.g. it is necessary that he who lives shall one day die; for already something has happened—e.g. the presence [10] of contraries in the same body. But whether he dies by disease or by violence, is not yet determined, but depends on the happening of something else. Clearly then the process goes back to a certain starting-point, but this no longer points to something further. This then will be the starting-point for the fortuitous, and will have nothing else as cause of its coming to be. But to what sort of starting-point and what sort of [15] cause we thus refer the fortuitous—whether to matter or to that for the sake of which or to the motive power, must be carefully considered.

4 · Let us dismiss the accidental; for we have sufficiently determined its nature. But since that which *is* in the sense of being true, or *is not* in the sense of being false, depends on combination and separation, and truth and falsehood [20] together are concerned with the apportionment of a contradiction (for truth has the affirmation in the case of what is compounded and the negation in the case of what is divided, while falsity has the contradictory of this apportionment—it is another question, how it happens that we think things together or apart; by ‘together’ and ‘apart’ I mean thinking them so that there is no succession in the thoughts but they become a unity—; for falsity and truth are not in things—it is not as if the good [25] were true, and the bad were in itself false—but in thought; while with regard to simple things and essences falsity and truth do not exist even in thought):—we must consider later what has to be discussed with regard to that which is or is not in this sense; but since the combination and the separation are in thought and not in the [30] things, and that which is in this sense is a different sort of being from the things that are in the full sense (for the thought attaches or removes either the ‘what’ or quality or quantity or one of the other categories), that which *is* accidentally and that which *is* in the sense of being true must be dismissed. For the cause of the former is indeterminate, and that of the latter is some affection of the thought, and both are [1028<sup>a</sup>1] related to the remaining genus of being, and do not indicate any separate class of being. Therefore let these be dismissed, and let us consider the causes and the principles of being itself, *qua* being. [It was clear in our discussion of the various meanings of terms, that ‘being’ has several meanings.]<sup>1</sup> [5]

## BOOK VII (Z)

1 · There are several senses in which a thing may be said to be, as we pointed [10] out previously in our book on the various senses of words; for in one sense it means what a thing is or a 'this', and in another sense it means that a thing is of a certain quality or quantity or has some such predicate asserted of it. While 'being' has all these senses, obviously that which is primarily is the 'what', which indicates the substance of the thing. For when we say of what quality a thing is, we say that it is [15] good or beautiful, but not that it is three cubits long or that it is a man; but when we say *what* it is, we do not say 'white' or 'hot' or 'three cubits long', but 'man' or 'God'. And all other things are said to be because they are, some of them, quantities of that which *is* in this primary sense, others qualities of it, others affections of it, and others some other determination of it. And so one might raise the question whether [20] 'to walk' and 'to be healthy' and 'to sit' signify in each case something that is, and similarly in any other case of this sort; for none of them is either self-subsistent or capable of being separated from substance, but rather, if anything, it is that which walks or is seated or is healthy that is an existent thing. Now these are seen to be [25] more real because there is something definite which underlies them; and this is the substance or individual, which is implied in such a predicate; for 'good' or 'sitting' are not used without this. Clearly then it is in virtue of this category that each of the others *is*. Therefore that which is primarily and *is* simply (not *is* something) must be [30] substance.

Now there are several senses in which a thing is said to be primary; but substance is primary in every sense—in formula, in order of knowledge, in time. For [35] of the other categories none can exist independently, but only substance. And in formula also this is primary; for in the formula of each term the formula of its [1028<sup>b</sup>1] substance must be present. And we think we know each thing most fully, when we know what it is, e.g. what man is or what fire is, rather than when we know its quality, its quantity, or where it is; since we know each of these things also, only when we know *what* the quantity or the quality *is*.

And indeed the question which, both now and of old, has always been raised, and always been the subject of doubt, viz. what being is, is just the question, what is [5] substance? For it is this that some assert to be one, others more than one, and that some assert to be limited in number, others unlimited. And so we also must consider chiefly and primarily and

almost exclusively what that is which is in this sense.

2 · Substance is thought to belong most obviously to bodies; and so we say [10] that both animals and plants and their parts are substances, and so are natural bodies such as fire and water and earth and everything of the sort, and all things that are parts of these or composed of these (either of parts or of the whole bodies), e.g. the heaven and its parts, stars and moon and sun. But whether these alone are substances, or there are also others, or only some of these, or some of these and some [15] other things are substances, or none of these but only some other things, must be considered. Some think the limits of body, i.e. surface, line, point, and unit, are substances, and more so than body or the solid. Further, some do not think there is anything substantial besides sensible things, but others think there are eternal substances which are more in number and more real, e.g. Plato posited two kinds of [20] substance—the Forms and the objects of mathematics—as well as a third kind, viz. the substance of sensible bodies. And Speusippus made still more kinds of substance, beginning with the One, and making principles for each kind of substance, one for numbers, another for spatial magnitudes, and then another for the soul; and in this way he multiplies the kinds of substance. And some say Forms [25] and numbers have the same nature, and other things come after them, e.g. lines and planes, until we come to the substance of the heavens and to sensible bodies.

Regarding these matters, then, we must inquire which of the common statements are right and which are not right, and what things are substances, and whether there are or are not any besides sensible substances, and how sensible [30] substances exist, and whether there is a separable substance (and if so why and how) or there is no substance separable from sensible substances; and we must first sketch the nature of substance.

3 · The word ‘substance’ is applied, if not in more senses, still at least to four main objects; for both the essence and the universal and the genus are thought to be [35] the substance of each thing, and fourthly the substratum. Now the substratum is that of which other things are predicated, while it is itself not predicated of anything else. And so we must first determine the nature of this; for that which underlies a [1029<sup>a</sup>1] thing primarily is thought to be in the truest sense its substance. And in one sense matter is said to be of the nature of substratum, in

another, shape, and in a third sense, the compound of these. By the matter I mean, for instance, the bronze, by the shape the plan of its form, and by the compound of these (the concrete thing) the [5] statue. Therefore if the form is prior to the matter and more real, it will be prior to the compound also for the same reason.

We have now outlined the nature of substance, showing that it is that which is not predicated of a subject, but of which all else is predicated. But we must not merely state the matter thus; for this is not enough. The statement itself is obscure, and further, on this view, *matter* becomes substance. For if this is not substance, it is [10] beyond us to say what else is. When all else is taken away evidently nothing but matter remains. For of the other elements some are affections, products, and capacities of bodies, while length, breadth, and depth are quantities and not substances. For a quantity is not a substance; but the substance is rather that to [15] which these belong primarily. But when length and breadth and depth are taken away we see nothing left except that which is bounded by these, whatever it be; so that to those who consider the question thus matter alone must seem to be substance. By matter I mean that which in itself is neither a particular thing nor of a [20] certain quantity nor assigned to any other of the categories by which being is determined. For there is something of which each of these is predicated, so that its being is different from that of each of the predicates; for the predicates other than substance are predicated of substance, while substance is predicated of matter. Therefore the ultimate substratum is of itself neither a particular thing nor of a particular quantity nor otherwise positively characterized; nor yet negatively, for [25] negations also will belong to it only by accident.

For those who adopt this point of view, then, it follows that matter is substance. But this is impossible; for both separability and individuality are thought to belong chiefly to substance. And so form and the compound of form and matter would be thought to be substance, rather than matter. The substance compounded of both, [30] i.e. of matter and shape, may be dismissed; for it is posterior and its nature is obvious. And matter also is in a sense manifest. But we must inquire into the third kind of substance; for this is the most difficult.

It is agreed that there are some substances among sensible things, so that we must look first among these. For it is in an advantage to advance to that which is [1029b1] more intelligible. For learning proceeds for all in this way—through that which is less intelligible by nature to that which is more intelligible; and just as in conduct [5] our work is to start

from what is good for each and make what is good in itself good for each, so it is our work to start from what is more intelligible to oneself and make what is intelligible by nature intelligible to oneself. Now what is intelligible and primary for particular sets of people is often intelligible to a very small extent, and has little or nothing of reality. But yet one must start from that which is barely [10] intelligible but intelligible to oneself, and try to understand what is intelligible in itself, passing, as has been said, by way of those very things which one understands.

4 · Since at the start we distinguished the various marks by which we determine substance, and one of these was thought to be the essence, we must investigate this. And first let us say something about it in the abstract. The essence of each thing is what it is said to be in virtue of itself. For being you is not being [15] musical; for you are not musical in virtue of yourself. What, then, you are in virtue of yourself is your essence.

But not the whole of this is the essence of a thing; not that which something is in virtue of itself in the way in which a surface is white, because being a surface is not being white. But again the combination of both—being a white surface—is not the essence of surface. Why? Because ‘surface’ itself is repeated. The formula, therefore, in which the term itself is not present but its meaning is expressed, this is [20] the formula of the essence of each thing. Therefore if to be a white surface is to be a smooth surface, to be white and to be smooth are one and the same.

But since there are compounds of substance with the other categories (for there is a substrate for each category, e.g. for quality, quantity, time, place, and [25] motion), we must inquire whether there is a formula of the essence of each of them, i.e. whether to these compounds also there belongs an essence, e.g. to white man. Let the compound be denoted by ‘cloak’. What is being a cloak? But, it may be said, this also is not said of something in its own right. We reply that there are two ways in which a predicate may fail to be true of a subject in its own right, and one of these [30] results from addition, and the other not. *One* kind of predicate is not said of a thing in its own right because the term that is being defined is added to something else, e.g. if in defining the essence of white one were to state the formula of white *man*; *another* because something else is added to it, e.g. if ‘cloak’ meant white man, and [1030<sup>a</sup>1] one were to define cloak as white; white man is white indeed, but its essence is not to be white. But is being a cloak an essence at all? Probably not. For the

essence is what something is; but when one thing is said of another, that is not what a 'this' is, [5] e.g. white man is not what a 'this' is since being a 'this' belongs only to substances. Therefore there is an essence only of those things whose formula is a definition. But we have a definition not where we have a word and a formula identical in meaning (for in that case all formulae would be definitions; for there will be some name for formula whatever, so that even the *Iliad* would be a definition), but where there is a [10] formula of something primary; and primary things are those which do not involve one thing's being said of another. Nothing, then, which is not a species of a genus will have an *essence*—only species will have it, for in these the subject is not thought to participate in the attribute and to have it as an affection, nor to have it by [15] accident; but for everything else as well, if it has a name, there will be a formula of its meaning—viz. that this attribute belongs to this subject; or instead of a simple formula we shall be able to give a more accurate one; but there will be no definition nor essence.

But after all, 'definition', like 'what a thing is', has several meanings; 'what a thing is' in one sense means substance and a 'this', in another one or other of the [20] predicates, quantity, quality, and the like. For as 'is' is predicable of all things, not however in the same sense, but of one sort of thing primarily and of others in a secondary way, so too the 'what' belongs simply to substance, but in a limited sense to the other categories. For even of a quality we might ask what it is, so that a [25] quality also is a 'what'—not simply, however, but just as, in the case of that which is not, some say, in the abstract, that that which is not *is*—not *is* simply, but *is* non-existent. So too with a quality.

Now we must inquire how we should express ourselves on each point, but still more how the facts actually stand. And so now also since it is evident what language we use, essence will belong, just as the 'what' does, primarily and in the simple sense to substance, and in a secondary way to the other categories also,—not essence [30] simply, but the essence of a quality or of a quantity. For it must be either homonymously that we say these *are*, or by making qualifications and abstractions (in the way in which that which is not known may be said to be known),—the truth being that we use the word neither homonymously nor in the same sense, but just as we apply the word 'medical' when there is a *reference* to one and the same thing, not *meaning* one and the same thing, nor yet speaking homonymously; for a patient and [1030<sup>b</sup>1] an operation and an instrument are called medical neither homonymously nor in virtue of one thing, but with reference to one thing. But it does not matter in which of



the two ways one likes to describe the facts; this is evident, that definition and essence in the primary and simple sense belong to substances. Still they belong to [5] other things as well in a similar way, but not primarily. For if we suppose this it does not follow that there is a definition of every word which means the same as any formula; it must mean the same as a particular kind of formula; and this condition is satisfied if it is a formula of something which is one, not by continuity like the *Iliad* or the things that are one by being bound together, but in one of the main senses of [10] 'one', which answer to the senses of 'is'; now 'that which is' in one sense denotes an individual, in another a quantity, in another a quality. And so there can be a formula or definition of white man, but not in the sense in which there is a definition either of white or of a substance.

5 · It is a difficult question, if one denies that a formula with an addition is a definition, whether any of the things that are not simple but coupled will be [15] is definable. For we *must* explain them by an addition. E.g. there is the nose, and concavity, and snubness, which is compounded out of the two by the presence of the one in the other, and it is not by accident that the nose has the attribute either of concavity or of snubness, but in virtue of its nature; nor do they attach to it as whiteness does to Callias, or to man (because Callias, who happens to be a man, is [20] white), but rather as 'male' attaches to animal and 'equal' to quantity, and as everything else which is said of something in its own right. And such attributes are those in which is involved either the *formula* or the *name* of the subject of the particular attribute, and which cannot be explained without this; e.g. white can be explained apart from man, but not female apart from animal. Therefore there is [25] either no essence and definition of any of these things, or if there is, it is in another sense, as we have said.

But there is also a second difficulty about them. For if snub nose and concave nose are the same thing, snub and concave will be the same thing; but if snub and concave are not the same (because it is impossible to speak of snubness apart from [30] the thing of which, in its own right, it is an attribute, for snubness is concavity *in the nose*), either it is impossible properly to say 'snub nose' or the same thing will have been said twice, concave nose nose; for snub nose will be concave nose nose. And so it is absurd that such things should have an essence; if they have, there will be an infinite regress; for in snub nose yet another nose will be

involved.

[1031<sup>a</sup>1] Clearly then only substance is definable. For if the other categories also are definable, it must be by addition, e.g. [the qualitative is defined thus, and so is]<sup>1</sup> the odd, for it cannot be defined apart from number; nor can female be defined apart from animal. (When I say 'by addition' I mean the expressions in which we have to [5] say the same thing twice, as in these instances.) And if this is true, coupled terms also, like 'odd number', will not be definable (but this escapes our notice because our formulae are not accurate). But if these also are definable, either it is in some other way or, as we said, definition and essence must be said to have more than one [10] sense. Therefore in one sense nothing will have a definition and nothing will have an essence, except substances, but in another sense other things will have them. Clearly, then, definition is the formula of the essence, and essence must belong to substances either alone or chiefly and primarily and in the unqualified sense.

[15] **6** · We must inquire whether each thing and its essence are the same or different. This is of some use for the inquiry concerning substance; for each thing is thought to be not different from its substance, and the essence is said to be the substance of each thing.

Now in the case of things with accidental attributes the two would be generally [20] thought to be different, e.g. white man would be thought to be different from the essence of white man. For if they are the same, the essence of man and that of white man are also the same; for a man and a white man are the same, as people say, so [25] that the essence of white man and that of man would be also the same. But probably it is not necessary that things with accidental attributes should be the same. For the extreme terms are not in the same way the same.—Perhaps *this* might be thought to follow, that the extreme terms, the accidents, should turn out to be the same, e.g. the essence of white and that of musical; but this is not actually thought to be the case.

But in the case of so-called self-subsistent things, is a thing necessarily the same as its essence? E.g. if there are some substances which have no other [30] substances nor entities prior to them—substances such as some assert the Ideas to be? If the essence of good is to be different from the Idea of good, and the essence of animal from the Idea of animal, and the essence of being from the Idea of being, [1031<sup>b</sup>1] there will, firstly, be other substances and entities and Ideas besides those which are asserted,

and, secondly, these others will be prior substances if the essence is substance. And if the posterior substances are severed from one another, there will be no knowledge of the ones and the others will have no being. (By 'severed' I mean, [5] if the Idea of good has not the essence of good, and the latter has not the property of being good.) For there is knowledge of each thing only when we know its essence. And the case is the same for other things as for the good; so that if the essence of good is not good, neither will the essence of being be, nor the essence of unity be one. And all essences alike exist or none of them does; so that if the essence of being is [10] not, neither will any of the others be. Again, that which has not the property of being good is not good. The good, then, must be one with the essence of good, and the beautiful with the essence of beauty, and so with all things which do not depend on something else but are self-subsistent and primary. For it is enough if they are this, even if there are no Forms; and perhaps all the more if there are Forms.—At [15] the same time it is clear that if there are Ideas such as some people say there are, the substratum of them will not be substance; for these must be substances, and not predicable of a substratum; for if they were they would exist only by being participated in.—Each thing then and its essence are one and the same in no merely accidental way, as is evident both from the preceding arguments and because to *know* each thing, at least, is to know its essence, so that even by the exhibition of [20] instances it becomes clear that both must be one.

(But of an accidental term, e.g. 'the musical' or 'the white', since it has two meanings, it is not true to say that it itself is identical with its essence; for both that to which the accidental quality belongs, and the accidental quality, are white, so [25] that in a sense the accident and its essence are the same, and in a sense they are not; for the essence of white is not the same as the man or the white man, but it is the same as the attribute white.)

The absurdity of the separation would appear also if one were to assign a name to each of the essences; for there would be another essence besides the original one, e.g. to the essence of horse there will belong a second essence. Yet why should not [30] some things be their essences from the start, since essence is substance? But not only are a thing and its essence one, but the formula of them is also the same, as is [1032<sup>a</sup>1] clear even from what has been said; for it is not by accident that the essence of one, and the one, are one. Further, if they were different, the process would go on to infinity; for we should have the essence of one, and the one, so that in their case also the same infinite regress would be found.

Clearly, then, each primary and self-subsistent thing is one and the same as its essence. [5]

Now the sophistical objections to this position, and the question whether Socrates and to be Socrates are the same thing, are obviously answered in the same way; for there is no difference either in the standpoint from which the question would be asked, or in that from which one could answer it successfully. We have explained, then, in what sense each thing is the same as its essence and in what sense [10] it is not.

7 · Of things that come to be some come to be by nature, some by art, some spontaneously. Now everything that comes to be comes to be by the agency of something and from something and comes to be something. And the something which I say it comes to be may be found in any category; it may come to be either a 'this' or of some quantity or of some quality or somewhere. [15]

Now natural comings to be are the comings to be of those things which come to be by nature; and that out of which they come to be is what we call matter; and that by which they come to be is something which exists naturally; and the something which they come to be is a man or a plant or one of the things of this kind, which we [20] say are substances if anything is. All things that come to be either by nature or by art have matter; for each of them is capable both of being and of not being, and this capacity is the matter in each. And, in general, both that from which they are produced is nature, and the type according to which they are produced is nature (for that which is produced, e.g. a plant or an animal, has a nature), and so is that by which they are produced—the so-called 'formal' nature, which is specifically the same as the nature of the thing produced (though it is in another individual); for [25] man begets man.

Thus, then, are natural products produced; all other productions are called 'makings'. And all makings proceed either from art or from a capacity or from [30] thought. Some of them happen also spontaneously or by chance just as natural products sometimes do; for there also the same things sometimes are produced without seed as well as from seed. Concerning these cases, then, we must inquire [1032<sup>b</sup>1] later, but from art proceed the things of which the form is in the soul. (By form I mean the essence of each thing and its primary substance.) For even contraries have in a sense the same form; for the substance of a privation is the

opposite substance, e.g. health is the substance of disease; for it is by its absence that disease exists; and [5] health is the formula and the knowledge in the soul. The healthy subject, then, is produced as the result of the following train of thought; since *this* is health, if the subject is to be healthy *this* must first be present, e.g. a uniform state of body, and if this is to be present, there must be heat; and the physician goes on thinking thus until he brings the matter to a final step which he himself can take. Then the process [10] from this point onward, i.e. the process towards health, is called a 'making'. Therefore it follows that in a sense health comes from health and house from house, that with matter from that without matter; for the medical art and the building art are the form of health and of the house; and I call the essence substance without [15] matter. Of productions and movements one part is called thinking and the other making,—that which proceeds from the starting-point and the form is thinking, and that which proceeds from the final step of the thinking is making. And each of the intermediate steps is taken in the same way. I mean, for instance, if the subject is to be healthy his bodily state must be made uniform. What then does being made [20] uniform imply? This or that. And this depends on his being made warm. What does this imply? Something else. And this something is present potentially; and what is present potentially is already in the physician's power.

The active principle then and the starting-point for the process of becoming healthy is, if it happens by art, the form in the soul, and if spontaneously, it is that, whatever it is, which is the starting-point of his making for the man who makes by [25] art, as in healing the starting-point is perhaps the production of warmth, and this the physician produces by rubbing. Warmth in the body, then, is either a part of health or is followed (either directly or through several intermediate steps) by something which is a part of health; and this, viz. that which produces the part, is the last step, and so are, e.g., the stones a part of the house, and so in all other cases.

Therefore, as we say, it is impossible that anything should be produced if there [30] were nothing before. Obviously then some part of the result will pre-exist of necessity; for the matter is a part; for this is present in the process and it is this that becomes something. But do some also of the elements in the *formula* pre-exist? [1033<sup>a</sup>1] Well, we describe in both ways what bronze circles are; we describe both the matter by saying it is bronze, and the form by saying that it is such and such a figure; and figure is the proximate genus in which it is placed. The bronze circle, then, has its matter *in its formula*. [5]

And as for that out of which as matter they are produced, some things are said, when they have been produced, to be not it but of it, e.g. the statue is not stone but of stone. But though what becomes healthy is a man, a man is not what the healthy product is said to come from. The reason is that though a thing comes both from its privation and from its substratum, which we call its matter (e.g. what becomes healthy is both a man and an invalid), it is said to come rather from its privation [10] (e.g. it is from an invalid rather than from a man that a healthy subject is produced). And so the healthy subject is not said to *be* an invalid, but to be a man, and a healthy man. But as for the things whose privation is obscure and nameless, e.g. in bronze the privation of a particular shape or in bricks and timber the [15] privation of arrangement as a house, the thing is thought to be produced *from* these materials, as in the former case the healthy man is produced *from* an invalid. And so, as there also a thing is not said to be that from which it comes, here the statue is not said to be wood but is said by a verbal change to be not wood but wooden, not bronze but of bronze, not stone but of stone, and the house is said to be not bricks but of bricks (since we should not say without qualification, if we looked at things carefully, even that a statue is produced from wood or a house from bricks, because [20] its coming to be implies change in that from which it comes, and not permanence). For this reason, then, we use this way of speaking.

8 · Since anything which is produced is produced by something (and this I call the starting-point of the production), and from something (and let this be taken [25] to be not the privation but the matter; for the meanings we attach to these have already been distinguished), and since something is produced (and this is either a sphere or a circle or whatever else it may chance to be), just as we do not make the substratum—the bronze, so we do not make the sphere, except incidentally, because the bronze sphere is a sphere and we make the former. For to make a ‘this’ is to [30] make a ‘this’ out of the general substratum. I mean that to make the bronze round is not to make the round or the sphere, but something else, i.e. to produce this form in something else. For if we make the form, we must make it out of something else; for [1033<sup>b</sup>1] this was assumed. E.g. we make a bronze sphere; and that in the sense that out of this, which is bronze, we make this other, which is a sphere. If, then, we make the sphere itself, clearly we must make it in the same way, and the processes of making will regress to infinity. Obviously then the form also, or whatever we ought to call [5] the shape of the sensible thing, is not

produced, nor does production relate to it,—i.e. the essence is not produced; for this is that which is made to be in something else by art or by nature or by some capacity. But that there is a *bronze sphere*, this we make. For we make it out of bronze and the sphere; we bring the form into this [10] particular matter, and the result is a bronze sphere. But if the essence of sphere in general is produced, something must be produced out of something. For the product will always have to be divisible, and one part must be this and another that, I mean the one must be matter and the other form. If then a sphere is the figure whose circumference is at all points equidistant from the centre, part of this will be the [15] medium in which the thing made will be, and part will be in that medium, and the whole will be the thing produced, which corresponds to the bronze sphere. It is obvious then from what has been said that the thing, in the sense of form or substance, is not produced, but the concrete thing which gets its name from this is produced, and that in everything which comes to be matter is present, and one part of the thing is matter and the other form.

[20] Is there then a sphere apart from the individual spheres or a house apart from the bricks? Rather we may say that no ‘this’ would ever have been coming to be, if this had been so. The ‘form’ however means the ‘such’, and is not a ‘this’—a definite thing; but the artist makes, or the father generates, a ‘such’ out of a ‘this’; and when it has been generated, it is a ‘this such’. And the whole ‘this’, Callias or Socrates, is [25] analogous to this bronze sphere, but man and animal to bronze sphere in general. Obviously then the cause which consists of the Forms (taken in the sense in which some maintain the existence of the Forms, i.e. if they are something apart from the individuals) is useless with regard both to comings-to-be and to substances; and the Forms need not, for this reason at least, be self-subsistent substances. In some cases [30] it is even obvious that the producer is of the same kind as the produced (not, however, the same nor one in number, but in form), e.g. in the case of natural products (for man produces man), unless something happens contrary to nature, e.g. the production of a mule by a horse. And even these cases are similar; for that which would be found to be common to horse and ass, the genus next above them, [1034<sup>a</sup>1] has not received a name, but it would doubtless be both, as the mule is both. Obviously, therefore, it is quite unnecessary to set up a Form as a pattern (for we should have looked for Forms in these cases if any; for these are substances if anything is so); the begetter is adequate to the making of the product and to the [5] causing of the form in the matter. And when we

have the whole, such and such a form in this flesh and in these bones, this is Callias or Socrates; and they are different in virtue of their matter (for that is different), but the same in form; for their form is indivisible.

9 · The question might be raised, why some things are produced spontaneously [10] as well as by art, e.g. health, while others are not, e.g. a house. The reason is that in some cases the matter which determines the production in the making and producing of any work of art, and in which a part of the product is present, is such as to be set in motion by itself and in some cases is not of this nature, and of the former kind some can move itself in the particular way required, while other matter is incapable of this; for many things can be set in motion by themselves but not in [15] some particular way, e.g. that of dancing. The things then whose matter is of this sort, e.g. stones, cannot be moved in the particular way required, except by something else, but in another way they can move themselves; and so it is with fire. Therefore some things cannot exist apart from some one who has the art of making them, while others can exist without such a person; for motion can be started by these things which have not the art but can move of themselves, i.e. either by *other* [20] things which have not the art or by a part of the product itself.

And it is clear also from what has been said that in a sense everything is produced from another individual which shares its name (natural products are so produced), or a part of itself which shares its name (e.g. the house produced by reason is produced from a house; for the art of building is the form of the house), or something which contains a part of it,—if we exclude things produced by accident. [25] For what directly and of itself causes the production is a part of the product. The heat in the movement causes heat in the body, and this is either health, or a part of health, or is followed by a part of health or by health itself. And so it is said to cause health, because it produces that on which health follows. [30]

Therefore substance is the starting-point of all production, as of deduction. It is from the 'what' that deductions start; and from it also we now find processes of production to start. And things which are formed by nature are in the same case as these products of art. For the seed produces them as the artist produces the works of art; for it has the form potentially, and that from which the seed comes has *in a* [1034<sup>b</sup>1] sense the same name as the offspring; only in a sense, for we must not expect *all* cases to have exactly the same name, as in the production of human



being from human being (for a woman also can be produced by a man—unless there is a deformity: that is why it is not from a mule that a mule is produced). The natural things which (like some artificial objects) can be produced spontaneously are those whose matter can be moved even by itself in the way in which the seed [5] usually moves it; but those things which have not such matter cannot be produced except by parents.

But not only regarding substance does our argument prove that its form does not come to be, but the argument applies to all the primary classes alike, i.e. quantity, quality, and the other categories. For as the bronze sphere comes to be, [10] but not the sphere nor the bronze, and so too in the case of bronze itself, if it comes to be, (for the matter and the form must always exist before), so is it as regards both ‘what’ and quality and quantity and the other categories likewise; for the quality does not come to be, but the wood of that quality, and the quantity does not come to [15] be, but the wood or the animal of that size. But we may learn from these instances a peculiarity of substance, that there must exist beforehand another actual substance which produces it, e.g. an animal if an animal is produced; but it is not necessary that a quality or quantity should pre-exist otherwise than potentially.

10 · Since a definition is a formula, and every formula has parts, and as the [20] formula is to the thing, so is the part of the formula to the part of the thing, we are already faced by the question whether the formula of the parts must be present in the formula of the whole or not. For in some cases the formulae of the parts are seen [25] to be present, and in some not. The formula of the circle does not include that of the segments, but that of the syllable includes that of the letters; yet the circle is divided into segments as the syllable is into letters.—And further if the parts are prior to the whole, and the acute angle is a part of the right angle and the finger a part of the [30] animal, the acute angle will be prior to the right angle and the finger to the man. But the latter are thought to be prior; for in formula the parts are explained by reference to them, and in virtue also of their power of existing apart from the parts the wholes are prior.

Perhaps we should rather say that ‘part’ is used in several senses. One of these is ‘that which measures another thing in respect of quantity’. But let this sense be set aside; let us inquire about the parts of which *substance* consists. If then matter is [1035<sup>a</sup>1] one thing, form another, the compound of these a third, and both the matter and the form and the

compound are substance, even the matter is in a sense called part of a thing, while in a sense *it* is not, but only the elements of which the formula of the [5] form consists. E.g. flesh (for this is the matter in which it is produced) is not a part of concavity, but of snubness it is a part; and the bronze is a part of the particular statue, but not of the statue as form. (For each thing must be referred to by naming its form, and as having form, but never by naming its material aspect as such.) And so the formula of the circle does not include that of the segments, but the formula of [10] the syllable includes that of the letters; for the letters are parts of the formula of the form, and not matter, but the segments are parts, in the sense of matter, on which the form supervenes; yet they are nearer the form than the bronze is when roundness is produced in bronze. But in a sense not even every kind of letter will be [15] present in the formula of the syllable, e.g. particular waxen letters or the letters as sounds in the air; for these also are part of the syllable only in the sense that they are its perceptible matter. For even if the line when divided passes away into its halves, or the man into bones and muscles and flesh, it does not follow that they are [20] composed of these as parts of their substance, but rather as matter; and these are parts of the concrete thing, but not of the form, i.e. of that to which the formula refers; and therefore they will not be in the formulae either. Therefore of some things the formula of such parts will be present, but in others it must not be present, where the formula does not refer to the concrete object. For it is for this reason that [25] some things have as their constituent principles parts into which they pass away, while some have not. Those things in which the form and the matter are taken together, e.g. the snub, or the bronze circle, pass away into these material parts, and the matter is a part of them; but those things which do not involve matter but are without matter, and whose formulae are formulae of the form only, do not pass [30] away,—either not at all or at any rate not in this way. Therefore these materials are principles and parts of the concrete things, while of the form they are neither parts nor principles. And therefore the clay statue is resolved into clay and the ball into bronze and Callias into flesh and bones, and again the circle into its segments; for there is a sense of ‘circle’ in which it involves matter. For ‘circle’ is used [1035<sup>b</sup>1] homonymously, meaning both the circle in general and the individual circle, because there is no name proper to the individuals.

The truth has really now been stated, but still let us state it yet more clearly, taking up the question again. The parts of the formula, into which the formula is [5] divided, are prior to it, either all or some of them. The

formula of the right angle, however, does not include the formula of the acute, but the formula of the acute includes that of the right angle; for he who defines the acute uses the right angle; for the acute is less than a right angle. The circle and the semicircle also are in a like relation; for the semicircle is defined by the circle; and so is the finger by the whole [10] body, for a finger is such and such a part of a man. Therefore the parts which are of the nature of matter and into which as its matter a thing is divided, are posterior; but those which are parts of the formula, and of the substance according to its formula, are prior, either all or some of them. And since the soul of animals (for this is the substance of living beings) is their substance according to the formula, i.e. the [15] form and the essence of a body of a certain kind (at least we shall define each part, if we define it well, not without reference to its function, and this cannot belong to it without perception), therefore the parts of soul are prior, either all or some of them, to the concrete animal, and similarly in each case of a concrete whole; and the body and its parts are posterior to this its substance, and it is not the substance but the [20] concrete thing that is divided into these parts as its matter. To the concrete thing these are in a sense prior, but in a sense they are not. For they cannot even exist if severed from the whole; for it is not a finger in *any* state that is the finger of a living thing, but the dead finger is a finger only homonymously. Some parts are neither [25] prior nor posterior to the whole, i.e. those which are most important and in which the formula, i.e. the substance, is immediately present, e.g. perhaps the heart or the brain; for it does not matter which of the two has this quality. But man and horse and terms which are thus applied to individuals, but universally, are not substance but something composed of this particular formula and this particular matter treated as universal; but when we come to the individual, Socrates is composed of [30] ultimate individual matter; and similarly in all other cases.

A part may be a part either of the form (i.e. the essence), or of the compound of the form and the matter, or of the matter itself. But only the parts of the form are parts of the formula, and the formula is of the universal; for being a circle is the same as the circle, and being a soul is the same as the soul. But when we come to the [1036\*1] concrete thing, e.g. *this* circle, i.e. one of the individual circles, whether sensible or intelligible (I mean by intelligible circles the mathematical, and by sensible circles those of bronze and of wood), of these there is no definition, but they are known by [5] the aid of thought or perception; and when they go out of our actual consciousness it is not clear whether

they exist or not; but they are always stated and cognized by means of the universal formula. But matter is unknowable in itself. And some matter is sensible and some intelligible, sensible matter being for instance bronze and wood and all matter that is changeable, and intelligible matter being that which [10] is present in sensible things not *qua* sensible, i.e. in the objects of mathematics. We have stated, then, how whole and part, and prior and posterior, are related.

When any one asks whether the right angle and the circle and the animal are prior to that into which they are divided and of which they consist, i.e. the parts, we [15] must meet the inquiry by saying that the question cannot be answered simply. For if the soul is the animal or the living thing, or the soul of each individual is the individual itself, and being a circle is the circle, and being a right angle and the essence of the right angle is the right angle, then the whole in one sense must be called posterior to the part in one sense, i.e. to the parts included in the formula and [20] to the parts of the individual right angle (for both the material right angle which is made of bronze, and that which is formed by individual lines, are posterior to their parts); while the immaterial right angle is posterior to the parts included in the formula, but prior to those included in the particular instance. But the question must not be answered simply. If, however, the soul is something different and is not identical with the animal, even so some parts must be called prior and others must [25] not, as has been said.

**11** · The question is naturally raised, what sort of parts belong to the form and what sort not to the form, but to the concrete thing. Yet if this is not plain it is not possible to define anything; for definition is of the universal and of the form. If then it is not evident which of the parts are of the nature of matter and which are [30] not, neither will the formula of the thing be evident. In the case of things which are found to occur in specifically different materials, as a circle may exist in bronze or stone or wood, it seems plain that these, the bronze or the stone, are no part of the essence of the circle, since it is found apart from them. Of things which are *not* seen to exist apart, there is no reason why the same may not be true, e.g. even if all circles [1036<sup>b</sup>1] that had ever been seen were of bronze (for none the less the bronze would be no part of the form); but it is hard to effect this severance in thought. E.g. the form of man is always found in flesh and bones and parts of this kind; are these then also [5] parts of the form and the formula? No, they are matter; but because man

is not found also in other matters we are unable to effect the severance.

Since this is thought to be possible, but it is not clear *when* it is the case, some are in doubt even in the case of the circle and the triangle, thinking that it is not [10] right to define these by lines and by continuous space, but that all these are to the circle or the triangle as flesh or bones are to man, and bronze or stone to the statue; and they bring all things to numbers, and they say the formula of line is that of two. And of those who assert the Ideas some make two the line itself, and others make it [15] the form of the line; for in some cases they say the Form and that of which it is the Form are the same, e.g. two and the Form of two; but in the case of line they say this is no longer so.

It follows then that there is one Form for many things whose Form is evidently different (a conclusion which confronted the Pythagoreans also); and that it is possible to make one thing the very Form of all, and to hold that the others are not [20] Forms; but thus all things will be one.

Now we have stated that the question of definitions contains some difficulty, and why this is so. Therefore to bring all things thus to Forms and to eliminate the matter is useless labour; for some things surely are a particular form in a particular matter, or particular things in a particular state. And the comparison which [25] Socrates the younger used to make in the case of animal is not good; for it leads away from the truth, and makes one suppose that man can possibly exist without his parts, as the circle can without the bronze. But the case is not similar; for an animal is something perceptible, and it is not possible to define it without reference to movement—nor, therefore, without reference to the parts and to their being in a [30] certain state. For it is not a hand in *any* state that is a part of man, but the hand which can fulfil its work, which therefore must be alive; if it is not alive it is not a part.

Regarding the objects of mathematics, why are the formulae of the parts not parts of the formulae of the wholes, e.g. why are not the formulae of the semicircles parts of the formula of the circle? It cannot be said, 'because these parts are perceptible things'; for they are not. But perhaps this makes no difference; for even some things which are not perceptible must have matter; for there is some matter in [1037<sup>a</sup>1] everything which is not an essence and a bare form but a 'this'. The semicircles, then, will be parts, not of the universal circle, but of the individual circles, as has been said before; for while one kind of matter is perceptible, there is another which is intelligible.

It is clear also that the soul is the primary substance and the body is matter, [5] and man or animal is the compound of both taken universally;

and Socrates or Coriscus, if even the soul of Socrates is Socrates, is taken in two ways (for some mean by such a term the soul, and others mean the concrete thing), but if he is simply this particular soul and this particular body, the individual is analogous to the universal.

Whether there is, apart from the matter of such substances, any other [10] substance, and one should look for some substance other than these, e.g. numbers or something of the sort, must be considered later. For it is for the sake of this that we are trying to determine the nature of perceptible substances, since in a sense the inquiry about perceptible substances is the work of natural science, i.e. of second [15] philosophy; for the natural scientist must not only know about the matter, but also about the substance in the sense of the formula, and even more than about the other. And in the case of definitions, how the elements in the formula are parts of the definition, and why the definition is one formula (for clearly the thing is one, but in virtue of *what* is the thing one, although it has parts?)—this must be considered [20] later.

What the essence is and in what sense it is independent, has been stated universally in a way which is true of every case, and also why the formula of the essence of some things contains the parts of the thing defined, while that of others does not; and we have stated that in the formula of the substance the material parts will not be present (for they are not even parts of the substance in that sense, but of [25] the concrete substance; but of this there is in a sense a formula, and in a sense there is not; for there is no formula of it with its matter, for this is indefinite, but there is a formula of it with reference to its primary substance—e.g. in the case of man the formula of the soul—, for the substance is the indwelling form, from which along with the matter the so-called concrete substance is derived; e.g. concavity is a form [30] of this sort, for from this and the nose arise snub nose and snubness; ['nose' will be found to be involved twice in these terms]);<sup>2</sup> but in the concrete substance, e.g. a snub nose or Callias, the matter also will be present. And we have stated that the [1037<sup>b</sup>1] essence and the individual thing are in some cases the same; i.e. in the case of primary substances, e.g. curvature and the essence of curvature, if this is primary. (By a primary substance I mean one which does not imply the presence of something in something else, i.e. in a substrate which acts as matter.) But things [5] which are of the nature of matter or of wholes which include matter, are not the same as their essences, nor are accidental unities like that of Socrates and musical; for these are the same only by accident.

12 · Now let us treat first of definition, in so far as we have not treated of it [10] in the *Analytics*; for the problem stated in them is useful for our inquiries concerning substance. I mean this problem:—wherein consists the unity of that, the formula of which we call a definition, as for instance in the case of man, two-footed animal; for let this be the formula of man. Why, then, is this one, and not many, viz. animal *and* two-footed? For in the case of ‘man’ and ‘white’ there is a plurality [15] when one term does not belong to the other, but a unity when it does belong and the subject, man, has a certain attribute; for then a unity is produced and we have the white man. In the present case, on the other hand, one does not share in the other; the genus is not thought to share in its differentiae; for then the same thing would [20] share in contraries; for the differentiae by which the genus is divided are contrary. And even if the genus does share in them, the same argument applies, since the differentiae present in man are many, e.g. endowed with feet, two-footed, featherless. Why are these one and not many? Not because they are present in one thing; for on this principle a unity can be made out of any set of attributes. But surely all [25] the attributes in the definition *must* be one; for the definition is a single formula and a formula of substance, so that it must be a formula of some one thing; for substance means a ‘one’ and a ‘this’, as we maintain.

We must first inquire about definitions arising out of divisions. There is [30] nothing in the definition except the first-named genus and the differentiae. The other genera are the first genus and along with this the differentiae that are taken with it, e.g. the first may be animal, the next animal which is two-footed, and again animal which is two-footed and featherless, and similarly if the definition includes [1038<sup>a</sup>1] more terms. And in general it makes no difference whether it includes many or few terms,—nor, therefore, whether it includes few or simply two; and of the two the one is differentia and the other genus, e.g. in ‘two-footed animal’ ‘animal’ is genus, [5] and the other is differentia. If then the genus absolutely does not exist apart from the species which it as genus includes, or if it exists but exists as matter (for the voice is genus and matter, but its differentiae make the species, i.e. the letters, out of it), clearly the definition is the formula which comprises the differentiae.

But it is also necessary in division to take the differentia of the differentia; e.g. [10] endowed with feet is a differentia of animal; again we must know the differentia of animal endowed with feet *qua* endowed with feet. Therefore we must not say, if we are to speak rightly, that of

that which is endowed with feet one part has feathers and one is featherless; if we say this we say it through incapacity; we must divide it into cloven-footed or not-cloven; for these are differentiae in the foot; cloven-footedness [15] is a form of footedness. And we always want to go on so till we come to the species that contain no differences. And then there will be as many kinds of foot as there are differentiae, and the kinds of animals endowed with feet will be equal in number to the differentiae. If then this is so, clearly the *last* differentia will be the substance of the thing and its definition, since it is not right to state the same things [20] more than once in our definitions; for it is superfluous. And this does happen; for when we say ‘animal which is endowed with feet, and two-footed’ we have said nothing other than ‘animal having feet, having two feet’; and if we divide this by the proper division, we shall be saying the same thing many times—as many times as there are differentiae.

If then a differentia of a differentia be taken at each step, one differentia—the [25] last—will be the form and the substance; but if we divide according to accidental qualities, e.g. if we were to divide that which is endowed with feet into the white and the black, there will be as many differentiae as there are processes of division. Therefore it is plain that the definition is the formula which contains the differentiae, or, according to the right method, the last of these. This would be [30] evident, if we were to change the order of such definitions, e.g. that of man, saying ‘animal which is two-footed and endowed with feet’; for ‘endowed with feet’ is superfluous when ‘two-footed’ has been said. But order is no part of the substance; for how are we to think the one element posterior and the other prior? Regarding the definitions, then, which arise out of divisions, let this much be taken as stated in [35] the first place as to their nature.

**13** · Let us again return to the subject of our inquiry, which is substance. As [1038<sup>b</sup>1] the substrate and the essence and the compound of these are called substance, so also is the universal. About two of these we have spoken; about the essence and about the substrate, of which we have said that it underlies in two senses, either [5] being a ‘this’—which is the way in which an animal underlies its attributes—, or as the matter underlies the complete reality. The universal also is thought by some to be in the fullest sense a cause, and a principle; therefore let us attack the discussion of this point also. For it seems impossible that any universal term should be the name of a substance. For primary substance is that



kind of substance which is peculiar to an individual, which does not belong to anything else; but the universal is [10] common, since that is called universal which naturally belongs to more than one thing. Of which individual then will this be the substance? Either of all or of none. But it cannot be the substance of all; and if it is to be the substance of one, this one will be the others also; for things whose substance is one and whose essence is one are themselves also one.

Further, substance means that which is not predicable of a subject, but the [15] universal is predicable of some subject always.

But perhaps the universal, while it cannot be substance in the way in which the essence is so, can be present in this, e.g. animal can be present in man and horse. Then clearly there is a formula of the universal. And it makes no difference even if [20] there is not a formula of everything that is in the substance; for none the less the universal will be the substance of something. Man is the substance of the individual man in whom it is present; therefore the same will happen again, for a substance, e.g. animal, must be the substance of that in which it is present as something peculiar to it. And further it is impossible and absurd that the 'this', i.e. the [25] substance, if it consists of parts, should not consist of substances nor of what is a 'this', but of quality; for that which is not substance, i.e. the quality, will then be prior to substance and to the 'this'. Which is impossible; for neither in formula nor in time nor in coming to be can the affections be prior to the substance; for then they would be separable from it. Further, in Socrates there will be a substance in a [30] substance, so that he will be the substance of two things. And in general it follows, if man and such things are substances, that none of the elements in their formulae is the substance of anything, nor does it exist apart from the species or in anything else; I mean, for instance, that no animal exists apart from the particular animals, nor does any other of the elements present in formulae exist apart.

If, then, we view the matter from these standpoints, it is plain that no universal [1039<sup>a</sup>1] attribute is a substance, and this is plain also from the fact that no common predicate indicates a 'this', but rather a 'such'. If not, many difficulties follow and especially the 'third man'.

The conclusion is evident also from the following consideration—that a substance cannot consist of substances present in it actually (for things that are thus [5] actually two are never actually one, though if they are *potentially* two, they can be one, e.g. the double line consists of two halves—potentially; for the *actualization* of the halves divides them from one another; therefore if the substance is one, it will not consist of substances

present in it); and according to the argument which [10] Democritus states rightly; he says one thing cannot come from two nor two from one; for he identifies his indivisible magnitudes with substances. It is clear therefore that the same will hold good of number, if number is a synthesis of units, as is said by some; for two is either not one, or there is no unit present in it actually.

The consequence of this view involves a difficulty. If no substance can consist [15] of universals because a universal indicates a 'such', not a 'this', and if no composite substance can be composed of actual substances, every substance would be incomposite, so that there would not even be a formula of any substance. But it is thought by all and has been previously stated that it is either only, or primarily, [20] substance that can be defined; yet now it seems that not even substance can. There cannot, then, be a definition of anything; or rather in a sense there can be, and in a sense there cannot. And what we say will be plainer from what follows.

14 · It is clear also from these very facts what consequences confront those [25] who say the Ideas are substances and can exist apart, and at the same time make the Form consist of the genus and the differentiae. For if the Forms exist and animal is present in man and horse, it is either one and the same in number, or different. (In formula it is clearly one; for he who states the formula unfolds the same formula in either case.) If there is a man-in-himself who is a 'this' and exists apart, the parts of [30] which he consists, e.g. animal and two-footed, must indicate a 'this' and be things existing apart and substances; therefore animal too must be of this sort.

Now if animal, which is in the horse and in man, is one and the same, as you are one and the same with yourself, how will the one in things that exist apart be [1039<sup>b</sup>1] one, and how will this animal escape being divided even from itself?

Further, if it is to share in two-footed and many-footed, an impossible conclusion follows; for contrary attributes will belong at the same time to it although it is one and a this. If it does not, what is the relation implied when one says the animal is two-footed or has feet? But perhaps these are put together and [5] are in contact, or are mixed. Yet all these are absurd.

But suppose the Form to be different in each species. Then there will be practically an infinite number of things whose *substance* is animal; for it is not by accident that man has animal for one of its elements. Further,

animal-in-itself will be many. For the animal in each species will be the substance of the species; for it is not dependent on anything else; if it were, that other would be an element in man, i.e. [10] would be the genus of man. And further all the elements of which man is composed will be Ideas. Now nothing can be the Idea of one thing and the substance of another; this is impossible. Each, then, of the Ideas present in the species of animals will be the ideal animal. Further, from what will these Ideas be derived; how will they be derived from the ideal animal? Or how can an Idea of animal whose essence [15] is simply animal exist apart from the ideal animal? Further, in the case of sensible things both these consequences and others still more absurd follow. If, then, these consequences are impossible, clearly there are not Forms of sensible things in the sense in which some maintain their existence.

15 · Since substance is of two kinds, the concrete thing and the formula (I [20] mean that one kind of substance is the formula taken with the matter, while another kind is the formula in its generality), substances in the former sense are capable of destruction (for they are capable also of generation), but there is no destruction of the formula in the sense that it is ever in course of being destroyed; for there is no generation of it (the being of house is not generated, but only the being of *this* [25] house), but without generation and destruction formulae are and are not; for it has been shown that no one produces nor makes these. For this reason, also, there is neither definition nor demonstration of sensible individual substances, because they have matter whose nature is such that they are capable both of being and of not being; for which reason all the individual instances of them are destructible. If then [30] demonstration is of necessary truths and definition involves knowledge, and if, just as knowledge cannot be sometimes knowledge and sometimes ignorance, but the state which varies thus is opinion, so too demonstration and definition cannot vary thus, but it is opinion that deals with that which can be otherwise than as it is, [1040<sup>a</sup>1] clearly there can neither be definition nor demonstration of sensible individuals. For perishing things are obscure to those who have knowledge of them, when they have passed from our perception; and though the formulae remain in the soul unchanged, [5] there will no longer be either definition or demonstration. Therefore when one of those who aim at definition defines any individual, he must recognize that his definition may always be overthrown; for it is not possible to define such things.

Nor is it possible to define any Idea. For the Idea is, as its supporters say, an individual, and can exist apart; and the formula must consist of words; and he who [10] defines must not invent a word (for it would be unknown), but the established words are common to each of a number of things; these then must apply to something besides the thing defined; e.g. if one were defining you, he would say 'an animal which is lean' or 'white', or something else which will apply also to some one other than you. If any one were to say that perhaps all the attributes taken apart may [15] belong to many subjects, but together they belong only to this one, we must reply firstly that they belong also to both the elements, e.g. two-footed animal belongs to animal and to the two-footed. And where the elements are eternal this is even necessary, since the elements are prior to and parts of the compound; what is more, they can also exist apart, if 'man' can exist apart. For either neither or both can. If, [20] then, neither can, the genus will not exist apart from the species; but if it does, the differentia will also. Secondly, we must reply that they are prior in being; and things which are prior to others are not destroyed when the others are.

Again, if the Ideas consist of Ideas (as they must, since elements are simpler than the compound), it will be further necessary that the elements of which the Idea consists, e.g. animal and two-footed, should be predicated of many subjects. If not, [25] how will they be known? For there will then be an Idea which cannot be predicated of more subjects than one. But this is not thought possible—every Idea is thought to be capable of being shared.

As has been said, then, people do not realize that it is impossible to define in the case of eternal things, especially those which are unique, like the sun or the [30] moon. For they err not only by adding attributes after whose removal the sun would still exist, e.g. 'going round the earth' or 'night-hidden' (for from their view it follows that if it stands still or is visible, it will no longer be the sun; but it is strange if this is so; for 'the sun' means a certain *substance*); but also by the mention of attributes which can belong to another subject; e.g. if another thing with the stated attributes comes into existence, clearly it will be a sun; the formula therefore is [1040<sup>b</sup>1] general. But the sun was supposed to be an individual, like Cleon or Socrates. Why does not one of the supporters of the Ideas produce a definition of an Idea? It would become clear, if they tried, that what has now been said is true.

[5] 16 · Evidently even of the things that are thought to be substances, most are only potentialities,—e.g. the parts of animals (for none of them exists separately; and when they *are* separated, then they too exist, all of them, merely as matter) and earth and fire and air; for none of them is one, but they are like a heap before it is fused by heat and some one thing is made out of the bits. One might suppose [10] especially that the parts of living things and the corresponding parts of the soul are both, i.e. exist both actually and potentially, because they have sources of movement in something in their joints; for which reason some animals live when divided. Yet all the parts must exist only potentially, when they are one and continuous by nature,—not by force or even by growing together, for such a [15] phenomenon is an abnormality.

Since the term ‘unity’ is used like the term ‘being’, and the substance of that which is one is one, and things whose substance is numerically one are numerically one, evidently neither unity nor being can be the substance of things, just as being an element or a principle cannot be the substance, but we seek *what* the principle is, that we may refer the thing to something more intelligible. Now of these things [20] being and unity are more substantial than principle or element or cause, but not even the former are substance, since in general nothing that is common is substance; for substance does not belong to anything but to itself and to that which has it, of which it is the substance. Further, that which is one cannot be in many things at the [25] same time, but that which is common is present in many things at the same time; so that clearly no universal exists apart from the individuals.

But those who say the Forms exist, in one respect are right, in saying the Forms exist apart, if they are substances; but in another respect they are not right, because they say the one *in* many is a Form. The reason for their doing this is that they [30] cannot say what are the substances of this sort, the imperishable substances which exist apart from the individual and sensible substances. They make them, then, the same in kind as the perishable things (for this kind of substance we know)—man himself and the horse itself, adding to the sensible things the word ‘itself. Yet even if we had not seen the stars, none the less, I suppose, would there be eternal [1041<sup>a</sup>1] substances besides those which we knew; so that now also if we do not know what eternal substances there are, yet it is doubtless necessary that some should exist. Clearly, then, no universal term is the name of a substance, and no substance is composed of

17 · We should say what, and what sort of thing, substance is, taking another starting-point; for perhaps from this we shall get a clear view also of that substance which exists apart from sensible substances. Since, then, substance is a principle and a cause, let us attack it from this standpoint. The ‘why’ is always [10] sought in this form—‘why does one thing attach to another?’ For to inquire why the musical man is a musical man, is either to inquire—as we have said—why the man is musical, or it is something else. Now ‘why a thing is itself’ is doubtless a meaningless inquiry; for the fact or the existence of the thing must already be [15] evident (e.g. that the moon is eclipsed), but the fact that a thing is itself is the single formula and the single cause to all such questions as why the man is man, or the musical musical, unless one were to say that each thing is inseparable from itself; and its being one just meant this. This, however, is common to all things and is a short and easy way with the question. But we *can* inquire why man is an animal of [20] such and such a nature. Here, then, we are evidently not inquiring why he who is a man is a man. We are inquiring, then, why something is predicable of something; that it is predicable must be clear; for if not, the inquiry is an inquiry into nothing. [25] E.g. why does it thunder?—why is sound produced in the clouds? Thus the inquiry is about the predication of one thing of another. And why are certain things, i.e. stones and bricks, a house? Plainly we are seeking the cause. And this is the essence (to speak abstractly), which in some cases is that for the sake of which, e.g. perhaps [30] in the case of a house or a bed, and in some cases is the first mover; for this also is a cause. But while the efficient cause is sought in the case of genesis and destruction, the final cause is sought in the case of being also.

The object of the inquiry is most overlooked where one term is not expressly [1041<sup>b</sup>1] predicated of another (e.g. when we inquire why man is), because we do not distinguish and do not say definitely ‘why do these parts form this whole?’ But we must distinguish the elements before we begin to inquire; if not, it is not clear whether the inquiry is significant or unmeaning. Since we must know the existence [5] of the thing and it must be given, clearly the question is *why* the matter is some individual thing, e.g. why are these materials a house? Because that which was the essence of a house is present. And why is this individual thing, or this body in this state, a man? Therefore what we seek is the cause, i.e. the

form, by reason of which the matter is some definite thing; and this is the substance of the thing. Evidently, then, in the case of simple things no inquiry nor teaching is possible; but we must [10] inquire into them in a different way.

As regards that which is compounded out of something so that the whole is one—not like a heap, however, but like a syllable,—the syllable is not its elements, *ba* is not the same as *b* and *a*, nor is flesh fire and earth; for when they are dissolved [15] the wholes, i.e. the flesh and the syllable, no longer exist, but the elements of the syllable exist, and so do fire and earth. The syllable, then, is something—not only its elements (the vowel and the consonant) but also something else; and the flesh is not only fire and earth or the hot and the cold, but also something else. Since, then, that [20] something must be either an element or composed of elements, if it is an element the same argument will again apply; for flesh will consist of this and fire and earth and something still further, so that the process will go on to infinity; while if it is a compound, clearly it will be a compound not of one but of many (or else it will itself be that one), so that again in this case we can use the same argument as in the case [25] of flesh or of the syllable. But it would seem that this is something, and not an element, and that it is the cause which makes *this* thing flesh and *that* a syllable. And similarly in all other cases. And this is the substance of each thing; for this is the primary cause of its being; and since, while some things are not substances, as [30] many as are substances are formed naturally and by nature, their substance would seem to be this nature, which is not an element but a principle. An *element* is that into which a thing is divided and which is present in it as matter, e.g. *a* and *b* are the elements of the syllable.

## BOOK VIII (H)

1 · We must draw our conclusions from what has been said, and sum up our results, and put the finishing touch to our inquiry. We have said that the causes, principles, and elements of substances are the object of our search. And some [5] substances are recognized by all thinkers, but some have been advocated by particular schools. Those generally recognized are the natural substances, i.e. fire, earth, water, air, &c., the simple bodies; secondly, plants and their parts, and animals and the parts of animals; and finally the heavens and the parts of the [10] heavens. Some particular schools say that Forms and the objects of mathematics are substances. And it follows from our arguments that there are other substances, the essence and the substratum. Again, in another way the genus seems more substantial than the species, and the universal than the particulars. And with the universal and the genus the Ideas are connected; it is in virtue of the same argument [15] that they are thought to be substances. And since the essence is substance, and the definition is a formula of the essence, for this reason we have discussed definition and essential predication. Since the definition is a formula, and a formula has parts, we had to consider with respect to the notion of part, what are parts of the substance [20] and what are not, and whether the same things are also parts of the definition. Further, then, neither the universal nor the genus is a substance; we must inquire later into the Ideas and the objects of mathematics; for some say these exist apart from sensible substances.

But now let us resume the discussion of the generally recognized substances. These are the sensible substances, and sensible substances all have matter. The [25] substratum is substance, and this is in one sense the matter (and by matter I mean that which, not being a 'this' actually, is potentially a 'this'), and in another sense the formula or form (which being a 'this' can be separately formulated), and thirdly the complex of matter and form, which alone is generated and destroyed, and is, [30] without qualification, capable of separate existence; for of substances in the sense of formulae some are separable and some are not.

But clearly matter also is substance; for in all the opposite changes that occur there is something which underlies the changes, e.g. in respect of place that which is now here and again elsewhere, and in respect of increase that which is now of one [35] size and again less or greater, and in respect of alteration that which is now healthy and again diseased; and



similarly in respect of substance there is something that is [1042<sup>b</sup>1] now being generated and again being destroyed, and now underlies the process as a 'this' and again underlies it as the privation of positive character. In this last change the others are involved. But in either one or two of the others this is not involved; for [5] it is not necessary if a thing has matter for change of place that it should also have matter for generation and destruction.

2 · The difference between becoming in the unqualified sense and becoming in a qualified sense has been stated in the *Physics*. Since the substance which exists as substratum and as matter is generally recognized, and this is that which exists [10] potentially, it remains for us to say what is the substance, in the sense of *actuality*, of sensible things. Democritus seems to think there are three kinds of difference between things; the underlying body, the matter, is one and the same, but they differ either in rhythm, i.e. shape, or in turning, i.e. position, or in inter-contact, i.e. [15] order. But evidently there are many differences; for instance, some things are characterized by the mode of composition of their matter, e.g. the things formed by mixture, such as honey-water; and others by being bound together, e.g. a bundle; and others by being glued together, e.g. a book; and others by being nailed together, e.g. a casket; and others in more than one of these ways; and others by position, e.g. [20] the threshold and the lintel (for these differ by being placed in a certain way); and others by time, e.g. dinner and breakfast; and others by place, e.g. the winds; and others by the affections proper to sensible things, e.g. hardness and softness, density and rarity, dryness and wetness; and some things by some of these qualities, others [25] by them all, and in general some by excess and some by defect. Clearly then the word 'is' has just as many meanings; a thing is a threshold because it lies in such and such a position, and its being means its lying in that position, while being ice means having been solidified in such and such a way. And the being of some things will be defined by *all* these qualities, because some parts of them are mixed, others are [30] fused, others are bound together, others are solidified, and others possess the other differentiae; e.g. the hand or the foot. We must grasp, then, the kinds of differentiae (for these will be the principles of the being of things), e.g. the things characterized by the more and the less, or by the dense and the rare, and by other such qualities; [35] for all these are characterized by excess and defect. And everything that is characterized by shape or by smoothness and roughness, is determined by the straight and the curved. And for

other things their being will mean their being [1043<sup>a</sup>1] mixed, and their not being will mean the opposite. It is clear then from these facts that if its substance is the cause of each thing's being, we must seek in these differentiae the cause of the being of each of these things. Now none of these differentiae is substance, even when coupled with matter, yet in each there is [5] something analogous to substance; and as in substances that which is predicated of the matter is the actuality itself, in all other definitions also it is what most resembles full actuality. E.g. if we had to define a threshold, we should say 'wood or stone in such and such a position', and a house we should define as 'bricks and timbers in such and such a position' (or we may name that for the sake of which as well in some cases), and if we define ice we say 'water frozen or solidified in such [10] and such a way', and harmony is 'such and such a blending of high and low'; and similarly in all other cases.

Obviously then the actuality or the formula is different when the matter is different; for in some cases it is the juxtaposition, in others the mixing, and in others some other of the attributes we have named. And so, in defining, those who define a [15] house as stones, bricks, and timbers, are speaking of the potential house, for these are the matter; but those who define it as a covering for bodies and chattels, or add some other similar differentia, speak of the actuality; and those who combine both of these speak of the third kind of substance, which is composed of matter and form. [20] For the formula that gives the differentiae seems to be an account of the form and the actuality, while that which gives the components is rather an account of the matter. And the same is true with regard to the definitions which Archytas used to accept; for they are accounts of the combined form and matter. E.g. what is still weather? Absence of motion in a large extent of air; air is the matter, and absence of motion is the actuality and substance. What is a calm? Smoothness of sea; the material substratum is the sea, and the actuality or form is smoothness. It is [25] obvious then, from what has been said, what sensible substance is and how it exists—one kind of it as matter, another as form or actuality; while the third kind is that which is composed of these two.

3 · We must not forget that sometimes it is not clear whether a name means the composite substance, or the actuality or form, e.g. whether 'house' is a sign for [30] the composite thing, 'a covering consisting of bricks and stones laid thus and thus', or for the actuality or form, 'a

covering', and whether a line is twoness in length or twoness, and whether an animal is a soul in a body or a soul. For soul is the substance or actuality of some body; but animal might be applied to both, not that [35] both are definable by one formula but because they refer to the same thing. But this question, while important for another purpose, is of no importance for the inquiry into sensible substance; for the essence certainly attaches to the form and the [1043<sup>b</sup>1] actuality. For soul and to be soul are the same, but to be man and man are not the same, unless indeed the soul is to be called man; and thus on one interpretation the thing is the same as its essence, and on another it is not.

If we consider we find that the syllable is not produced by the letters and [5] juxtaposition, nor is the house bricks and juxtaposition. And this is right; for the juxtaposition or mixing is not produced by those things of which it is the juxtaposition or mixing. And the same is true in the other cases, e.g. if the threshold is characterized by its position, the position is not produced by the threshold, but rather the latter is produced by the former. Nor is man animal and biped, but there [10] must be something besides these, if these are matter,—something which is neither an element in the whole nor produced by an element, but is the substance, which people eliminate and state the matter. If then this is the cause of the thing's being, and if the cause of its being is its substance, they cannot be stating the substance itself.

This, then, must either be eternal or it must be destructible without being ever [15] in course of being destroyed, and must have come to be without ever being in course of coming to be. But it has been proved and explained elsewhere that no one makes or generates the form, but it is a 'this' that is made, i.e. the complex of form and matter that is generated. Whether the substances of destructible things can exist apart, is not yet at all clear; except that obviously this is impossible in some cases—in the case of things which cannot exist apart from the individual instances, [20] e.g. house or utensil. Perhaps neither these things themselves, nor any of the other things which are not formed by nature, are substances at all; for one might say that the nature in natural objects is the only substance to be found in destructible things.

*Therefore* the difficulty which was raised by the school of Antisthenes and [25] other such uneducated people has a certain appropriateness. They stated that the 'what' cannot be defined (for the definition so called is a long formula); but of what *sort* a thing, e.g. silver, is, they thought it possible to explain, not saying what it is but that it is like tin. Therefore one kind of substance can be defined and formulated, i.e. the composite

kind, whether it be the object of sense or of reason; [30] but the primary parts of which this consists cannot be defined, since a definitory formula predicates something of something, and one part of the definition must play the part of matter and the other that of form.

It is also obvious that, if all substances are in a sense numbers, they are so in this sense and not, as some say as numbers of units. For definition is a sort of [35] number; for it is divisible, and into indivisible parts (for definitory formulae are not infinite), and number also is of this nature. And as, when one of the parts of which a number consists has been taken from or added to the number, it is no longer the same number, but a different one, even if it is the very smallest part that has been [1044<sup>a</sup>1] taken away or added, so the definition and the essence will no longer remain when anything has been taken away or added. And the number must have something in virtue of which it is one thing, while our opponents cannot say if it is one (for either [5] it is not one but a sort of heap, or if it is, we ought to say what it is that makes one out of many); and the definition is one, but similarly they cannot say what makes *it* one. And this is natural; for the same reason is applicable, and substance is one in the sense which we have explained, and not, as some say, by being a sort of unit or point; each is a complete reality and a definite nature. And as number does not admit of [10] the more and the less, neither does substance, in the sense of form, but if any substance does, it is only the substance which involves matter. Let this then suffice for an account of the generation and destruction of so-called substances—in what sense it is possible and in what sense impossible—and of the reduction of things to number.

[15] 4 · Regarding material substance we must not forget that even if all things have the same primary constituent or constituents, and if the same matter serves as starting-point for their generation, yet there is a matter proper to each, e.g. the sweet or the fat of phlegm, and the bitter, or something else, of bile; though perhaps [20] these have the same constituent. And there come to be several matters for the same thing, when the one matter is matter for the other, e.g. phlegm comes from the fat and from the sweet, if the fat comes from the sweet; and it comes from bile by analysis of the bile into its ultimate matter. For one thing comes from another in two senses, either because it will be found at a later stage of development, or because it is produced if the other is analysed into its original constituents. When [25] the matter is one, different things may

be produced owing to difference in the moving cause, e.g. from wood may be made both a chest and a bed. But *some* different things must have their matter different, e.g. a saw could not be made of wood, nor is this in the power of the moving cause; for it could not make a saw of [30] wool or of wood. But if, as a matter of fact, the same thing can be made of different material, clearly the art, i.e. the moving principle, is the same; for if both the matter and the moving principle were different, the product would be too.

When one inquires what is the cause, one should, as causes are spoken of in several senses, state all the possible causes. E.g. what is the material cause of man? The menstrual fluid. What is the moving cause? The *semen*. The formal cause? His essence. The final cause? His end. But perhaps the latter two are the same.—We [1044<sup>b</sup>1] must state the *proximate* causes. What is the material cause? Not fire or earth, but the matter peculiar to the thing.

Regarding *generable* natural substances, *if* the causes are really these and of this number and we have to learn the causes, we must inquire thus, if we are to [5] inquire rightly. But in the case of natural but *eternal* substances another account must be given. For perhaps some have no matter, or not matter of this sort but only such as can be moved in respect of place. Nor does matter belong to those things which exist by nature but are not substances; their substratum is the *substance*. E.g. what is the cause of an eclipse? What is its matter? There is none; the *moon* is that [10] which suffers eclipse. What is the moving cause which extinguishes the light? The earth. The final cause perhaps does not exist. The formal principle is the definitory formula, but this is obscure if it does not include the cause. E.g. what is eclipse? Deprivation of light. But if we add ‘by interposition of the earth’, this is the formula which includes the cause. In the case of sleep it is not clear what it is that [15] proximately has this affection. Surely the animal, it will be said. Yes, but the animal in virtue of what, i.e. what is the proximate subject? The heart or some other part. Next, by what is it produced? Next, what is the affection—that of the proximate subject, not of the whole animal? Shall we say that it is immobility of such and such a kind? Yes, but to what process in the proximate subject is this due? [20]

5 · Since some things are and are not, without coming to be and ceasing to be, e.g. points, if they can be said to *be*, and in general forms (for it is not white that comes to be, but the wood comes to be white, if

everything that comes to be comes from something and comes to be something), not all contraries can come from one another, but it is in different senses that a white man comes from a black man, and [25] white comes from black. Nor has everything matter, but only those things which come to be and change into one another. Those things which, without ever being in course of changing, are or are not, have no matter.

There is difficulty in the question how the matter of each thing is related to its contrary states. E.g. if the body is potentially healthy, and disease is contrary to [30] health, is it potentially both? And is water potentially wine and vinegar? We answer that it is the matter of one in virtue of its positive state and its form, and of the other in virtue of the privation of its positive state and the corruption of it contrary to its nature. It is also hard to say why wine is not said to be the matter of vinegar nor potentially vinegar (though vinegar is produced from it), and why the living man is [35] not said to be potentially dead. In fact they are not, but the corruptions in question are accidental, and it is the matter of the animal that is itself in virtue of its [1045<sup>a</sup>1] corruption the potency and matter of a corpse, and it is water that is the matter of vinegar. For the one comes from the other as night from day. And *all* things which change thus into one another must be reduced to their matter, e.g. if from a corpse is [5] produced an animal, the corpse is first reduced to its matter, and only then becomes an animal; and vinegar is first reduced to water, and only then becomes wine.

6 · To return to the difficulty which has been stated with respect to definitions and numbers, what is the cause of the unity of each of them? In the case of all things which have several parts and in which the whole is not, as it were, a [10] mere heap, but the totality is something besides the parts, there is a cause of unity; for as regards material things contact is the cause in some cases, and in others viscosity or some other such quality. And a definition is a formula which is one not by being connected together, like the *Iliad*, but by dealing with one object.—What [15] then is it that makes man one; why is he one and not many, e.g. animal—biped, especially if there are, as some say, an ideal animal and an ideal biped? Why are not those Ideas the ideal man, so that men would exist by participation not in man, nor in one Idea, but in two, animal and biped? And in general man would be not one but [20] more than one thing, animal and biped.

Clearly, then, if people proceed thus in their usual manner of

definition and speech, they cannot explain and solve the difficulty. But if, as we say, one element is matter and another is form, and one is potentially and the other actually, the [25] question will no longer be thought a difficulty. For this difficulty is the same as would arise if 'round bronze' were the definition of cloak; for this name would be a sign of the definitory formula, so that the question is, what is the cause of the unity of round and bronze? The difficulty disappears, because the one is matter, the other [30] form. What then is the cause of this—the reason why that which was potentially is actually,—what except, in the case of things which are generated, the agent? For there is no other reason why the potential sphere becomes actually a sphere, but this was the essence of either. Of matter some is the object of reason, some of sense, and [35] part of the formula is always matter and part is actuality, e.g. the circle is a figure which is plane. But of the things which have no matter, either for reason or for [1045<sup>b</sup>1] sense, each is by its nature essentially a kind of unity, as it is essentially a kind of being—a 'this', a quality, or a quantity. And so neither 'existent' nor 'one' is present in definitions, and an essence is by its very nature a kind of unity as it is a kind of being. This is why none of these has any reason outside itself for being one, nor for [5] being a kind of being; for each is by its nature a kind of being and a kind of unity, not as being in the genus 'being' or 'one' nor in the sense that being and unity can exist apart from particulars.

Owing to the difficulty about unity some speak of participation, and raise the question, what is the cause of participation and what is it to participate; and others [10] speak of communion, as Lycophron says knowledge is a communion of knowing with the soul; and others say life is a composition or connexion of soul with body. Yet the same account applies to all cases; for being healthy will be either a communion or a connexion or a composition of soul and health, and the fact that the [15] bronze is a triangle will be a composition of bronze and triangle, and the fact that a thing is white will be a composition of surface and whiteness. —The reason is that people look for a unifying formula, and a difference, between potentiality and actuality. But, as has been said, the proximate matter and the form are one and the same thing, the one potentially, the other actually. Therefore to ask the cause of their being one is like asking the cause of unity in general; for each thing is a unity, [20] and the potential and the actual are somehow one. Therefore there is no other cause here unless there is something which caused the movement from potentiality into actuality. And all things which have *no* matter are *without qualification* essentially unities.





## BOOK IX (Θ)

1 · We have treated of that which is primarily and to which all the other categories of being are referred—i.e. of substance. For it is in virtue of the formula of substance that the others are said to be—quantity and quality and the like; for all [30] will be found to contain the formula of substance, as we said in the first part of our work. And since ‘being’ is in one way divided into ‘what’, quality, and quantity, and is in another way distinguished in respect of potentiality and fulfillment, and of function, let us discuss potentiality and fulfillment. First let us explain potentiality [35] in the strictest sense, which is, however, not the most useful for our present purpose. For potentiality and actuality extend further than the mere sphere of motion. But [1046<sup>a</sup>1] when we have spoken of this first kind, we shall in our discussions of actuality explain the other kinds of potentiality.

We have pointed out elsewhere that ‘potentiality’ and the word ‘can’ have [5] several senses.<sup>1</sup> Of these we may neglect all the potentialities that are so called homonomously. For some are called so by analogy, as in geometry; and we say things can be or cannot be because in some definite way they are or are not.

But all potentialities that conform to the same type are starting points, and are called potentialities in reference to one primary kind, which is a starting-point of [10] change in another thing or in the thing itself *qua* other. For one kind is a potentiality for being acted on, i.e. the principle in the very thing acted on, which makes it capable of being changed and acted on by another thing or by itself regarded as other; and another kind is a state of insusceptibility to change for the worse and to destruction by another thing or by the thing itself *qua* other, i.e. by a principle of change. In all these definitions is contained the formula of potentiality in the [15] primary sense.—And again these so-called potentialities are potentialities either of acting merely or of being acted on, or of acting or being acted on *well*, so that even in the formulae of the latter the formulae of the prior kinds of potentiality are somehow contained.

Obviously, then, in a sense the potentiality of acting and of being acted on is one (for a thing may be capable either because it can be acted on or because [20] something else can be acted on by it), but in a sense

the potentialities are different. For the one is in the thing acted on; it is because it contains a certain motive principle, and because even the matter is a motive principle, that the thing acted on is acted on, one thing by one, another by another; for that which is oily is [25] inflammable, and that which yields in a particular way can be crushed; and similarly in all other cases. But the other potentiality is in the agent, e.g. heat and the art of building are present, one in that which can produce heat and the other in the man who can build. And so in so far as a thing is an organic unity, it cannot be acted on by itself; for it is one and not two different things. And want of potentiality, [30] or powerlessness, is the privation which is contrary to potentiality of this sort, so that every potentiality belongs to the same subject and refers to the same process as a corresponding want of potentiality. Privation has several senses; for it means that which has not a certain quality and that which might naturally have it but has not got it, either in general or when it might naturally have it, and either in some particular way, e.g. when it *completely* fails to have it, or when it in any degree fails to have it. And in certain cases if things which naturally have a quality lose it by [35] violence, we say they suffer privation.

2 · Since some such principles are present in soulless things, and others in [1046<sup>b</sup>1] things possessed of soul, and in soul and in the rational part of the soul, clearly some potentialities will be non-rational and some will be accompanied by reason. This is why all arts, i.e. all productive forms of knowledge, are potentialities; they are principles of change in another thing or in the artist himself considered as other.

[5] And each of those which are accompanied by reason is alike capable of contrary effects, but one non-rational power produces one effect; e.g. the hot is capable only of heating, but the medical art can produce both disease and health. The reason is that science is a rational formula, and the same rational formula explains a thing and its privation, only not in the same way; and in a sense it applies [10] to both, but in a sense it applies rather to the positive fact. Therefore such sciences must deal with contraries, but with one in virtue of their own nature and with the other not in virtue of their nature; for the rational formula applies to one object in virtue of that object's nature, and to the other, in a sense, accidentally. For it is by denial and removal that it explains the contrary; for the contrary is the primary [15] privation, and this is the entire removal of the positive term. Now since on the one hand contraries do

not occur in the same thing, but on the other hand science is a potentiality which depends on the possession of a rational formula, and the soul possesses a principle of movement; therefore, on the other hand, the healthy produces only health and what can heat only heat and what can cool only cold, but the scientific man, on the other hand, produces both the contrary effects. For there [20] is a rational formula which applies to both, though not in the same way, and it is in a soul which possesses a principle of movement; so that the soul will start both processes from the same principle, applying them to the same object. And so the things whose potentiality is according to a rational formula act contrariwise to the things whose potentiality is non-rational; for the products of the former are included under one principle, the rational formula.

It is obvious also that the potentiality of merely doing a thing or having it done [25] to one is implied in that of doing it or having it done *well*, but the latter is not always implied in the former: for he who does a thing well must do it, but he who does it merely need not do it well.

3 · There are some who say, as the Megaric school does, that a thing can act only when it is acting, and when it is not acting it cannot act, e.g. he who is not [30] building cannot build, but only he who is building, when he is building; and so in all other cases. It is not hard to see the absurdities that attend this view.

For it is clear that on this view a man will not be a builder unless he is building (for to be a builder is to be able to build), and so with the other arts. If, then, it is [35] impossible to have such arts if one has not at some time learnt and acquired them, and it is then impossible not to have them if one has not sometime lost them (either by forgetfulness or by some accident or by time; for it cannot be by the destruction [1047<sup>a</sup>1] of the object itself, for that lasts for ever), a man will not have the art when he has ceased to use it, and yet he may immediately build again; how then will he have got the art? And similarly with regard to lifeless things; nothing will be either cold or hot or sweet or perceptible at all if people are not perceiving it; so that the upholders [5] of this view will have to maintain the doctrine of Protagoras. But, indeed, nothing will even have perception if it is not perceiving, i.e. exercising its perception. If, then, that is blind which has not sight though it would naturally have it, when it would naturally have it and when it still exists, the same people will be blind many times in the day—and deaf too. [10]

Again, if that which is deprived of potentiality is incapable, that which is not happening will be incapable of happening; but he who says of that which is incapable of happening that it is or will be will say what is untrue; for this is what incapacity meant. Therefore these views do away with both movement and becoming. For that which stands will always stand, and that which sits will always [15] sit; if it is sitting it will not get up; for that which cannot get up will be incapable of getting up. But we cannot say this, so that evidently potentiality and actuality are different; but these views make potentiality and actuality the same, so that it is no small thing they are seeking to annihilate. [20]

Therefore it is possible that a thing may be capable of being and not *be*, and capable of not being and yet *be*, and similarly with the other kinds of predicate; it may be capable of walking and yet not walk, or capable of not walking and yet walk. And a thing is capable of doing something if there is nothing impossible in its having the actuality of that of which it is said to have the capacity. I mean for instance, if a [25] thing is capable of sitting and it is open to it to sit, there will be nothing impossible in its actually sitting; and similarly if it is capable of being moved or moving or of standing or making to stand or of being or coming to be, or of not being or not coming to be.

The word ‘actuality’, which we connect with fulfillment, has, strictly speaking, [30] been extended from movements to other things; for actuality in the strict sense is identified with movement. And so people do not assign movement to non-existent things, though they do assign some other predicates. E.g. they say that non-existent things are objects of thought and desire, but not that they are moved; and this because, while they do not actually exist, they would have to exist actually if they [1047<sup>b</sup>1] were moved. For of non-existent things some exist potentially; but they do not *exist*, because they do not exist in fulfillment.

4 · If what we have described is the possible or a consequence of the possible, evidently it cannot be true to say ‘this is capable of being but will not be’,—a view [5] which leads to the conclusion that there is nothing incapable of being. Suppose, for instance, that a man (one who did not understand the meaning of ‘incapable of being’) were to say that the diagonal of the square is capable of being measured but will not be measured, because a thing may be capable of being or coming to be, and yet not be or be about to be. But from the premises this necessarily follows, that if [10] we actually suppose that which is not, but is capable

of being, to be or to have come to be, there will be nothing impossible in this; but the result *will* be impossible, for the actual measuring of the diagonal is impossible. For the false and the impossible are not the same; that you are standing now is false, but not impossible.

[15] At the same time it is clear that if, when *A* is, *B* must be, then, when *A* is possible, *B* also must be possible. For if *B* need not be possible, there is nothing to prevent its not being possible. Now let *A* be supposed possible. Then, when *A* is possible, nothing impossible would follow if *A* were supposed to be; and then *B* must [20] of course be. But we supposed *B* to be impossible. Let it be impossible, then. If, then, *B* is impossible, *A* also must be so. But *A* was supposed possible; therefore *B* also is possible. If, then, *A* is possible, *B* also will be possible, if they were so related that if [25] *A* is, *B* must be. If, then, *A* and *B* being thus related, *B* is not possible on this condition, *A* and *B* will not be related as was supposed. And if when *A* is possible, *B* must be possible, then if *A* is, *B* must also be. For to say that *B* must be possible, if *A* is possible, means that if *A* is both at the time when and in the way in which it was [30] supposed capable of being, *B* also must then and in that way be.

5 · As all potentialities are either innate, like the senses, or come by practice, like the power of playing the flute, or by learning, like that of the arts, those which come by practice or by rational formula we must acquire by previous exercise, but [35] this is not necessary with those which are not of this nature and which imply passivity.

[1048<sup>a</sup>1] Since that which is capable is capable of something and at some time and in some way—with all the other qualifications which must be present in the definition—, and since some things can work according to a rational formula and their potentialities involve a formula, while other things are non-rational and their potentialities are non-rational, and the former potentialities must be in a living [5] thing, while the latter can be both in the living and in the lifeless; as regards potentialities of the latter kind, when the agent and the patient meet in the way appropriate to the potentiality in question, the one must act and the other be acted on, but with the former kind this is not necessary. For the non-rational potentialities are all productive of one effect each, but the rational produce contrary effects, so that they would produce contrary effects at the same time; but this is impossible. That which decides, then, must be something else; I mean by this, desire or choice. [10] For whichever of two things the animal desires decisively, it will do, when it is in the

circumstances appropriate to the potentiality in question and meets the passive object. Therefore everything which has a rational potentiality, when it desires that for which it has a potentiality and in the circumstances in which it has it, must do this. And it has the potentiality in question when the passive object is present and is [15] in a certain state; if not it will not be able to act. To add the qualification 'if nothing external prevents it' is not further necessary; for it has the potentiality in so far as this is a potentiality of acting, and it is this not in all circumstances but on certain conditions, among which will be the exclusion of external hindrances; for these are barred by some of the positive qualifications. And so even if one has a rational wish, [20] or an appetite, to do two things or contrary things at the same time, one cannot do them; for it is not on these terms that one has the potentiality for them, nor is it a potentiality for doing both at the same time, since one will do just the things which it is a potentiality for doing.

6 · Since we have treated of the kind of potentiality which is related to [25] movement, let us discuss actuality, what and what sort of thing it is. In the course of our analysis it will also become clear, with regard to the potential, that we not only ascribe potentiality to that whose nature it is to move something else, either without qualification or in some particular way, but also use the word in another sense, in the pursuit of which we have discussed these previous senses. Actuality means the [30] existence of the thing, not in the way which we express by 'potentially'; we say that potentially, for instance, a statue of Hermes is in the block of wood and the half-line is in the whole, because it might be separated out, and even the man who is not studying we call a man of science, if he is capable of studying. Otherwise, actually. Our meaning can be seen in the particular cases by induction, and we must not seek [35] a definition of everything but be content to grasp the analogy,—that as that which is building is to that which is capable of building, so is the waking to the sleeping, [1048<sup>b</sup>1] and that which is seeing to that which has its eyes shut but has sight, and that which is shaped out of the matter to the matter, and that which has been wrought to the unwrought. Let actuality be defined by one member of this antithesis, and the [5] potential by the other. But all things are not said in the *same sense* to exist actually, but only by analogy—as *A* is in *B* or to *B*, *C* is in *D* or to *D*; for some are as movement to potentiality, and the others as substance to some sort of matter.

The infinite and the void and all similar things are said to exist potentially and [10] actually in a different sense from that in which many other things are said so to exist, e.g. that which sees or walks or is seen. For of the latter class these predicates can at some time be truly asserted without qualification; for the seen is so called sometimes because it is being seen, sometimes because it is capable of being seen. But the infinite does not exist potentially in the sense that it will ever actually have separate existence; its separateness is only in knowledge. For the fact that division [15] never ceases to be possible gives the result that this actuality exists potentially, but not that it exists separately.

Since of the actions which have a limit none is an end but all are relative to the end, e.g. the process of making thin is of this sort, and the things themselves when [20] one is making them thin are in movement in this way (i.e. without being already that at which the movement aims), this is not an action or at least not a complete one (for it is not an end); but that in which the end is present is an action. E.g. at the same time we are seeing and have seen, are understanding and have understood, are thinking and have thought: but it is not true that at the same time we are learning [25] and have learnt, or are being cured and have been cured. At the same time we are living well and have lived well, and are happy and have been happy. If not, the process would have had sometime to cease, as the process of making thin ceases: but, as it is, it does not cease; we are living and have lived. Of these processes, then, we must call the one set movements, and the other actualities. For every movement is incomplete—making thin, learning, walking, building; these are movements, and [30] incomplete movements. For it is not true that at the same time we are walking and have walked, or are building and have built, or are coming to be and have come to be—it is a different thing that is being moved and that has been moved, and that is moving and that has moved; but it is the same thing that at the same time has seen and is seeing, or is thinking and has thought. The latter sort of process, then, I call an actuality, and the former a movement.

[35] **7** · What and what sort of thing the actual is may be taken as explained by these and similar considerations. But we must distinguish when a thing is [1049<sup>a</sup>1] potentially and when it is not; for it is not at any and every time. E.g. is *earth* potentially a man? No—but rather when it has already become *seed*, and perhaps not even then, as not everything can be healed by the medical art or by chance, but there is a certain kind

of thing which is capable of it, and only this is potentially [5] healthy. And the definition of that which as a result of *thought* comes to be in fulfillment from having been potentially is that when it has been wished it comes to pass if nothing external hinders it, while the condition on the other side—viz. in that which is healed—is that nothing in it hinders the result. Similarly there is potentially a house, if nothing in the thing acted on—i.e. in the matter—prevents it [10] from becoming a house, and if there is nothing which must be added or taken away or changed; this is potentially a house, and the same is true of all other things for which the source of their becoming is external. And in the cases in which the source of the becoming is in the very thing which suffers change, all those things are said to be potentially something else, which will be it of themselves if nothing external hinders them. E.g. the seed is not yet potentially a man; for it must further undergo [15] a change in a foreign medium.<sup>2</sup> But when through its own motive principle it has already got such and such attributes, in this state it is already potentially a man; while in the former state it needs another principle, just as earth is not yet potentially a statue, for it must change in order to become bronze.

It seems that when we call a thing not something else but ‘of’ that something (e.g. a casket is not wood but of wood, and wood is not earth but made of earth, and [20] again perhaps in the same way earth is not something else but made of that something), that something is always potentially (in the full sense of that word) the thing which comes after it in this series. E.g. a casket is not earthen nor earth, but wooden; for wood is potentially a casket and is the matter of a casket, wood in general of a casket in general, and this particular wood of this particular casket. And if there is a first thing, which no longer is called after something else, and said [25] to be of it, this is prime matter; e.g. if earth is airy and air is not fire but fiery, fire then is prime matter, not being a ‘this’. For the subject and substratum differ by being or not being a ‘this’; the substratum of *accidents* is an individual such as a man, i.e. body and soul, while the accident is something like musical or white. (The [30] subject is called, when music is implanted in it, not music but musical, and the man is not whiteness but white, and not ambulation or movement but walking or moving,—as in the above examples of ‘of’ something.) Wherever this is so, then, the ultimate subject is a substance; but when this is not so but the predicate is a form or [35] a ‘this’, the ultimate subject is matter and material substance. And it is only right that the ‘of’ something locution should be used with reference both to the matter and to the accidents; for both are indeterminates. We have stated, then, when a [1049<sup>b</sup>1] thing is



to be said to be potentially and when it is not.

8 · We have distinguished the various senses of ‘prior’, and it is clear that actuality is prior to potentiality. And I mean by potentiality not only that definite [5] kind which is said to be a principle of change in another thing or in the thing itself regarded as other, but in general every principle of movement or of rest. For nature also is in the same genus as potentiality; for it is a principle of movement—not, however, in something else but in the thing itself *qua* itself. To all such potentiality, [10] then, actuality is prior both in formula and in substance; and in time it is prior in one sense, and in another not.

Clearly it is prior in formula; for that which is in the primary sense potential is potential because it is possible for it to become actual, e.g. I mean by ‘capable of building’ that which can build, and by ‘capable of seeing’ that which can see, and by [15] ‘visible’ that which can be seen. And the same account applies to all other cases, so that the formula and the knowledge of the one must precede the knowledge of the other.

In time it is prior in this sense: the actual member of a species is prior to the potential member of the same species, though the individual is potential before it is actual. I mean that the matter and the seed and that which is capable of seeing, which are potentially a man and corn and seeing, but not yet actually so, are prior in [20] time to this particular man who now exists actually, and to the corn and to the seeing subject; but they are posterior in time to other actually existing things, from which they were produced. For from the potential the actual is always produced by [25] an actual thing, e.g. man by man, musician by musician; there is always a first mover, and the mover already exists actually. We have said in our account of substance that everything that is produced is something produced from something and by something, and is the same in species as it.

[30] This is why it is thought impossible to be a builder if one has built nothing or a harpist if one has never played the harp; for he who learns to play the harp learns to play it by playing it, and all other learners do similarly. And thence arose the sophistical quibble, that one who does not know a science will be doing that which is the object of the science; for he who is learning it does not know it. But since, of that [35] which is coming to be, some part must have come to be, and, of that which, in general, is changing, some part must have changed (this is shown in the treatise on [1050<sup>a</sup>1] movement), he who is learning must, it

would seem, know some part of the science. It is surely clear, then, in this way, that the actuality is in this sense also, viz. in order of becoming and of time, prior to the potentiality.

But it is also prior in substance; firstly, because the things that are posterior in [5] becoming are prior in form and in substance, e.g. man is prior to boy and human being to seed; for the one already has its form, and the other has not. Secondly, because everything that comes to be moves towards a principle, i.e. an end. For that for the sake of which a thing is, is its principle, and the becoming is for the sake of the end; and the actuality is the end, and it is for the sake of this that the potentiality [10] is acquired. For animals do not see in order that they may have sight, but they have sight that they may see. And similarly men have the art of building that they may build, and theoretical science that they may theorize; but they do not theorize that they may have theoretical science, except those who are learning by practice; and these do not theorize except in a limited sense, or else they have no need to theorize.<sup>3</sup> [15] Further, matter exists in a potential state, just because it may attain to its form; and when it exists *actually*, then it is in its form.

And the same holds good in cases in which the end is a movement, as well as in all others. Therefore as teachers think they have achieved their end when they have exhibited the pupil at work, so also does nature. For if this is not the case, we shall [20] have Pauson's Hermes over again; for it will be hard to say about the knowledge, as about the statue, whether it is within or without. For the action is the end, and the actuality is the action. Therefore even the *word* 'actuality' is derived from 'action', and points to the fulfillment.

And while in some cases the exercise is the ultimate thing (e.g. in sight the [25] ultimate thing is seeing, and no other product besides this results from sight), but from some things a product follows (e.g. from the art of building there results a house as well as the act of building), yet none the less the act is in the former case the end and in the latter more of an end than the mere potentiality is. For the act of building is the thing that is being built, and comes to be—and is—at the same time as the house.

Where, then, the result is something apart from the exercise, the actuality is in [30] the thing that is being made, e.g. the act of building is in the thing that is being built and that of weaving in the thing that is being woven, and similarly in all other cases, and in general the movement is in the thing that is being moved; but when there is no product apart from the actuality, the actuality is in the agents, e.g. the act

of [35] seeing is in the seeing subject and that of theorizing in the theorizing subject and the life is in the soul (and therefore well-being also; for it is a certain kind of life). [1050<sup>b</sup>1] Obviously, therefore, the substance or form is actuality. From this argument it is obvious that actuality is prior in substance to potentiality; and as we have said, one actuality always precedes another in time right back to the actuality of the [5] eternal prime mover.

But actuality is prior in a higher sense also; for eternal things are prior in substance to perishable things, and no eternal thing exists potentially. The reason is this. Every potentiality is at one and the same time a potentiality for the opposite; for, while that which is not capable of being present in a subject cannot be present, everything that is capable of being may possibly not be actual. That, then, which is [10] capable of being may either be or not be; the same thing, then, is capable both of being and of not being. And that which is capable of not being may possibly not be; and that which may possibly not be is perishable, either without qualification, or in the precise sense in which it is said that it possibly may not be, i.e. either in respect [15] of place or quantity or quality; 'without qualification' means 'in substance'. Nothing, then, which is without qualification imperishable is without qualification potentially (though there is nothing to prevent its being potentially in some respect, e.g. potentially of a certain quality or in a certain place); imperishable things, then, exist actually. Nor can anything which is of *necessity* be potential; yet these things are primary; for if these did not exist, nothing would exist. Nor does eternal movement, if there be such, exist potentially; and, if there is an eternal mover, it is [20] not potentially in motion (except in respect of 'whence' and 'whither'; there is nothing to prevent its having matter for this). Therefore the sun and the stars and the whole heaven are ever active, and there is no fear that they may sometime stand still, as the natural philosophers fear they may. Nor do they tire in this activity; for movement does not imply for them, as it does for perishable things, the potentiality [25] for opposites, so that the continuity of the movement should be laborious; for it is that kind of substance which is matter and potentiality, not actuality, that causes this.

Imperishable things are imitated by those that are involved in change, e.g. earth and fire. For these also are ever active; for they have their movement of [30] themselves and in themselves. But the other potentialities, according to the distinction we have drawn above, are all potentialities for opposites; for that which can move another in this way can also move it not in this way, i.e. if it acts according to a rational

formula. But the same *non-rational* potentialities can produce opposite results only by their presence or absence.

If, then, there are any entities or substances such as the dialecticians say the [35] Ideas are, there must be something much more scientific than the Idea of science [1051<sup>a</sup>1] and something more mobile than the Idea of movement; for these will be more of the nature of actualities, while the Ideas are potentialities for these. Obviously, then, actuality is prior both to potentiality and to every principle of change.

9 · That the good actuality is better and more valuable than the good [5] potentiality is evident from the following argument. Everything of which we say that it can do something, is alike capable of contraries, e.g. that of which we say that it can be healthy is the same as that which can be ill, and has both potentialities at once; for one and the same potentiality is a potentiality for health and illness, for [10] rest and motion, for building and throwing down, for being built and being thrown down. The capacity for contraries is present at the same time; but contraries cannot be present at the same time, and the actualities also cannot be present at the same time, e.g. health and illness. Therefore one of them must be the good, but the [15] capacity is both the contraries alike, or neither; the actuality, then, is better. And in the case of bad things, the end or actuality must be worse than the potentiality; for that which can is both contraries alike.

Clearly, then, the bad does not exist apart from bad things; for the bad is in its nature posterior to the potentiality. And therefore we may also say that in the things [20] which are from the beginning, i.e. in eternal things, there is nothing bad, nothing defective, nothing perverted (for perversion is something bad).

It is by actualization also that geometrical relations are discovered; for it is by dividing the given figures that people discover them. If they had been already divided, the relations would have been obvious; but as it is the divisions are present only potentially. Why are the angles of the triangle equal to two right angles? [25] Because the angles about one point are equal to two right angles. If, then, the line parallel to the side had been already drawn, the theorem would have been evident to any one as soon as he saw the figure. Why is the angle in a semicircle in all cases a right angle? Because if three lines are equal—the two which form the base, and the perpendicular from the centre—the conclusion is evident at a glance to one who knows this premise.

Obviously, therefore, the potentially existing relations are discovered by being [30] brought to actuality (the reason being that thinking is the actuality of thought); so that potentiality is discovered from actuality (and therefore it is by an act of construction that people acquire the knowledge), though the single actuality is later in generation.

10 · The terms ‘being’ and ‘non-being’ are employed firstly with reference to the categories, and secondly with reference to the potentiality or actuality of these [1051<sup>b</sup>1] or their opposites, while being and non-being in the strictest sense are truth and falsity<sup>4</sup>. The condition of this in the objects is their being combined or separated, so that he who thinks the separated to be separated and the combined to be combined has the truth, while he whose thought is in a state contrary to that of the objects is in error. This being so, when is what is called truth or falsity present, and when is it [5] not? We must consider what we mean by these terms. It is not because we think that you are white, that you *are* white, but because you are white we who say this have the truth. If, then, some things are always combined and cannot be separated, and others are always separated and cannot be combined, while others are capable [10] either of combination or of separation, being is being combined and one, and not being is being not combined but more than one; regarding contingent facts, then, the same opinion or the same statement comes to be false and true, and it is possible at one time to have the truth and at another to be in error; but regarding things that [15] cannot be otherwise opinions are not at one time true and at another false, but the same opinions are always true or always false.

With regard to *incomposites*, what is being or not being, and truth or falsity? A thing of this sort is not composite, so as to be when it is compounded, and not to be if it is separated, like the white wood or the incommensurability of the diagonal; nor [20] will truth and falsity be still present in the same way as in the previous cases. In fact, as truth is not the same in these cases, so also being is not the same; but truth or falsity is as follows—contact and assertion are truth (assertion not being the same as affirmation), and ignorance is non-contact. For it is not possible to be in *error* [25] regarding the question what a thing is, save in an accidental sense; and the same holds good regarding non-composite substances (for it is not possible to be in error about them). And they all exist actually, not potentially; for otherwise they would come to be and cease to be; but, as it is, being itself does not come to be (nor cease to be);

for if it did it would have to come out of something. About the things, then, [30] which are essences and exist in actuality, it is not possible to be in error, but only to think them or not to think them. Inquiry about their 'what' takes the form of asking whether they are of such and such a nature or not.

As regards being in the sense of truth and not being in the sense of falsity, in one case there is truth if the subject and the attribute are really combined, and falsity if they are not combined; in the other case, if the object is existent it exists in a particular way, and if it does not exist in this way it does not exist at all; and truth [1052<sup>a</sup>1] means thinking these objects, and falsity does not exist, nor error, but only ignorance,—and not an ignorance which is like blindness; for blindness is akin to a total absence of the faculty of thinking.

It is evident also that about unchangeable things there can be no error in respect of time, if we assume them to be unchangeable. E.g. if we suppose that the [5] triangle does not change, we shall not suppose that at one time its angles are equal to two right angles while at another time they are not (for that would imply change). It is possible, however, to suppose that one member of such a class has a certain attribute and another has not, e.g. while we may suppose that no even number is prime, we may suppose that some are and some are not. But regarding a single number not even this form of error is possible; for we cannot in this case suppose that one instance has an attribute and another has not; but whether our [10] judgement be true or false, it is implied that the fact is eternal.



## BOOK X (I)

[15] 1 · We have said previously, in our distinction of the various meanings of words, that ‘one’ has several meanings; while it is used in many senses, the things that are primarily and of their own nature and not accidentally called one may be summarized under four heads. (1) There is the continuous, either in general, or [20] especially that which is continuous by nature and not by contact nor by bonds; and of these, those things have more unity and are prior, whose movement is more indivisible and simpler. (2) That which is a whole and has a certain shape and form is *one* in a still higher degree; and especially if a thing is of this sort by nature, and not by force like the things which are unified by glue or nails or by being tied [25] together, i.e. if it has in itself something which is the cause of its continuity. A thing is of this sort because its movement is one and indivisible in place and time; so that evidently if a thing has by nature a principle of movement that is of the first kind (i.e. local movement) and the first in that kind (i.e. circular movement), this is in the primary sense one extended thing. The things, then, which are in this way one are either continuous<sup>1</sup> or whole, and the other things that are one are those whose [30] formula is one. Of this sort are the things the thought of which is one, i.e. those the thought of which is indivisible; and it is indivisible if the thing is indivisible in kind or in number. (3) In number, then, the individual is indivisible, and (4) in kind, that which in intelligibility and in knowledge is indivisible, so that that which causes substances to be one must be one in the primary sense. ‘One,’ then, has all these [35] meanings—the naturally continuous, the whole, the individual, and the universal. And all these are one because in some cases the movement, in others the thought or [1052<sup>b</sup>1] the formula, is indivisible.

But it must be observed that the questions, what sort of things are said to be one, and on the other hand what it is to be one and what is the formula of it, should not be assumed to be the same. ‘One’ has all these meanings, and each of those [5] things to which one of these kinds of unity belongs will be one; but ‘to be one’ will sometimes mean being one of these things, and sometimes something else, which is even nearer to the word ‘one’, while these other things approximate to its force. This is also true of ‘element’ or ‘cause’, if one had both to specify the things of



which it is predicable and to give the definition of the word. For in a sense fire is an element [10] (and doubtless 'the indefinite' or something else of the sort is by its own nature the element), but in a sense it is not; for it is not the same thing to be fire and to be an element, but while as a particular thing with a nature of its own fire is an element, the name 'element' means that it has this attribute, that there is something which is [15] made of it as a primary constituent. And so with 'cause' and 'one' and all such terms. For this reason to be one is to be indivisible (being essentially a 'this' and capable of existing apart either in place or in form or thought); or perhaps to be whole and indivisible; but it is especially to be the first measure of a kind, and above all of quantity; for it is from this that it has been extended to the other categories. For measure is that by which quantity is known; and quantity *qua* quantity is known [20] either by a 'one' or by a number, and all number is known by a 'one'. Therefore all quantity *qua* quantity is known by the one, and that by which quantities are primarily known is the one itself; and so the one is the starting-point of number *qua* number. And hence in the other classes too 'measure' means that by which each is [25] first known, and the measure of each is a 'one'—in length, in breadth, in depth, in weight, in speed. (Weight and speed are common to both contraries; for each of them has two meanings,—'weight' means both that which has any amount of gravity and that which has an excess of gravity, and 'speed' both that which has any amount of movement and that which has an excess of movement; for even the slow [30] has a certain speed and the light a certain weight.)

In all these, then, the measure and starting-point is something one and indivisible, since even in lines we treat as indivisible the line a foot long. For everywhere we seek as the measure something one and indivisible; and this is that which is simple either in quality or in quantity. Now where it is thought impossible [35] to take away or to add, there the measure is exact. Hence that of number is most exact; for we posit the unit as absolutely indivisible; and in all other cases we imitate [1053<sup>a</sup>1] this sort of measure. For in the case of a furlong or a talent or of anything large any addition or subtraction might more easily escape our notice than in the case of something smaller; so that the first thing from which, as far as our perception goes, [5] nothing can be subtracted, all men make the measure, whether of liquids or of solids, whether of weight or of size; and they think they know the quantity when they know it by means of this measure. And they know movement too by the simple movement and the quickest; for this occupies least time. And therefore in

astronomy a 'one' of this sort is the starting-point and measure (for they assume the [10] movement of the heavens to be uniform and the quickest, and judge the others by reference to it), and in music the quarter-tone (because it is the least interval) and in speech the letter. And all these are one in this sense—not that 'one' is something predicable in the same sense of all of these, but in the sense we have mentioned.

But the measure is not always one in number—sometimes there are several; [15] e.g. the quarter-tones (not to the ear, but as determined by the ratios) are two, and the articulate sounds by which we measure are more than one, and the diagonal of the square and its side are measured by two quantities, and so are all spatial magnitudes. Thus, then, the one is the measure of all things, because we come to know the elements in the substance by dividing the things either in respect of quantity or in respect of kind. The one is indivisible just because the first of each [20] class of things is indivisible. But it is not in the same way that every 'one' is indivisible, e.g. a foot and a unit; the latter is absolutely indivisible, while the former must be placed among things which are undivided in perception, as has been said already,—for doubtless every continuous thing is divisible.

The measure is always homogeneous with the thing measured; the measure of spatial magnitudes is a spatial magnitude, and in particular that of length is a [25] length, that of breadth a breadth, that of articulate sounds an articulate sound, that of weight a weight, that of units a unit. (For we must state the matter so, and not say that the measure of numbers is a number; we ought indeed to say this if we were to use the corresponding form of words, but the supposition does not really correspond—it is as if one supposed that the measure of units is units, and not a [30] unit, for number is a plurality of units.)

Knowledge also, and perception, we call the measure of things, for the same reason, because we know something by them,—while as a matter of fact they are measured rather than measure other things. But it is with us as if some one else measured us and we came to know how big we are by seeing that he applied the cubit-measure a certain number of times to us. But Protagoras says man is the [1053<sup>b</sup>1] measure of all things, meaning really the man who knows or the man who perceives, and these because they have respectively knowledge and perception, which we say are the measures of objects. They are saying nothing, then, while appearing to be saying something remarkable. Evidently, then, being one in the strictest sense, if we [5] define it according to the meaning of the word, is a measure, and especially of quantity, and

secondly of quality. And some things will be one if they are indivisible in quantity, and others if they are indivisible in quality; therefore that which is one is indivisible, either absolutely or *qua* one.

2 · With regard to the substance and nature of the one we must ask in which [10] of two ways it exists. This is the very question that we reviewed in our discussion of problems, viz. what the one is and how we must conceive of it, whether we must take the one itself as being a substance (as both the Pythagoreans say in earlier and Plato in later times), or there is, rather, an underlying nature and it is to be explained more intelligibly and more in the manner of the natural philosophers, of whom one [15] says the one is love, another says it is air, and another the indefinite.

If then no universal can be a substance, as has been said in our discussion of substance and being, and if being itself cannot be a substance in the sense of a one apart from the many (for it is common to the many), but is only a predicate, clearly [20] the one also cannot be a substance; for being and one are the most universal of all predicates. Therefore, on the one hand, classes are not certain entities and substances separable from other things; and on the other hand the one cannot be a class, for the same reasons for which being and substance cannot be classes.

Further, this must hold good in all categories alike. Now 'being' and 'unity' [25] have an equal number of meanings; so that since in the sphere of qualities the one is something definite—some entity—and similarly in the sphere of quantities, clearly we must also ask in general what unity is, as we must ask what being is, since it is not enough to say that its nature is just to be unity or being. But in colours the one is [30] a colour, e.g. white—the other colours are observed to be produced out of this and black, and black is the privation of white, as darkness of light. Therefore if all existent things were colours, existent things would have been a number, indeed, but of what? Clearly of colours; and the 'one' would have been a particular 'one', e.g. [35] white. And similarly if all existent things were tunes, they would have been a number, but a number of quarter-tones, and their substance would not have been number; and the one would have been something whose substance was not the one [1054<sup>a</sup>1] but the quarter-tone. And similarly if all existent things had been articulate sounds, they would have been a number of letters, and the one would have been a vowel. And if all existent things were rectilinear

figures, they would have been a number of figures, and the one would have been the triangle. And the same argument applies to all other classes. Since, therefore, while there are numbers and a one both in [5] affections and in qualities and in quantities and in movement, in all cases the number is a number of particular things and the one is one something, and its substance is not to be one, the same must be true of substances; for it is true of all cases alike. That the one, then, in every class is a definite thing, and in no case is its [10] nature just this—viz. unity, is evident; but as in colours the one itself which we must seek is one colour, so too in substance the one itself is one substance.

And that in a sense unity means the same as being is clear from the fact that it follows the categories in as many ways, and is not comprised within any category, e.g. neither in substance nor in quality, but is related to them just as being is; and [15] from the fact that in ‘one man’ nothing more is predicated than in ‘man’, just as being is nothing apart from substance or quality or quantity; and to be one is just to be a particular thing.

**3** · The one and the many are opposed in several ways, of which one is the [20] opposition of the one and plurality as indivisible and divisible; for that which is either divided or divisible is called a plurality, and that which is indivisible or not divided is called one. Now since opposition is of four kinds, and one of these two terms is privative in meaning, they must be contraries, and neither contradictory [25] nor correlative. And the one gets its meaning and explanation from its contrary, the indivisible from the divisible, because plurality and the divisible is more perceptible than the indivisible, so that in formula plurality is prior to the indivisible, because of the conditions of perception. To the one belong, as we indicated graphically in our [30] distinction of the contraries, the same and the like and the equal, and to plurality belong the other and the unlike and the unequal.

‘The same’ has several meanings: we sometimes mean ‘the same numerically’; again, we call a thing the same if it is one both in formula and in number, e.g. you are one with yourself both in form and in matter; and again, if the formula of its [1054<sup>b</sup>1] primary substance is one, e.g. equal straight lines are the same, and so are equal and equal-angled quadrilaterals—there are many such, but in these equality constitutes unity.

Things are like if, not being absolutely the same, nor without

difference in their compound substance, they are the same in form, e.g. the larger square is like [5] the smaller, and unequal straight lines are like; they are like, but not absolutely the same. Other things are like, if, having the same form, and being things in which difference of degree is possible, they have no difference of degree. Other things, if they have a quality that is in form one and the same—e.g. whiteness—in a greater [10] or less degree, are called like because their form is one. Other things are called like if the qualities they have in common are more numerous than those in which they differ—either the qualities in general or the prominent qualities, e.g. tin is like silver, *qua* white, and gold is like fire, *qua* yellow and red.

Evidently, then, ‘other’ and ‘unlike’ also have several meanings. And the other [15] in one sense is the opposite of the same (so that everything is either the same as or other than everything else). In another sense things are other unless both their matter and their formula are one (so that you are other than your neighbour). The other in the third sense is exemplified in the objects of mathematics. ‘Other’ or ‘the same’ can for this reason be predicated of everything with regard to everything else,—but only if the things are one and existent, for the other is not the [20] *contradictory* of the same; which is why it is not predicated of non-existent things (while ‘not the same’ is so predicated). It is predicated of all *existing* things; for if a thing is both existent and one, it is naturally either one or not one. The other, then, and the same are thus opposed.

But difference is not the same as otherness. For the other and that which it is other than need not be other in some definite respect (for everything that exists is [25] either other or the same), but that which is different from anything is different in some respect, so that there must be something identical whereby they differ. And this identical thing is genus or species; for all things that differ differ either in genus or in species, in genus if the things have not their matter in common and are not generated out of each other (i.e. if they belong to different figures of predication), [30] and in species if they have the same genus (the genus is that same thing which both the different things are said to be in respect of their substance). And contraries are different, and contrariety is a kind of difference. That we are right in this supposition is shown by induction. For they are all seen to be different; they are not merely other, but some are other in genus, and others are in the same line of [1055<sup>a</sup>1] predication, and therefore in the same genus, and the same in genus. We have distinguished elsewhere what sort of things are the same or other in genus.

4 · Since things which differ may differ from one another more or less, there [5] is also a greatest difference, and this I call contrariety. That contrariety is the greatest difference is made clear by induction. For things which differ in *genus* have no way to one another, but are too far distant and are not comparable; and for things that differ in *species* the extremes from which generation takes place are the contraries; and the distance between extremes—and therefore that between the contraries—is the greatest.

[10] But that which is greatest in each class is complete. For that is greatest which cannot be exceeded, and that is complete beyond which nothing can be found. For the complete difference marks the end (just as the other things which are called complete are so called because they have attained an end), and beyond the end there is nothing; for in everything it is the extreme and includes all else, and therefore [15] there is nothing beyond the end, and the complete needs nothing further. From this, then, it is clear that contrariety is complete difference; and as contraries are so called in several senses, their modes of completeness will answer to the various modes of contrariety which attach to them.

This being so, evidently one thing cannot have more than one contrary, for [20] neither can there be anything more extreme than the extreme, nor can there be more than two extremes for the one interval. And in general if contrariety is a difference, and if a difference must be between two things, then the complete difference must be so too.

And the other definitions are also necessarily true of contraries. For in each case the complete difference is the greatest difference. We cannot get anything beyond it, whether the things differ in *genus* or in *species*; for it has been shown that [25] there is *no* difference between anything and the things outside its *genus*; and among these things the complete difference is the greatest. And the things in the same *genus* which differ most are contraries; for the complete difference is the greatest difference among these. And the things in the same receptive material which differ most are contrary; for the matter is the same for contraries. And of the things which [30] are dealt with by the same faculty the most different are contrary; for one science deals with one class of things, and in these the complete difference is the greatest.

The primary contrariety is that between state and privation—not every privation, however (for ‘privation’ has several meanings), but that which is complete. And the other contraries must be called so with reference to these, some [35] because they possess these, others because

they produce or tend to produce them, others because they are acquisitions or losses of these or of other contraries. Now if the kinds of opposition are contradiction and privation and contrariety and relation, and of these the first is contradiction, and contradiction admits of no intermediate, [1055<sup>b</sup>1] while contraries admit of one, clearly contradiction and contrariety are not the same. But privation is a kind of contradiction; for what suffers privation, either in general or in some determinate way, is either that which is quite incapable of having some attribute or that which, being of such a nature as to have it, has it not; here we [5] have already a variety of meanings, which have been distinguished elsewhere. Privation, therefore, is a contradiction or incapacity which is determinate or taken along with the receptive material. This is the reason why, while contradiction does not admit of an intermediate, privation sometimes does; for everything is equal or not equal, but not everything is equal or unequal, or if it is, it is only within the [10] sphere of that which is receptive of equality. If, then, the changes which happen to the matter start from the contraries, and proceed either from the form and the possession of the form or from a privation of the form or shape, clearly all contrariety is a privation. (But perhaps not all privation is contrariety, the reason [15] being that that which suffers privation may suffer it in several ways.) For the extremes from which the changes proceed are contraries.

And this is obvious also by induction. For every contrariety involves, as one of its terms, a privation. But not all cases are alike; inequality is the privation of equality and unlikeness of likeness, and vice is the privation of excellence. But the [20] cases differ as has been said; in one case we mean simply that the thing suffers privation, in another case that it does so at a certain time or in a certain part (e.g. at a certain age or in the proper part), or throughout. This is why in some cases there is something in between (there are men who are neither good nor bad), and in others there is not (a number must be either odd or even). Further, some contraries have their subject defined, others have not.—Therefore it is evident that one of the [25] contraries is always privative; but it is enough if this is true of the first—i.e., the generic—contraries, e.g. the one and the many; for the others can be referred to these.

[30] **5** · Since one thing has one contrary, we might raise the question how the one is opposed to the many and the equal to the great and the small.—For if we use the word ‘whether’ only in an opposition,

asking e.g. whether it is white or black, and whether it is white or not white (we do not ask whether it is a man or white, unless [35] we are proceeding on a prior assumption and asking e.g. whether it was Cleon or Socrates that came. But this is not necessary in any class of things. Yet even this is an extension from the case of opposites; for opposites alone cannot be present together; and we assume this incompatibility here in asking which of the two came; [1056<sup>a</sup>1] for if they might both have come, the question would have been absurd. But if they might, even so this falls just as much into an opposition—that of the one and the many, i.e. we ask whether both came or only one):—if, then, the question ‘whether’ is always concerned with opposites, and we can ask whether it is greater or less or [5] equal, what is the opposition between the greater and the less, and the equal? The equal is not contrary either to one alone or to both; for why should it be contrary to the greater rather than to the less? Further, the equal is contrary to the *unequal*. Therefore it will be contrary to more things than one. But if the unequal means the same as both the greater and the less together, the equal *will* be opposite to both [10] (and the difficulty supports those who say the unequal is a ‘two’), but it follows that one thing has two contraries, which is impossible. Again, the equal is evidently intermediate between the great and the small, but no contrary is either observed to be intermediate, nor, from its definition, can be so; for it would not be a perfect contrary if it were intermediate between any two things, but rather it always has something intermediate between itself and something else.

[15] It remains, then, that it is opposed either as negation or as privation. It cannot be opposite to one of the two; for why to the great rather than to the small? It is then the privative negation of both. Therefore also ‘whether’ is said with reference to both—not to one of the two (e.g. we ask whether it is greater or equal, or whether it [20] is equal or less); there are always three cases. But it is not a *necessary* privation; for not everything which is not greater or less is equal, but only the things which are of such a nature as to have these attributes. The equal, then, is that which is neither great nor small and is naturally fitted to be either great or small; and it is opposed to both as a privative negation (and therefore is also intermediate). And that which is [25] neither good nor bad is opposed to both, but has no name (for each of these has several meanings and the receptive material is not one); but that which is neither white nor black has more claim to a name. Yet even this has not one name, though the colours of which this negation is privately predicated are in a way limited; for [30] they must be either grey or yellow or



something else of the kind. Therefore it is an incorrect criticism that is passed by those who think that all such phrases are used in the same way, so that that which is neither a shoe nor a hand would be intermediate between a shoe and a hand, since that which is neither good nor bad is intermediate between the good and the bad,—as if there must be an intermediate in all cases. This result does not necessarily follow. For the combined denial of opposites applies [35] when there is an intermediate and a certain natural interval; but in the other case there is no difference; for the things, the denials of which are combined, belong to [1056<sup>b</sup>1] different classes, so that the substratum is not one.

6 · We might raise similar questions about the one and the many. For if the many are absolutely opposed to the one, certain impossible results follow. One will [5] then be few; for the many are opposed also to the few. Further, two will be many, since the double is multiple, and double derives from two; therefore one will be few; for what is that in comparison with which two are called many, except one and that which is few? For there is nothing fewer. Further, if a lot and few are in plurality [10] what the long and the short are in length, and whatever is a lot is also many, and the many are a lot (unless, indeed, there is a difference in the case of an easily-bounded continuum), the few will be a plurality. Therefore one is a plurality, if it is few; and this must be so, if two are many. But perhaps, while the many are in a sense said to [15] be a lot, it is with a difference, e.g. there is a lot of water, not many waters.

But 'many' is applied to the things that are divisible; in one sense it means a plurality which is excessive either absolutely or relatively (while 'few' is similarly a plurality which is deficient), and in another sense it means number, in which sense alone it is opposed to the one. For we say 'one or many', just as if one were to say [20] 'one and ones' or 'white thing and white things', or to compare the things that have been measured with the measure. It is in this sense also that multiples are so called. For each number is said to be many because it consists of ones and because each number is measurable by one; and it is many as that which is opposed to one, not to the few. In this sense, then, even two is many—not however in the sense of a [25] plurality which is excessive either relatively or absolutely; it is the *first* plurality. But without qualification two is few; for it is the first plurality which is deficient. (For this reason Anaxagoras was not right in leaving the subject with the statement that all things were together, boundless both in multitude and in smallness—

where by ‘and in smallness’ he meant ‘and in fewness’; for they could not have been [30] boundless in fewness.) For it is not one, as some say, but two, that make a few.

The one is opposed then to the many in numbers as measure to thing measurable; and these are opposed as relatives which are not from their very nature relative. We have distinguished elsewhere the two senses in which relatives are so [35] called—some as contraries, others as knowledge to thing known, a term being called relative because another is relative to it. There is nothing to prevent one from being [1057<sup>a</sup>1] fewer than something, e.g. than two; for if it is fewer, it is not therefore few. Plurality is as it were the class to which number belongs; for number is plurality measurable by one. And one and number are in a sense opposed, not as contrary, but as we have said some relative terms are opposed; for inasmuch as one is measure and [5] the other measurable, they are opposed. This is why not everything that is one is a number, i.e. if the thing is indivisible it is not a number. But though knowledge is similarly spoken of as related to the knowable, the relation does not work out similarly, for while knowledge might be thought to be the measure, and the [10] knowable the thing measured, the fact is that all knowledge is knowable, but not all that is knowable is knowledge, because in a sense knowledge is measured by the knowable.—Plurality is contrary neither to the few (the *many* being contrary to this as excessive plurality to plurality exceeded), nor to the one in every sense; but in one [15] sense they are contrary, as has been said, because the former is divisible and the latter indivisible, while in another sense they are relative (as knowledge is to the knowable), if plurality is number and the one is measure.

7 · Since contraries admit of an intermediate and in some cases have it, the intermediate must be composed of the contraries. For all intermediates are in the [20] same genus as the things between which they stand. For we call those things intermediates, into which that which changes must change first; e.g. if we were to pass from the highest string to the lowest by the shortest way, we should come sooner to the intermediate notes, and in colours if we are to pass from white to black, [25] we shall come sooner to crimson and gray than to black; and similarly in all other cases. But to pass from one genus to another genus (e.g. from colour to figure) is not possible except in an incidental way. Intermediates, then, must be in the same genus as one another and as the things they stand between.

[30] But all intermediates stand between opposites of some kind; for only between these can change take place in virtue of their own nature. Therefore an intermediate is impossible between things which are not opposite; for then there would be change which was not from one opposite towards the other. Among opposites, contradictories admit of no middle term; for contradiction is this—an opposition, one or other [35] side of which must attach to anything whatever, i.e. which has no intermediate. Of other opposites, some are relative, others privative, others contrary. Of relative terms, those which are not contrary have no intermediate. The reason is that they are not in the same genus. For what intermediate could there be between knowledge [1057<sup>b</sup>1] and the knowable? But between great and small there *is* one.

If intermediates are in the same genus, as has been shown, and stand between contraries, they must be composed of these contraries. For either there will be a genus including the contraries or there will be none. And if there is a genus in such a [5] way that it is something prior to the contraries, the differentiae which constitute the contrary species of the genus will be contraries prior to the species; for species are composed of the genus and the differentiae. E.g. if white and black are contraries, and one is a piercing colour and the other a compressing colour, these differentiae—piercing [10] and compressing—are prior; so that these are prior contraries of one another (though indeed the species which differ by contrariety are more truly contrary). And the other species, i.e. the intermediates, must be composed of their genus and their differentiae. E.g. all colours which are between white and black [15] must be said to be composed of the genus (i.e. colour) and certain differentiae. But these differentiae will not be the primary contraries; otherwise every colour would be either white or black. They are different, then, from the primary contraries; and therefore they will be between the primary contraries; the primary differentiae are piercing and compressing. Therefore it is with regard to these contraries which do not fall within a genus that we must first ask of what their intermediates are [20] composed. (For things which *are* in the same genus must be composed of terms in which the genus is not an element, or else be themselves incomposite.) Now contraries do not involve one another in their composition, and are therefore first principles; but the intermediates are either all incomposite, or none of them. But there is something compounded out of the contraries, which is such that there can be a change from a contrary to it sooner than to the other contrary; for it will have less of the quality in question than the one contrary and more than the other. This [25] also, then, will come

between the contraries. All the other intermediates also, therefore, are *composite*; for that which has more of a quality than one thing and less than another is compounded somehow out of the things than which it is said to have more and less respectively. And since there are no other things prior to the contraries and homogeneous with the intermediates, all intermediates must be [30] compounded out of the contraries. Therefore all the inferior classes, both the contraries and their intermediates, will be compounded out of the primary contraries. Clearly, then, intermediates are all in the same genus and intermediate between contraries and compounded out of the contraries.

8 · That which is other in species is other than something in something, and [35] this must belong to both; e.g. if it is an animal other in species, both are animals. The things, then, which are other in species must be in the same genus. For by genus I mean that one identical thing which is predicated of both and is differentiated in no merely accidental way, whether conceived as matter or otherwise. For not only [1058<sup>a</sup>1] must the common nature attach to the different things, e.g. not only must both be animals, but this very animal must also be different for each (e.g. in the one case horse, in the other man), and therefore this common nature is specifically different for the two things. One then will be in virtue of its own nature one sort of animal, [5] and the other another, e.g. one a horse and the other a man. This difference then must be an otherness of the genus. For I give the name of ‘difference in the genus’ to an otherness which makes the genus itself other.

This, then, will be a contrariety (as can be shown also by induction). For all things are divided by opposites, and it has been proved that contraries are in the [10] same genus. For contrariety was seen to be complete difference; and every difference in species is a difference from something in something; so that this is the same for both and is their genus. (Hence also all contraries which are different in species and not in genus are in the same line of predication, and other than one another in the highest degree—for the difference is complete—, and cannot be [15] present along with one another.) The difference, then, is a contrariety.

This, then, is the meaning of calling two things other in species—that they are contrary, being in the same genus and being indivisible (and those things are the same in species, which have no contrariety, being indivisible); for in the process of division contrarieties arise even in the intermediate stages before we come to the [20] indivisibles. Evidently,

therefore, with reference to that which is called the genus, none of the species which belong to the genus is either the same as it or other than it in species (rightly so, for the matter is indicated by negation, and the genus is the matter of that of which it is called the genus, not in the sense in which we speak of the genus of the Heraclidae, but in that in which we speak of a genus in nature), nor [25] is it so with reference to things which are not in the same genus, but it will differ in genus from them, and in species from things in the same genus. For the difference between things which differ in species must be a contrariety; and this belongs only to things in the same genus.

9 · One might raise the question, why woman does not differ from man in [30] species, female and male being contrary, and their difference being a contrariety; and why a female and a male animal are not different in species, though this difference belongs to animal in virtue of its own nature, and not as whiteness or blackness does; both female and male belong to it *qua* animal. This question is [35] almost the same as the other, why one contrariety makes things different in species and another does not, e.g. ‘with feet’ and ‘with wings’ do, but whiteness and blackness do not. Perhaps it is because the former are modifications peculiar to the genus, and the latter are less so. And since one element is formula and one is matter, [1058<sup>b</sup>1] contraries which are in the formula make a difference in species, but those which are in the compound material thing do not make one. Therefore whiteness in a man, or blackness, does not make one, nor is there a difference in species between the [5] white man and the black man, not even if each of them be denoted by one word. For man plays the part of matter, and matter does not create a difference; for it does not make individual men species of man, though the flesh and the bones of which this man and that man consist are other. The compound thing is other, but not other in species, because in the formula there is contrariety, and man is the ultimate [10] indivisible kind. Callias is formula together with matter; white man, then, is so also, because Callias is white; man, then, is white only incidentally. Nor do a brazen and a wooden circle differ in species; and if a brazen triangle and a wooden circle differ in species, it is not because of the matter, but because there is a contrariety in the [15] formula. But does the matter not make things other in species, when it is other in a certain way, or is there a sense in which it does? For why is this horse other than this man in species, although their matter is included with their formulae? Doubtless because there is a contrariety in the *formula*. For while there is a contrariety also

between white man and black horse, and it is a contrariety in species, it does not [20] depend on the whiteness of the one and the blackness of the other, since even if both had been white, yet they would have been other in species. And male and female are indeed modifications peculiar to animal, not however in virtue of its substance but in the matter, i.e. the body. This is why the same seed becomes female or male by being acted on in a certain way. We have stated, then, what it is to be other in [25] species, and why some things differ in species and others do not.

10 · Since contraries are other in form, and the perishable and the imperishable are contraries (for privation is a determinate incapacity), the perishable and the imperishable must be different in kind.

Now so far we have spoken of the general terms themselves, so that it might be thought not to be necessary that every imperishable thing should be different from [30] every perishable thing in form, just as not every white thing is different in form from every black thing. For the same thing can be both, even at the same time if it is a universal (e.g. man can be both white and black), and if it is an individual it can still be both; for the same man can be, though not at the same time, white and black. Yet white is contrary to black. [35]

But while some contraries belong to certain things by accident (e.g. those now mentioned and many others), others cannot, and among these are both 'perishable' [1059<sup>a</sup>1] and 'imperishable'. For nothing is by accident perishable. What is accidental is capable of not being present, but perishableness is one of the attributes that belong of necessity to the things to which they belong; or else one and the same thing may be perishable and imperishable, if perishableness is capable of not belonging to it. [5] Perishableness then must either be the substance or be present in the substance of each perishable thing. The same account holds good for imperishableness also; for both are attributes which are present of necessity. The characteristics, then, in respect of which and in direct consequence of which one thing is perishable and another imperishable, are opposite, so that the things must be different in kind. [10]

Evidently, then, there cannot be Forms such as some maintain, for then one man would be perishable and another imperishable. Yet the Forms are said to be the same in form with the individuals and not homonymous; but things which differ in kind are further apart than those which differ in form.

## BOOK XI (K)

1 · That Wisdom is a science of first principles, is evident from the introductory chapters in which we have raised objections to the statements of others about the first principles; but one might ask the question whether Wisdom is to be [20] conceived as one science or as several. If as one, it may be objected that one science always deals with contraries, but the first principles are not contrary. If it is not one, what are these sciences with which it is to be identified?

Further, is it the business of one science or of more to examine the first principles of demonstration? If of one, why of this rather than of any other? If of [25] more, which must these be said to be?

Further, does it investigate all substances or not? If not all, it is hard to say which; but if, being one, it investigates them all, it is doubtful how the same science can embrace several subject-matters.

Further, does it deal with substances only or also with their accidents? If in the [30] case of attributes demonstration is possible, in that of substances it is not. But if the two sciences are different, what is each of them and which is Wisdom? If we think of it as demonstrative, the science of the *accidents* is Wisdom, but if as dealing with first principles, the science of *substances* claims the title.

[35] But again the science we are looking for must not be supposed to deal with the causes which have been mentioned in the *Physics*. For it does not deal with the final cause (for this is the good, and this is found in the field of action and movement; and it is the first mover—for that is the nature of the end—but in the case of things unmovable there is no first mover), and in general it is hard to say whether the [1059<sup>b</sup>1] science we are now looking for deals with perceptible substances or not with them, but with certain others. If with others, it must deal either with the Forms or with the objects of mathematics. Now evidently the Forms do not exist. (But it is hard to say, even if one suppose them to exist, why the same is not true of the other things of [5] which there are Forms, as of the objects of mathematics. I mean that they place the objects of mathematics between the Forms and perceptible things, as a third class of things besides the Forms and the things in this world; but there is not a third man or horse besides the ideal and the individuals. If on the other hand it is not as they say, [10] with what sort of things must the

mathematician be supposed to deal? Certainly not with the things in this world; for none of these is the sort of thing which the mathematical sciences inquire into.) Nor does the science which we are now seeking treat of the objects of mathematics; for none of them can exist separately. But again it does not deal with perceptible substances; for they are perishable.

[15] In general we might raise the question, to which science it belongs to discuss the difficulties about the matter of the objects of mathematics. Neither to natural science (because the whole inquiry of the natural scientist is about the things that have in themselves a principle of movement and rest), nor yet to the science which inquires into demonstration and science; for *this* is just the subject which *it* [20] investigates. It remains then that it is the philosophy which we have set before ourselves that treats of those subjects.

One might discuss the question whether the science we are seeking should be said to deal with the principles which are by some called elements. All men suppose [25] these to be present in compound things; but it might be thought that the science we seek should treat rather of *universals*; for every formula and every science is of universals and not of particulars, so that as far as this goes it would deal with the highest classes. These would be being and unity; for these might most of all be supposed to contain all things that are, and to be most like principles because they [30] are first by nature; for if they perish all other things are destroyed with them; for all things *are* and are one. But inasmuch as, if one is to suppose them to be genera, they must be genera predicable of their differentiae, and no genus is predicable of any of its differentiae, in this way it would seem that we should not make them genera nor [35] principles. Further, if the simpler is more of a principle than the less simple, and the ultimate members of the genus are simpler than the genus (for they are indivisible, but the genera are divided into many and differing species), the species might seem to be the principles, rather than the genera. But inasmuch as the species are involved in the destruction of the genera, the genera are more like principles; for [1060<sup>a</sup>1] that which involves another in its destruction is a principle of it. These and others of the kind are the subjects that involve difficulties.

2 · Further, must we suppose something apart from individual things, or is it these that the science we are seeking treats of? But these are infinite in number. But the things that are apart from the individuals are



genera or species; and the science [5] we now seek treats of neither of these. The reason why this is impossible has been stated. It is in general hard to say whether one must assume that there is a separable substance besides the sensible substances (i.e. the substances in this world), or that these are the real things and philosophy is concerned with them. For we seem to [10] seek another kind of substance, and this is our problem, i.e. to see if there is something which can exist apart by itself and belongs to no sensible thing.—Further, if there is another substance apart from sensible substances, which kinds of sensible substance must be supposed to have this corresponding to them? Why should one suppose men or horses to have it, and not the other animals or even all [15] lifeless things? On the other hand to set up other and eternal substances equal in number to the sensible and perishable substances would seem to fall beyond the bounds of probability.—But if the principle we now seek is not separable from corporeal things, what has a better claim to the name than matter? This, however, [20] does not exist in actuality, but exists in potency, and it would seem rather that the form or shape is a more important principle than this; but the form is perishable, so that there is no eternal substance at all which can exist apart and independent. But this is paradoxical; for such a principle and substance seems to exist and is sought by nearly all the best thinkers as something that exists; for how is there to be order [25] unless there is something eternal and independent and permanent?

Further, if there is a substance or principle of such a nature as that which we are now seeking, and if this is one for all things, and the same for eternal and for perishable things, it is hard to say why, if there is the same principle, some of the things that fall under the principle are eternal, and others are not eternal; this is [30] paradoxical. But if there is one principle of perishable and another of eternal things, we shall be in a like difficulty if the principle of perishable things as well is eternal; for why, if the principle is eternal, are not the things that fall under the principle also eternal? But if it is perishable it must have another principle, and that must [35] have yet another, and this will go on to infinity.

If on the other hand we set up what are thought to be the most unchangeable principles, being and unity, firstly, if each of these does not indicate a ‘this’ and a [1060<sup>b</sup>1] substance, how will they be separable and independent? Yet we expect the eternal and primary principles to be so. But if each of them does signify a ‘this’ and a substance, all things that are are substances; for being is predicated of all things [5] (and unity also of

some); but that all things that are substance is false. Further, how can they be right who say that the first principle is unity and this is substance, and generate number as the first product from unity and from matter, and assert that number is substance? How are we to think of two, and each of the other [10] numbers composed of units, as one? On this point neither do they say anything nor is it easy to say anything. But if we suppose lines or what comes after these (I mean the primary plane figures) to be principles, these at least are not separable substances, but sections and divisions—the former of surfaces, the latter of solids [15] (while points are sections and divisions of lines); and further they are limits of these same things; and all these are in other things and none is separable. Further, how are we to suppose that there is a substance of unity and the point? Every substance comes into being, but the point does not; for the point is a division.

[20] A further difficulty is raised by the fact that all knowledge is of universals and of the ‘such’, but substance does not belong to universals, but is rather a ‘this’ and separable, so that if there is knowledge about the first principles, the question arises, how are we to suppose the first principle to be substance?

Further, is there anything apart from the compound thing (by which I mean [25] the matter and that which is joined with matter), or not? If not, all things that are in matter are perishable. But if there *is* something, it must be the form or shape. It is hard to determine in which cases this exists apart and in which it does not; for in some cases the form is evidently not separable, e.g. in the case of a house.

Further, are the principles the same in kind or in number? If they are one in [30] number, all things will be the same.

3 · Since the science of the philosopher treats of being *qua* being universally and not of some part of it, and ‘being’ has many senses and is not used in one only, it follows that if it is used homonymously and in virtue of no common nature, it does not fall under one science (for there is no one class in the case of such things); but if [35] it is used in virtue of some common nature, it will fall under one science. The term seems to be used in the way we have mentioned, like ‘medical’ and ‘healthy’. For [1061<sup>a</sup>1] each of these also we use in many senses; and each is used in this way because the former refers somehow to medical science and the latter to health. Other terms refer to other things, but each term refers to some one thing. For a prescription and a knife are called medical because

the former proceeds from medical science, and [5] the latter is useful to it. And a thing is called healthy in the same way; one thing because it is indicative of health, another because it is productive of it. And the same is true in the other cases. Everything that is, then, is said to be in this same way; each thing is said to be because it is a modification of being *qua* being or a [10] permanent or a transient state or a movement of it, or something else of the sort. And since everything that is may be referred to some one common nature, each of the contrarieties also may be referred to the first differences and contrarieties of being, whether the first differences of being are plurality and unity or likeness and [15] unlikeness, or some other differences; let these be taken as already discussed. It makes no difference whether that which is be referred to being or to unity. For even if they are not the same but different, they are convertible; for that which is one is also somehow being, and that which is being is one.—But as every pair of contraries falls to be examined by one and the same science, and in each pair one term is the [20] privation of the other (though one might regarding some contraries raise the question, how they can be privatively related, viz. those which have an intermediate, e.g. unjust and just; in all such cases one must maintain that the privation is not of the whole formula, but of its extreme form; e.g. if a man is just who is by virtue of [25] some permanent disposition obedient to the laws, the unjust man need not have the whole formula denied of him, but will be in some respect deficient in obedience to the laws, and in this respect the privation will attach to him; and similarly in all other cases); and since, as the mathematician investigates abstractions (for in his investigation he eliminates all the sensible qualities, e.g. weight and lightness, [30] hardness and its contrary, and also heat and cold and the other sensible contrarieties, and leaves only the quantitative and continuous, sometimes in one, sometimes in two, sometimes in three dimensions, and the attributes of things *qua* quantitative and continuous, and does not consider them in any other respect, and examines the [35] relative positions of some and the consequences of these, and the commensurability and incommensurability of others, and the ratios of others; but yet we say there is [1061<sup>b</sup>1] one and the same science of all these things—geometry), the same is true with regard to being (for the attributes of this in so far as it is being, and the contrarieties in it *qua* being, it is the business of no other science than *philosophy* to investigate; [5] for to natural science one would assign the study of things not *qua* being, but rather *qua* sharing in movement; while dialectic and sophistic deal with the attributes of things that are, but not of things *qua* being,

and not with being itself in so far as it is being);—therefore it remains that the *philosopher* studies the things we have [10] named, in so far as they are being. Since all that is is said to be in virtue of one common character though the term has many meanings, and contraries are in the same case (for they are referred to the first contrarieties and differences of being), and things of this sort can fall under one science, the difficulty we stated at the [15] beginning is solved,—I mean the question how there can be one science of things which are many and different in genus.

4 · Since even the mathematician uses the common axioms only in a special application, it must be the business of first philosophy to examine the principles of mathematics also. That when equals are taken from equals the remainders are [20] equal, is common to all quantities, but mathematics marks off a part of its proper matter and studies it separately, e.g. lines or angles or numbers or some other kind of quality—not, however, *qua* being but in so far as each of them is continuous in one or two or three dimensions; but philosophy does not inquire about particular [25] subjects in so far as each of them has such and such attributes, but considers each subject in relation to being *qua* being.—Natural science is in the same position as mathematics; for natural science studies the attributes and the principles of the things that are, *qua* moving and not *qua* being, whereas the primary science, we [30] have said, deals with these only in so far as the underlying subjects are existent, and not in virtue of any other character. Therefore both natural science and mathematics must be regarded as *parts* of Wisdom.

5 · There is a principle in things, about which we cannot be deceived, but must always, on the contrary, recognize the truth,—viz. that the same thing cannot at one and the same time be and not be, or admit any other similar pair of opposites. [1062<sup>a</sup>1] About such matters there is no proof in the full sense, though there is proof *ad hominem*. For it is not possible to infer this truth itself from a more certain principle, yet this is necessary if there is to be proof of it without qualification. But [5] he who wants to prove to the asserter of opposites that he is wrong must get from him an admission which shall *be* identical with the principle that the same thing cannot both be and not be at one and the same time, but shall not *seem* to be identical: for thus alone can he demonstrate his thesis to the man who says that [10] opposite statements can be truly made about the same subject. Those, then, who are to join in argument with one another must

to some extent understand one another; for if this does not happen how *can* they join in argument with one another? Therefore every word must be intelligible and signify something, and not many [15] things but only one; and if it signifies more than one thing, it must be made plain to which of these the word is being applied. He, then, who says this is and is not denies what he affirms, so that what the word signifies, he says it does not signify; and this is impossible. Therefore if 'this is' signifies something, one cannot truly assert the contradictory.

[20] Further, if the word signifies something and this can be truly asserted of it, it necessarily *is* this; and it is not possible that that which is necessary should ever not be; it is not possible therefore to make the opposed assertions truly of the same subject. Further, if the affirmation is no more true than the negation, he who says [25] 'man' will be no more right than he who says 'not-man'. It would seem also that in saying the man is not a horse we should be either more or not less right than in saying he is not a man, so that we shall be right in saying that the same person is a horse; for it was assumed to be possible to make opposite statements equally truly. It follows then that the same person is a man and a horse, or any other animal. While, [30] then, there is no proof of the axiom without qualification, there is a proof relatively to anyone who will make these suppositions. And perhaps if we had questioned Heraclitus himself in this way we might have forced him to confess that opposite statements can never be true of the same subjects. But, as it is, he adopted his opinion without understanding what his statement involved. But in any case if what [1062<sup>b</sup>1] is said by him is true, not even this itself is true—viz. that the same thing can at one and the same time both be and not be. For as, when the statements are separated, the affirmation is no more true than the negation, in the same way—the complex [5] statement being like one affirmation—the whole taken as an affirmation will be no more true than its negation. Further, if it is not possible to affirm anything truly, this itself will be false—the assertion that there is no true affirmation. But if a true [10] affirmation exists, this appears to refute what is said by those who raise such objections and utterly destroy rational discourse.

6 · The saying of Protagoras is like the views we have mentioned; he said that man is the measure of all things, meaning simply that that which seems to each man [15] assuredly is. If this is so, it follows that the same thing both is and is not, and is bad and good, and that the contents

of all other opposite statements are true, because often a particular thing appears beautiful to some and ugly to others, and that [20] which appears to each man is the measure. This difficulty may be solved by considering the source of the opinion. It seems to have arisen in some cases from the doctrine of the natural philosophers, and in others from the fact that all men have not the same views about the same things, but a particular thing appears pleasant to some and the contrary of pleasant to others.

That nothing comes to be out of that which is not, but everything out of that which is, is a doctrine common to nearly all the natural philosophers. Since, then, a [25] thing can become not-white, having been perfectly white and in no respect not-white, that which becomes white must come from that which is not-white; so that a thing must come to be out of that which is not (so they argue), unless the same thing was at the beginning both not-white and white. But it is not hard to solve [30] this difficulty; for we have said in the *Physics*<sup>1</sup> in what sense things that come to be come to be from that which is not, and in what sense from that which is.

But to lend oneself equally to the opinions and the fancies of disputing parties is foolish; for clearly one of them must be mistaken. And this is evident from what happens in sensation; for the same thing never appears sweet to some and bitter to [1063<sup>a</sup>1] others, unless in the one case the sense-organ which discriminates the aforesaid flavours has been perverted and injured. And if this is so the one party must be taken to be the measure, and the other must not. And I say the same of good and [5] bad, and beautiful and ugly, and all other such qualities. For to maintain the view we are opposing is just like maintaining the truth of what appears to people who put their finger under their eye and make the object appear two instead of one, i.e. like saying that it is two (because it appears to be of that number) and again one (for to those who do not interfere with their eye the one object appears one). [10]

In general, it is absurd to make the fact that the things of this earth are observed to change and never to remain in the same state, the basis of our judgements about the truth. For in pursuing the truth one must start from the things that are always in the same state and suffer no change. Such are the heavenly [15] bodies; for these do not appear to be now of one nature and again of another, but are manifestly always the same and share in no change.

Further, if there is movement, and something moved, and everything is moved out of something and into something, it follows that that which

is moved must first be in that out of which it is to be moved, and then not be in it, and move into the [20] other and come to be in it, and that the contradictory statements are not true *at the same time*, as our opponents assert they are.

And if the things of this earth continuously flow and move in respect of quantity—if one were to suppose this, although it is not true—why should they not endure in respect of quality? For the assertion of contradictory statements about the same thing seems to have arisen largely from the belief that the quantity of [25] bodies does not endure, so that the same thing both is and is not four cubits long. But the substance depends on quality, and this is of determinate nature, though quantity is indeterminate.

Further, when the doctor orders people to take some particular food, why do they take it? For why is this bread rather than not bread?—so that it would make [30] no difference whether one ate or not. But as a matter of fact they take it, assuming that they know the truth about it and that what has been prescribed is bread. Yet they should not, if there were no fixed constant nature in sensible things, but all moved and flowed for ever.

[35] Again, if we are always changing and never remain the same, what wonder is it if to us, as to the sick, things never appear the same? For to them also, because they [1063<sup>b</sup>1] are not in the same condition as when they were well, sensible qualities do not appear like; yet, for all that, the sensible things themselves need not share in any change, though they produce different, and not identical, sensations in the sick. And [5] the same must surely happen to the healthy if the aforesaid change takes place. But if we do not change but remain the same, there will be something that endures.

As for those to whom these difficulties are suggested by reason, it is not easy to solve the difficulties unless they will posit something and no longer demand a reason [10] for it; for it is thus that all reasoning and all proof is accomplished; if they posit nothing, they destroy discussion and all reasoning. Therefore with such men there is no reasoning. But as for those who are perplexed by the traditional difficulties, it is easy to meet them and to dissipate the causes of their perplexity. This is evident from what has been said.

[15] It is manifest, therefore, from these arguments that contradictory statements cannot be truly made about the same subject at one time, nor can contrary statements, because every contrariety depends on privation. This is evident if we reduce the formulae of contraries to their principle.

[20] Similarly, no intermediate between contraries can be predicated of one and the same subject. If the subject is white we shall be wrong in saying it is neither white nor black, for it would follow that it is and is not white; for the first of the two terms we have put together would be true of it, and this is the contradictory of white.

[25] We could not be right, then, in accepting the views either of Heraclitus or of Anaxagoras. If we were, it would follow that contraries would be predicated of the same subject, for when Anaxagoras says a portion of everything is in everything, he says nothing is sweet any more than it is bitter, and so with any other pair of contraries, since in everything everything is present not potentially only, but [30] actually and separately. And similarly all statements cannot be false nor all true, both because of many other difficulties which might be deduced as arising from this position, and because if all are false it will not be true even to say all are false, and if [35] all are true it will not be false to say all are false.

7 · Every science seeks certain principles and causes for each of its [1064<sup>a</sup>1] objects—e.g. medicine and gymnastics and each of the other sciences, whether productive or mathematical. For each of these marks off a certain class of things for itself and busies itself about this as about something that exists and is—not however *qua* being; the science that does *this* is another distinct from these. Of the sciences [5] mentioned each gets somehow the ‘what’ in some class of things and tries to prove the other truths, whether loosely or accurately. Some get the ‘what’ through perception, others by hypothesis; so that it is clear from an induction of this sort that there is no *demonstration* of the substance, i.e. of the ‘what’.

There is a science of nature, and evidently it must be different both from [10] practical and from productive science. For in the case of productive science the principle of production is in the producer and not in the product, and is either an art or some other capacity. And similarly in practical science the movement is not in the thing done, but rather in the doers. But the science of the natural philosopher [15] deals with the things that have *in themselves* a principle of movement. It is clear from these facts, then, that natural science must be neither practical nor productive, but theoretical (for it must fall into one of these classes). And since each of the sciences must somehow know the ‘what’ and use this as a principle, we must not fail [20] to observe how the natural philosopher



should define things and how he must state the formula of the substance—whether as akin to snub or rather to concave. For of these the formula of the snub includes the matter of the thing, but that of the concave is independent of the matter; for snubness is found in a nose, so that its [25] formula includes the nose—for the snub is a concave nose. Evidently then the formula of flesh and the eye and the other parts must always be stated without eliminating the matter.

Since there is a science of being *qua* being and capable of existing apart, we must consider whether this is to be regarded as the same as natural science or rather [30] as different. Natural science deals with the things that have a principle of movement in themselves; mathematics is theoretical, and is a science that deals with things that are at rest, but its subjects cannot exist apart. Therefore about that which can exist apart and is unmovable there is a science different from both of these, if there is a substance of this nature (I mean separable and unmovable), as we [35] shall try to prove there is. And if there is such a kind of thing in the world, here must surely be the divine, and this must be the first and most important principle. Evidently, then, there are three kinds of theoretical sciences—natural science, [1064<sup>b</sup>1] mathematics, theology. The class of theoretical sciences is the best, and of these themselves the last named is best; for it deals with the highest of existing things, and each science is called better or worse in virtue of its proper object. [5]

One might raise the question whether the science of being *qua* being is to be regarded as universal or not. Each of the mathematical sciences deals with some one determinate class of things, but universal mathematics applies alike to all. Now if natural substances are the first of existing things, natural science must be the first [10] of sciences; but if there is another entity and substance, separable and unmovable, the science of it must be different and prior to natural science, and universal because it is prior.

8 · Since things are said to be, without qualification, in several ways, of [15] which one is being by accident, we must consider first that which is in this sense. Evidently none of the traditional sciences busies itself about the accidental. For neither does building consider what will happen to those who are to use the house (e.g. whether they will have a painful life in it or not), nor does weaving, or [20] shoemaking, or the confectioner's art, do the like; but each of these sciences considers only what is peculiar to it, i.e. its proper end. And as for the argument that

when he who is musical becomes lettered he will be both at once, not having been [25] both before; and that which is, not having always been, must have been coming to be; therefore he must have been at once becoming musical and lettered,—this none of the recognized sciences considers, but only sophistic; for this alone busies itself about the accidental, so that Plato was not wrong when he said that the sophist spends his time on non-being.

[30] That a science of the accidental is not even possible, will be evident if we try to see what the accidental really is. We say that everything either is always and of necessity (necessity not in the sense of violence, but that which we appeal to in [35] demonstrations), or is for the most part, or is neither for the most part, nor always and of necessity, but merely as it chances; e.g. there might be cold in the dog-days, but this occurs neither always and of necessity, nor for the most part, though it [1065<sup>a</sup>1] might happen sometimes. The accidental, then, is what occurs, but not always nor of necessity, nor for the most part. Now we have said what the accidental is, and it is obvious why there is no science of such a thing; for all science is of that which is [5] always or for the most part, but the accidental is in neither of these classes.

Evidently there are not causes and principles of the accidental, of the same kind as there are of what is in its own right; for if there were, everything would be of necessity. If *A* is when *B* is, and *B* is when *C* is, and if *C* exists not by chance but of [10] necessity, that of which *C* was cause will exist of necessity, down to the last mentioned of the things caused (but this was supposed to be accidental). Therefore all things will be of necessity, and chance and the possibility of a thing's either occurring or not occurring are removed entirely from the range of events. And if the [15] cause be supposed not to exist but to be coming to be, the same results will follow; everything will occur of necessity. For tomorrow's eclipse will occur if *A* occurs, and *A* if *B* occurs, and *B* if *C* occurs; and in this way if we subtract time from the limited time between now and tomorrow we shall come sometime to the already existing [20] condition. Therefore since this exists, everything after this will occur of necessity, so that all things occur of necessity.

As to that which is in the sense of being true or of being by accident, the *former* depends on a combination in thought and is an affection of thought (which is the reason why it is the principles, not of that which is in this sense, but of that which is outside and can exist apart, that are sought); and the *latter* is not necessary but [25] indeterminate (I mean the accidental); and of such a thing the causes are unordered and indefinite.

The 'for the sake of something' is found in events that happen by nature or as the result of thought. It is chance when one of these events happens by accident. For as a thing may exist, so it may be a cause, either by its own nature or by accident. [30] Chance is a cause accidentally among those of events that happen for the sake of something which are in accordance with choice. Therefore chance and thought are concerned with the same sphere; for choice cannot exist without thought. The causes from which chance results might happen are indeterminate; therefore chance is obscure to human calculation and is a cause by accident, but in the unqualified sense a cause of nothing. It is good or bad luck when the result is good or [1065<sup>b</sup>1] evil; and prosperity or misfortune when the scale is large.

Since nothing accidental is prior to the essential, neither are accidental causes prior. If, then, chance or spontaneity is a cause of the heavens, reason and nature are causes before it.

9 · Some things exist only actually, some potentially, some potentially and [5] actually—some as beings, some as quantities, others in the other categories. There is no movement apart from things; for change is always according to the categories of being; and there is nothing common to these and in no one category; but each of the categories belongs to all its subjects in either of two ways (e.g. 'thisness'—for [10] one kind of it is form, and the other is privation; and as regards quality one kind is white and the other black, and as regards quantity one kind is complete and the other incomplete, and as regards spatial movement one is upwards and the other downwards, or one thing is light and another heavy); so that there are as many kinds of movement and change as of being. Each kind of thing being divided into the [15] potential and the fulfilled, I call the actuality of the potential as such, movement. That what we say is true, is plain from the following facts. When the buildable, in so far as we call it such, exists actually, it is being built, and this is the process of building. Similarly with learning, healing, and rolling, walking, leaping, ageing, ripening. Movement takes place when the fulfillment itself exists, and neither [20] earlier nor later. The fulfillment then, of that which is potentially, when it is fulfilled and actual, not *qua* itself, but *qua* movable, is movement. By *qua* I mean this: bronze is potentially a statue; but yet the fulfillment of bronze, *qua* bronze, is [25] not movement. For it is not the same to be bronze and to be a certain potentiality. If it were absolutely the same in its formula, the

fulfillment of bronze would have been a movement. But it is not the same. This is evident in the case of contraries; for to be capable of health and to be capable of illness are not the same; for if they were, health and illness would have been the same. (It is that which underlies and is [30] healthy or sick, whether it is moisture or blood, that is one and the same.) And since they are not the same, as colour and the visible are not the same, it is the fulfillment of the potential *as such*, that is movement. Evidently it is this, and movement takes place when the fulfillment itself exists, and neither earlier nor later. For each thing is capable of being sometimes actual, sometimes not, e.g. the buildable *qua* [1066<sup>a</sup>1] buildable; and the actuality of the buildable *qua* buildable is building. For the actuality is either this—building—or the house. But when the *house* exists, it is no longer buildable; the buildable is being built. The actuality then must be the [5] *building*, and the building is a movement. And the same account applies to all other movements.

That what we have said is right, is evident from what all others say about movement, and from the fact that it is not easy to define it otherwise. For firstly one cannot put it in another class. This is evident from what people say. Some call it [10] difference and inequality and the unreal; none of these, however, is necessarily moved, and further, change is not to these nor from these but rather from opposite to opposite. The reason why people put movement in these classes is that it is thought to be something indefinite, and the principles on one side of the list of contraries are indefinite because they are privative, for none of them is either a ‘this’ [15] or a ‘such’ or in any of the other categories. And the reason why movement is thought to be indefinite is that it cannot be classed either with the potentiality of things or with their actuality, for neither that which is capable of being of a certain [20] quantity, nor that which is actually of a certain quantity, is moved of necessity. And movement is thought to be an actuality, but incomplete; the reason is that the potential, whose actuality it is, is incomplete. And therefore it is hard to grasp what movement is; for it must be classed either with privation or with potentiality or with absolute actuality, but evidently none of these is possible. Therefore what remains is [25] that it must be what we said—actuality, i.e. actuality in the sense we have defined—which is hard to understand but capable of existing.

And evidently movement is in the movable; for it is the fulfillment of this by that which is capable of causing movement. And the actuality of that which is capable of causing movement is no other than that of the movable. For it must be [30] the fulfillment of both. For a thing is

capable of causing movement because it *can* do this, and is a mover because it is *active*; but it is on the movable that it is capable of acting, so that the actuality of both alike is one, just as there is the same interval from one to two as from two to one, and as the ascent and the descent are one, but being them is not one; the case of the mover and the moved is similar.

[35] 10 · The infinite is either that which is incapable of being traversed because it is not its nature to be traversed (as the voice is invisible), or that which admits only of incomplete traverse or scarcely admits of traverse, or that which, though it naturally admits of traverse, is not traversed or limited; further, a thing may be [1066<sup>b</sup>1] infinite in respect of addition or of subtraction or of both. The infinite cannot be a separate, independent thing. For if it is neither a spatial magnitude nor a plurality, but infinity itself is its substance and not an accident, it will be indivisible; for the [5] divisible is either magnitude or plurality. But if indivisible, it is not infinite, except as the voice is invisible; but people do not mean this, nor are we examining this sort of infinite, but the infinite as untraversable. Further, how can an infinite exist by itself, unless number and magnitude also exist by themselves,—since infinity is an attribute of these? Further, if the infinite is an accident of something else, it cannot [10] be *qua* infinite an element in things, as the invisible is not an element in speech, though the voice is invisible. And evidently the infinite cannot exist actually. For then any part of it that might be taken would be infinite; for to be infinite and the infinite are the same, if the infinite is substance and not predicated of a subject. Therefore it is either indivisible, or if it can be divided, it is divisible into infinite [15] parts; but the same thing cannot be many infinities, yet as a part of air is air, so a part of the infinite would be infinite, if the infinite is a substance and a principle. Therefore it must be inseparable and indivisible. But the actually infinite cannot be indivisible; for it must be a quantity. Therefore infinity belongs to a subject [20] incidentally. But if so, as we have said, it cannot be a principle, but rather that of which it is an accident—the air or the even number.

This inquiry is universal; but that the infinite is not among sensible things, is evident from the following argument. If the formula of body is that which is bounded by planes, there cannot be an infinite body either sensible or intelligible; nor a separate and infinite number, for number or that which has a number can be [25] counted. The following

considerations drawn from natural science make matters clear: the infinite can neither be composite nor simple. For it cannot be a composite body, since the elements are limited in multitude. For the contraries must be equal and no *one* of them must be infinite; for if one of the two bodies falls at all short of the other in capacity, the finite will be destroyed by the infinite. And that *each* [30] should be infinite is impossible. For body is that which has extension in all directions, and the infinite is the boundlessly extended, so that the infinite body will be infinite in every direction. Nor can the infinite body be one and simple—neither, as some say, something which is apart from the elements, from which they generate [35] these (for there is no such body apart from the elements; for everything can be resolved into that of which it consists, but no such thing is observed except the simple bodies), nor fire nor any other of the elements. For apart from the question [1067<sup>a</sup>1] how any of them could be infinite, the universe, even if it is finite, cannot either be or become one of them, as Heraclitus says all things sometime become fire. The same argument applies to the One, which the natural philosophers posit besides the [5] elements. For everything changes from the contrary, e.g. from hot to cold.

Further, every sensible body is somewhere, and whole and part have the same proper place, e.g. the whole earth and part of the earth. Therefore if the infinite body is homogeneous, it will be unmovable or it will be always moving. But the latter is impossible; for why should it rather move down than up or anywhere else? [10] E.g. if there is a clod, where will this move or rest? The proper place of the body which is homogeneous with it is infinite. Will the clod occupy the whole place, then? And how? When then is its rest or its movement? It will either rest everywhere, and then it cannot move; or it will move everywhere, and then it cannot be still. But if the infinite body has unlike parts, the proper places of the parts are unlike also, and, [15] firstly, the body of the universe is not one except by contact, and, secondly, the parts will be either finite or infinite in kind. *Finite* they cannot be; for then those of one kind will be infinite and those of another will not (if the universe is infinite), e.g. fire or water would be infinite, but such an infinite part would be destruction to its [20] contrary. But if the parts are *infinite* and simple, their places also are infinite and the elements will be infinite; and if this is impossible, and the places are finite, the universe also must be limited.

In general, there cannot be an infinite body and also a proper place for all bodies, if every sensible body has either weight or lightness. For it

must move either towards the middle or upwards, and the infinite—either the whole or the [25] half—cannot do either; for how will you divide it? Or how will part of the infinite be up and part down, or part extreme and part middle? Further, every sensible body is in a place, and there are six kinds of place, but these cannot exist in an infinite body. [30] In general, if there cannot be an infinite place, there cannot be an infinite body; for that which is in a place is somewhere, and this means either up or down or in one of the other directions, and each of these is a limit.

The infinite is not the same in the sense that it is one thing whether exhibited in magnitude or in movement or in time, but the posterior among these is called [35] infinite in virtue of its relation to the prior, i.e. a movement is called infinite in virtue of the distance covered by the spatial movement or alteration or growth, and a time is called infinite because of the movement which occupies it.

[1067<sup>b</sup>1] **11** · Of things which change, some change in an accidental sense, like that in which the musical may be said to walk, and others are said, without qualification, to change, because something in them changes, i.e. the things that change in parts; the body becomes healthy, because the eye does. But there is something which is by its [5] own nature moved primarily, and this is the essentially movable. The same distinction is found in the case of the mover; for it causes movement either in an accidental sense or in respect of a part of itself or essentially. There is something that primarily causes movement; and there is something that is moved, also the time in which it is moved, and that from which and that into which it is moved. But the [10] forms and the affections and the place, which are the terminals of the movement of moving things, are unmovable, e.g. knowledge or heat; it is not heat that is a movement, but heating. Change which is not accidental is found not in all things, but between contraries, and their intermediates, and between contradictories. We may convince ourselves of this by induction.

[15] That which changes changes either from subject into subject, or from non-subject into non-subject, or from subject into non-subject, or from non-subject into subject. (By subject I mean that which is expressed by an affirmative term.) [20] Therefore there must be three changes; for that from non-subject into non-subject is not change; for the terms are neither contraries nor contradictories, because there is no opposition. The change from non-subject into contradictory subject is generation—absolute change absolute generation, and partial change partial

generation; and the change from subject to non-subject is destruction—absolute change absolute destruction, and partial change partial destruction. If, then, ‘that which is [25] not’ has several senses, and movement can attach neither to that which implies putting together or separating, nor to that which implies potentiality and is opposed to that which is without qualification (true, the not-white or not-good *can* be moved *incidentally*, for the not-white might be a man; but that which is not a ‘this’ at all [30] can in no way be moved), that which is not cannot be moved, and if this is so, generation cannot be movement; for that which is not is generated. For even if we admit to the fullest that its generation is accidental, yet it is true to say that not-being is predicable of that which is generated absolutely. (Similarly *rest* cannot [35] belong to that which is not.) These difficulties, then, follow, and also this, that everything that is moved is in a place, but that which is not is not in a place; for then it would be somewhere. Nor is destruction movement; for the contrary of movement [1068<sup>a</sup>1] is movement or rest, but the contrary of destruction is generation. Since every movement is a change, and the kinds of change are the three named above, and of these those in the way of generation and destruction are not movements, and these are the changes from a thing to its contradictory, only the change from subject into [5] subject can be movement. And the subjects are either contrary or intermediate; for even privation must be regarded as contrary, and is expressed by a positive term, e.g. ‘naked’ or ‘toothless’ or ‘black’.

12 · If the categories are classified as substance, quality, place, acting or being acted on, relation, quantity, there must be three kinds of movement—of quality, of quantity, of place. There is no movement in respect of substance [10] (because there is nothing contrary to substance), nor in respect of relation (for it is possible that if one of two things changes, the other ceases to be true, though it does not change at all,—so that their movement is accidental), nor of agent and patient, nor of mover and moved, because there is no movement of movement nor generation [15] of generation, nor, in general, change of change. For there *might* be movement of movement in two senses; (1) movement may be the subject moved, as a man is moved because he changes from white to black,—so that in this way movement might be either heated or cooled or change its place or increase. But this is impossible; for change is not a subject. Or (2) some other subject may change from [20] a change into some other species of change (as a man changes from disease into health). But this also is not possible except incidentally. For every movement is



change from something into something. (And so are generation and destruction; but they are changes into things opposed in *one* way, while movements are changes into [25] things opposed in another way.) A thing changes, then, at the same time from health into illness, and from this change itself into another. Clearly, then, if it has become ill, it will have changed into some change or other (for it may be at rest), and, further, into a determinate change each time; and that new change will be from something into something; therefore it will be the opposite change, that of growing [30] well. But this happens only incidentally, e.g. there is a change from the process of recollection to that of forgetting, only because that to which the process attaches is changing, now into a state of knowledge, now into one of ignorance.

Further, the process will go on to infinity, if there is to be change of change and generation of generation. For if the later is, so too must the earlier be—e.g. if the simple coming to be was once coming to be, that which was coming to be it was also [1068<sup>b</sup>1] once coming to be; therefore that which was simply coming to be it was not yet in existence, but something which was coming to be coming to be it was already in existence. And this was once coming to be, so that then it was not yet coming to be. Now since of an infinite number of terms there is not a first, the first in this series will not exist, and therefore no following term will exist. Nothing, then, can either [5] come to be or move or change. Further, that which has a movement has also the contrary movement and rest, and that which comes to be also ceases to be. Therefore that which is coming to be is ceasing to be when it has come to be coming to be; for it cannot cease to be at the very time at which it is coming to be coming to be, nor after it has come to be; for that which is ceasing to be must *be*. Further, there must be a matter underlying that which comes to be and changes. What will it be, [10] then, that becomes movement or generation, as body or soul is that which suffers alteration? And what is it that they move into? For their movement must be the movement or coming to be of this from that to the other. How, then, can this condition be fulfilled? There can be no learning of learning, and therefore no [15] generation of generation.

Since there is not movement either of substance or of relation or of activity and passivity, it remains that movement is in respect of quality and quantity and place; for each of these admits of contrariety. By quality I mean not that which is in the substance (for even the differentia is a quality), but the passive quality, in virtue of [20] which a thing is said to be acted on or to be incapable of being acted on. The unmovable is either

that which is wholly incapable of being moved, or that which is moved with difficulty in a long time or begins slowly, or that which would naturally be moved and can be moved, but is not moving when and where and as it would naturally be moved. This alone among unmovables I describe as being at rest; for [25] rest is contrary to movement, so that it must be a privation in that which is receptive of movement.

Things which are in one primary place are *together*, and things which are in different places are *apart*. Things whose extremes are together *touch*. That at which the changing thing, if it changes continuously according to its nature, naturally arrives before it arrives at the extreme into which it is changing, is [30] *between*. That which is most distant in a straight line is *contrary in place*. That is *successive* which is after the beginning (the order being determined by position or form or in some other way) and has nothing of the same class between it and that which it succeeds, e.g. lines succeed a line, units a unit, or one house another house. (There is nothing to prevent a thing of some *other* class from being between.) For the successive succeeds something and is something later; one does not succeed two, [1069<sup>a</sup>1] nor the first day of the month the second. That which, being successive, touches, is *contiguous*. Since all change is between opposites, and these are either contraries or contradictories, and there is no middle term for contradictories, clearly that which [5] is *between* is between contraries. The *continuous* is a species of the contiguous; two things are called continuous when the limits of each, with which they touch and are kept together, become one and the same, so that plainly the continuous is found in the things out of which a unity naturally arises in virtue of their contact. And plainly the successive is primary for the successive does not necessarily touch, but [10] that which touches is successive. And if a thing is continuous, it touches, but if it touches, it is not necessarily continuous; and in things in which there is no touching, there is no organic unity. Therefore a point is not the same as a unit; for contact belongs to points, but not to units, which have only succession; and there is something between two of the former but not between two of the latter.

## BOOK XII (Λ)

1 · Substance is the subject of our inquiry; for the principles and the causes we are seeking are those of substances. For if the universe is of the nature of a whole, [20] substance is its first part; and if it coheres by virtue of succession, on this view also substance is first, and is succeeded by quality, and then by quantity. At the same time these latter are not even beings in the unqualified sense, but are quantities and movements—or else even the not-white and the not-straight would be; at least we say even these *are*, e.g. ‘there is a not-white’. Further, none of the others can exist apart. And the old philosophers also in effect testify to this; for it was of substance [25] that they sought the principles and elements and causes. The thinkers of the present day tend to rank universals as substances (for genera are universals, and these they tend to describe as principles and substances, owing to the abstract nature of their inquiry); but the old thinkers ranked particular things as substances, e.g. fire and earth, but not what is common to both, body.

There are three kinds of substance—one that is sensible (of which one [30] subdivision is eternal and another is perishable, and which all recognize, as comprising e.g. plants and animals),—of this we must grasp the elements, whether one or many; and another that is immovable, and this certain thinkers assert to be capable of existing apart, some dividing it into two, others combining the Forms and the objects of mathematics into one class, and others believing only in the [35] mathematical part of this class. The former two kinds of substance are the subject of natural science (for they imply movement); but the third kind belongs to another [1069<sup>b</sup>1] science, if there is no principle common to it and to the other kinds.

Sensible substance is changeable. Now if change proceeds from opposites or from intermediate points, and not from all opposites (for the voice is not-white) but [5] from the contrary, there must be something underlying which changes into the contrary state; for the contraries do not change.

2 · Further, something persists, but the contrary does not persist; there is, then, some third thing besides the contraries, viz. the matter.

Now since changes are of four kinds—either in respect of the essence or of the quality or of the quantity or of the place, and change in respect of the ‘this’ is simple generation and destruction, [10] and change in quantity is increase and diminution, and change in respect of an affection is alteration, and change in place is motion, changes will be from given states into those contrary to them in these several respects. The matter, then, which changes must be capable of both states. And since things are said to be in two ways, everything changes from that which is potentially to that which is actually, e.g. [15] from the potentially white to the actually white, and similarly in the case of increase and diminution. Therefore not only can a thing come to be, incidentally, out of that which is not, but also all things come to be out of that which is, but is potentially, [20] and is not actually. And this is the ‘One’ of Anaxagoras; for instead of ‘all things were together’ and the ‘Mixture’ of Empedocles and Anaximander and the account given by Democritus, it is better to say all things were together potentially but not actually. Therefore these thinkers seem to have had some notion of matter.

Now all things that change have matter, but different matter; and of eternal [25] things those which are not generable but are movable in space have matter—not matter for generation, however, but for motion from one place to another.

(One might raise the question from what sort of non-being generation proceeds; for things are said not to be in three ways.)

If, then, a thing exists potentially, still it is not potentially any and every thing, but different things come from different things; nor is it satisfactory to say that all [30] things were together; for they differ in their matter, since otherwise why did an infinity of things come to be, and not one thing? For Reason is one, so that if matter also is one, that must have come to be in actuality what the matter was in potentiality. The causes and the principles, then, are three, two being the pair of contraries of which one is formula and form and the other is privation, and the third being the matter.

[35] **3** · Next we must observe that neither the matter nor the form comes to be—i.e. the proximate matter and form. For everything that changes is something [1070a1] and is changed by something and into something. That by which it is changed is the primary mover; that which is changed, the matter; that into which it is changed, the form. The process, then, will go on to infinity, if not only the bronze comes to be

round but also the round or the bronze comes to be; therefore there must be a stop at some point.

Next we must observe that each substance comes into being out of something [5] synonymous. (Natural objects and other things are substances.) For things come into being either by art or by nature or by chance or by spontaneity. Now art is a principle of movement in something other than the thing moved, nature is a principle in the thing itself (for man begets man), and the other causes are privations of these two.

There are three kinds of substance—the matter, which is a ‘this’ by being [10] perceived (for all things that are characterized by contact and not by organic unity are matter and substratum); the nature, a ‘this’ and a state that it moves towards; and again, thirdly, the particular substance which is composed of these two, e.g. Socrates or Callias. Now in some cases the ‘this’ does not exist apart from the composite substance, e.g. the form of house does not so exist, unless the art of [15] building exists apart (nor is there generation and destruction of these forms, but it is in another way that the house apart from its matter, and health, and all things of art, exist and do not exist); but if it does it is only in the case of natural objects. And so Plato was not far wrong when he said that there are as many Forms as there are kinds of natural things (if there are Forms at all),—though not of such things<sup>1</sup> as [20] fire, flesh, head; for all these are matter, and the last matter is the matter of that which is in the fullest sense substance. The moving causes exist as things preceding the effects, but causes in the sense of formulae are simultaneous with their effects. For when a man is healthy, then health also exists; and the shape of a bronze sphere exists at the same time as the bronze sphere. But we must examine whether any [25] form also survives afterwards. For in some cases this may be so, e.g. the soul may be of this sort—not all soul but the reason; for doubtless it is impossible that *all* soul should survive. Evidently then there is no necessity, on this ground at least, for the existence of the Ideas. For man is begotten by man, each individual by an [30] individual; and similarly in the arts; for the medical art is the formula of health.

4 · The causes and the principles of different things are in a sense different, but in a sense, if one speaks universally and analogically, they are the same for all. For we might raise the question whether the principles and elements are different or the same for substances and for

relatives, and similarly in the case of each of the categories. But it is paradoxical that they should be the same for all. For then from [35] the same elements will proceed relatives and substances. What then will this common element be? For there is nothing common to and distinct from substance [1070<sup>b</sup>1] and the other things which are predicated; but the element is prior to the things of which it is an element. But again substance is not an element of relatives, nor is any of these an element of substance. Further, how can all things have the same elements? For none of the elements can be the same as that which is composed of [5] the elements, e.g. *b* or *a* cannot be the same as *ba*. (None, therefore, of the intelligibles, e.g. unity or being, is an element; for these are predicable of each of the compounds as well.) None of the elements then would be either a substance or a relative; but it must be one or other. All things then have not the same elements.

Or, as we put it, in a sense they have and in a sense they have not; e.g. perhaps [10] the elements of perceptible bodies are, as *form*, the hot, and in another sense the cold, which is the *privation*; and, as *matter*, that which directly and of itself is potentially these; and both these are substances and also the things composed of these, of which these are the principles (i.e. any unity which is produced out of the hot and the cold, e.g. flesh or bone); for the product must be different from the [15] elements. These things then have the same elements and principles, but different things have different elements; and if we put the matter thus, all things have not the same elements, but analogically they have; i.e. one might say that there are three principles—the form, the privation, and the matter. But each of these is different for each class, e.g. in colour they are white, black, and surface. Again, there is light, [20] darkness, and air; and out of these are produced day and night.

Since not only the elements present in a thing are causes, but also something external, i.e. the moving cause, clearly while principle and element are different both are causes, and principle is divided into these two kinds; and that which moves a thing or makes it rest is a principle and a substance. Therefore analogically there [25] are three elements, and four causes and principles; but the elements are different in different things, and the primary moving cause is different for different things. Health, disease, body; the moving cause is the medical art. Form, disorder of a particular kind, bricks; the moving cause is the building art. And since the moving cause in the case of natural things is, for instance man, and in the products of [30] thought it is the form or its contrary, there are in a sense three causes, while in a sense there are four. For the

medical art is in some sense health, and the building art is the form of the house, and man begets man; further, besides these there is that which as first of all things moves all things. [35]

5 · Some things can exist apart and some cannot, and it is the former that are substances. And therefore all things have the same causes, because, without [1071<sup>a</sup>1] substances, affections and movements do not exist. Further, these causes will probably be soul and body, or reason and desire and body.

And in yet another way, analogically identical things are principles, i.e., [5] actuality and potency; but these also are not only different for different things but also apply in different senses to them. For in some cases the same thing exists at one time actually and at another potentially, e.g. wine or flesh or man does so. (And these too fall under the above-named causes. For the form exists actually, if it can exist apart, and so does the complex of form and matter, and the privation, e.g. [10] darkness or the diseased. But the matter exists potentially; for this is that which can become both the actual things.) But the distinction of actuality and potentiality applies differently to cases where the matter is not the same, in which cases the form also is not the same but different; e.g. the cause of man is the elements in man (viz. fire and earth as matter, and the peculiar form), and the external cause, whatever it [15] is, e.g. the father, and besides these the sun and its oblique course, which are neither matter nor form nor privation nor of the same species with man, but moving causes.

Further, one must observe that some causes can be expressed in universal terms, and some cannot. The primary principles of all things are the actual primary 'this' and another thing which exists potentially. The universal causes, then, of [20] which we spoke do not *exist*. For the *individual* is the source of the individuals. For while man is the cause of man universally, there is no universal man; but Peleus is the cause of Achilles, and your father of you, and this particular *b* of this particular *ba*, though *b* in general is the cause of *ba* taken without qualification.

Again, if the causes of substances are causes of everything, still different [25] things have different causes and elements, as was said; the causes of things that are not in the same class, e.g. of colours, sounds, substances, and quantities, are different except in an analogical sense; and those of things in the same species are different, not in species, but in the sense that the causes of different individuals are different, your matter

and form and moving cause being different from mine, while in their universal formula they are the same. And if we inquire what are the [30] principles or elements of substances and relations and qualities—whether they are the same or different, clearly when the terms ‘principle’ and ‘element’ are used in several senses the principles and elements of all are the same, but when the senses are distinguished the causes are not the same but different, except that in a special sense the causes of all are the same. They are in a special sense the same, i.e. by analogy, because matter, form, privation, and the moving cause are common to all things; and the causes of substances may be treated as causes of all things in this [35] sense, that when they are removed all things are removed; further, that which is first in respect of fulfillment is the cause of all things. But in another sense there are different first causes, viz. all the contraries which are neither stated as classes nor spoken of in several ways; and, further, the matters of different things are different. [1071<sup>b</sup>1] We have stated, then, what are the principles of sensible things and how many they are, and in what sense they are the same and in what sense different.

6 · Since there were three kinds of substance, two of them natural and one unmovable, regarding the latter we must assert that it is necessary that there should be an eternal unmovable substance. For substances are the first of existing things, [5] and if they are all destructible, all things are destructible. But it is impossible that movement should either come into being or cease to be; for it must always have existed. Nor can time come into being or cease to be; for there could not be a before and an after if time did not exist. Movement also is continuous, then, in the sense in which time is; for time is either the same thing as movement or an attribute of [10] movement. And there is no continuous movement except movement in place, and of this only that which is circular is continuous.

But if there is something which is capable of moving things or acting on them, but is not actually doing so, there will not be movement; for that which has a capacity need not exercise it. Nothing, then, is gained even if we suppose eternal substances, as the believers in the Forms do, unless there is to be in them some [15] principle which can cause movement; and even this is not enough, nor is another substance besides the Forms enough; for if it does not *act*, there will be no movement. Further, even if it acts, this will not be enough, if its substance is potentiality; for there will not be *eternal* movement; for that which is



potentially may possibly not be. There must, then, be such a principle, whose very substance is [20] actuality. Further, then, these substances must be without matter; for they must be eternal, at least if anything else is eternal. Therefore they must be actuality.

Yet there is a difficulty; for it is thought that everything that acts is able to act, but that not everything that is able to act acts, so that the potentiality is prior. But if this is so, nothing at all will exist; for it is possible for things to be capable of existing [25] but not yet to exist. Yet if we follow the mythologists who generate the world from night, or the natural philosophers who say that all things were together, the same impossible result ensues. For how will there be movement, if there is no actual cause? Matter will surely not move itself—the carpenter's art must act on it; nor [30] will the menstrual fluids nor the earth set themselves in motion, but the seeds and the semen must act on them.

This is why some suppose eternal actuality—e.g. Leucippus and Plato; for they say there is always movement. But why and what this movement is they do not say, nor, if the world moves in this way or that, do they tell us the cause of its doing so. Now nothing is moved at random, but there must always be something present, e.g. [35] as a matter of fact a thing moves in one way by nature, and in another by force or through the influence of thought or something else. Further, what sort of movement is primary? This makes a vast difference. But again Plato, at least, cannot even say what it is that he sometimes supposes to be the source of movement—that which [1072<sup>a</sup>1] moves itself; for the *soul* is later, and simultaneous with the heavens, according to his account. To suppose potentiality prior to actuality, then, is in a sense right, and in a sense not; and we have specified these senses.

That actuality is prior is testified by Anaxagoras (for his thought is actuality) [5] and by Empedocles in his doctrine of love and strife, and by those who say that there is always movement, e.g. Leucippus.

Therefore chaos or night did not exist for any infinite time, but the same things have always existed (either passing through a cycle of changes or in some other way), since actuality is prior to potentiality. If, then, there is a constant cycle, [10] something must always remain, acting in the same way. And if there is to be generation and destruction, there must be something else which is always acting in different ways. This must, then, act in one way in virtue of itself, and in another in virtue of something else—either of a third agent, therefore, or of the first. But it must be in virtue of the first. For otherwise this again causes the motion both of the [15] third agent and of the second. Therefore it is better to

say the first. For it was the cause of eternal movement; and something else is the cause of variety, and evidently both together are the cause of eternal variety. This, accordingly, is the character which the motions actually exhibit. What need then is there to seek for other principles?

7 · Since this is a possible account of the matter, and if it were not true, the [20] world would have proceeded out of night and ‘all things together’ and out of non-being, these difficulties may be taken as solved. There is, then, something which is always moved with an unceasing motion, which is motion in a circle; and this is plain not in theory only but in fact. Therefore the first heavens must be eternal. There is therefore also something which moves them. And since that which [25] is moved and moves is intermediate, there is a mover<sup>2</sup> which moves without being moved, being eternal, substance, and actuality. And the object of desire and the object of thought move in this way; they move without being moved. The primary objects of desire and of thought are the same. For the apparent good is the object of appetite, and the real good is the primary object of wish. But desire is consequent on opinion rather than opinion on desire; for the thinking is the starting-point. And [30] thought is moved by the object of thought, and one side of the list of opposites is in itself the object of thought; and in this, substance is first, and in substance, that which is simple and exists actually. (The one and the simple are not the same; for ‘one’ means a measure, but ‘simple’ means that the thing itself has a certain [35] nature.) But the good, also, and that which is in itself desirable are on this same side of the list; and the first in any class is always best, or analogous to the best.

[1072<sup>b</sup>1] That that for the sake of which is found among the unmovables is shown by making a distinction; for that for the sake of which is both that *for* which and that *towards* which, and of these the one is unmovable and the other is not. Thus it produces motion by being loved, and it moves the other moving things. Now if something is moved it is capable of being otherwise than as it is. Therefore if the [5] actuality of the heavens is primary motion, then in so far as they are in motion, in *this* respect they are capable of being otherwise,—in place, even if not in substance. But since there is something which moves while itself unmoved, existing actually, this can in no way be otherwise than as it is. For motion in space is the first of the kinds of change, and motion in a circle the first kind of spatial motion; and this the [10] first mover *produces*. The first mover, then, of necessity exists; and in so far as it is

necessary, it is good, and in this sense a first principle. For the necessary has all these senses—that which is necessary perforce because it is contrary to impulse, that without which the good is impossible, and that which cannot be otherwise but is *absolutely* necessary.

On such a principle, then, depend the heavens and the world of nature. And its life is such as the best which we enjoy, and enjoy for but a short time. For it is ever in [15] this state (which we cannot be), since its actuality is also pleasure. (And therefore waking, perception, and thinking are most pleasant, and hopes and memories are so because of their reference to these.) And thought in itself deals with that which is best in itself, and that which is thought in the fullest sense with that which is best in the fullest sense. And thought thinks itself because it shares the nature of the object [20] of thought; for it becomes an object of thought in coming into contact with and thinking its objects, so that thought and object of thought are the same. For that which is *capable* of receiving the object of thought, i.e. the substance, is thought. And it is *active* when it *possesses* this object. Therefore the latter rather than the former is the divine element which thought seems to contain, and the act of contemplation is what is most pleasant and best. If, then, God is always in that good state in which we sometimes are, this compels our wonder; and if in a better this [25] compels it yet more. And God *is* in a better state. And life also belongs to God; for the actuality of thought is life, and God is that actuality; and God's essential actuality is life most good and eternal. We say therefore that God is a living being, eternal, most good, so that life and duration continuous and eternal belong to God; [30] for this *is* God.

Those who suppose, as the Pythagoreans and Speusippus do, that supreme beauty and goodness are not present in the beginning, because the beginnings both of plants and of animals are *causes*, but beauty and completeness are in the *effects* of these, are wrong in their opinion. For the seed comes from other individuals which are prior and complete, and the first thing is not seed but the complete being, [1073<sup>a</sup>1] e.g. we must say that before the seed there is a man,—not the man produced from the seed, but another from whom the seed comes.

It is clear then from what has been said that there is a substance which is eternal and unmovable and separate from sensible things. It has been shown also [5] that this substance cannot have any magnitude, but is without parts and indivisible. For it produces movement through infinite time, but nothing finite has infinite power. And, while every magnitude is either infinite or finite, it cannot, for the above reason, have

finite magnitude, and it cannot have infinite magnitude because [10] there is no infinite magnitude at all. But it is also clear that it is impassive and unalterable; for all the other changes are posterior to change of place. It is clear, then, why the first mover has these attributes.

8 · We must not ignore the question whether we have to suppose one such substance or more than one, and if the latter, how many; we must also mention, [15] regarding the opinions expressed by others, that they have said nothing that can even be clearly stated about the number of the substances. For the theory of Ideas has no special discussion of the subject; for those who believe in Ideas say the Ideas [20] are numbers, and they speak of numbers now as unlimited, now as limited by the number 10; but as for the reason why there should be just so many numbers, nothing is said with any demonstrative exactness.

We however must discuss the subject, starting from the presuppositions and distinctions we have mentioned. The first principle or primary being is not movable [25] either in itself or accidentally, but produces the primary eternal and single movement. And since that which is moved must be moved by something, and the first mover must be in itself unmovable, and eternal movement must be produced by something eternal and a single movement by a single thing, and since we see that besides the simple spatial movement of the universe, which we say the first and [30] unmovable substance produces, there are other spatial movements—those of the planets—which are eternal (for the body which moves in a circle is eternal and unresting; we have proved these points in the *Physics*<sup>3</sup>), each of *these* movements also must be caused by a substance unmovable in itself and eternal. For the nature [35] of the stars is eternal, being a kind of substance, and the mover is eternal and prior to the moved, and that which is prior to a substance must be a substance. Evidently, then, there must be substances which are of the same number as the movements of the stars, and in their nature eternal, and in themselves unmovable, and without [1073<sup>b</sup>1] magnitude, for the reason before mentioned.

That the movers are substances, then, and that one of these is first and another second according to the same order as the movements of the stars, is evident. But in the number of movements we reach a problem which must be treated from the standpoint of that one of the mathematical sciences which is most akin to [5] philosophy—viz. of astronomy; for this science speculates about substance which is

perceptible but eternal, but the other mathematical sciences, i.e. arithmetic and geometry, treat of no substance. That the movements are more numerous than the bodies that are moved, is evident to those who have given even moderate attention to [10] the matter; for each of the planets has more than one movement. But as to the actual number of these movements, we now—to give some notion of the subject—quote what some of the mathematicians say, that our thought may have some definite number to grasp; but, for the rest, we must partly investigate for ourselves, [15] partly learn from other investigators, and if those who study this subject form an opinion contrary to what we have now stated, we must esteem both parties indeed, but follow the more accurate.

Eudoxus supposed that the motion of the sun or of the moon involves, in either case, three spheres, of which the first is the sphere of the fixed stars, and the second [20] moves in the circle which runs along the middle of the zodiac, and the third in the circle which is inclined across the breadth of the zodiac; but the circle in which the moon moves is inclined at a greater angle than that in which the sun moves. And the motion of the planets involves, in each case, four spheres, and of these also the first and second are the same as the first two mentioned above (for the sphere of the [25] fixed stars is that which moves all the other spheres, and that which is placed beneath this and has its movement in the circle which bisects the zodiac is common to all), but the *poles* of the third sphere of each planet are in the circle which bisects the zodiac, and the motion of the fourth sphere is in the circle which is inclined at an angle to the equator of the third sphere; and the poles of the third spheres are [30] different for the other planets, but those of Venus and Mercury are the same.

Callippus made the position of the spheres the same as Eudoxus did, but while he assigned the same number as Eudoxus did to Jupiter and to Saturn, he thought two more spheres should be added to the sun and two to the moon, if we were to [35] explain the phenomena, and one more to each of the other planets.

But it is necessary, if all the spheres combined are to explain the phenomena, [1074<sup>a</sup>1] that for each of the planets there should be other spheres (one fewer than those hitherto assigned) which counteract those already mentioned and bring back to the same position the first sphere of the star which in each case is situated below the star in question; for only thus can all the forces at work produce the motion of the [5] planets. Since, then, the spheres by which the planets themselves are moved are eight and twenty-five, and of these only those by which the lowest-

situated planet is moved need not be counteracted, the spheres which counteract those of the first two planets will be six in number, and the spheres which counteract those of the next four planets will be sixteen, and the number of all the spheres—those which move [10] the planets and those which counteract these—will be fifty-five. And if one were not to add to the moon and to the sun the movements we mentioned, all the spheres will be forty-nine in number.<sup>4</sup>

Let this then be taken as the number of the spheres, so that the unmovable [15] substances and principles may reasonably be taken as just so many; the assertion of *necessity* must be left to more powerful thinkers.

If there can be no spatial movement which does not conduce to the moving of a star, and if further every being and every substance which is immune from change and in virtue of itself has attained to the best must be considered an end, there can [20] be no other being apart from these we have named, but this must be the number of the substances. For if there are others, they will cause change as being an end of movement; but there *cannot* be other movements besides those mentioned. And it is reasonable to infer this from a consideration of the bodies that are moved; for if everything that moves is for the sake of that which is moved, and every movement [25] belongs to something that is moved, no movement can be for the sake of itself or of another movement, but all movements must be for the sake of the stars. For if a movement is to be for the sake of a movement, this latter also will have to be for the sake of something else; so that since there cannot be an infinite regress, the end of every movement will be one of the divine bodies which move through the heaven. [30]

Evidently there is but one heaven. For if there are many heavens as there are many men, the moving principles, of which each heaven will have one, will be one in form but in number many. But all things that are many in number have matter. (For one and the same formula applies to *many* things, e.g. the formula of man; but [35] Socrates is *one*.) But the primary essence has not matter; for it is fulfillment. So the unmovable first mover is one both in formula and in number; therefore also that which is moved always and continuously is one alone; therefore there is one heaven alone.

[1074<sup>b</sup>1] Our forefathers in the most remote ages have handed down to us their posterity a tradition, in the form of a myth, that these substances are gods and that the divine encloses the whole of nature. The rest of the tradition has been added later in [5] mythical form with a

view to the persuasion of the multitude and to its legal and utilitarian expediency; they say these gods are in the form of men or like some of the other animals, and they say other things consequent on and similar to these which we have mentioned. But if we were to separate the first point from these additions and take it alone—that they thought the first substances to be gods—we must [10] regard this as an inspired utterance, and reflect that, while probably each art and science has often been developed as far as possible and has again perished, these opinions have been preserved like relics until the present. Only thus far, then, is the opinion of our ancestors and our earliest predecessors clear to us.

[15] 9 · The nature of the divine thought involves certain problems; for while thought is held to be the most divine of phenomena, the question what it must be in order to have that character involves difficulties. For if it thinks nothing, what is there here of dignity? It is just like one who sleeps. And if it thinks, but this depends on something else, then (as that which is its substance is not the act of thinking, but [20] a capacity) it cannot be the best substance; for it is through thinking that its value belongs to it. Further, whether its substance is the faculty of thought or the act of thinking, what does it think? Either itself or something else; and if something else, either the same always or something different. Does it matter, then, or not, whether it thinks the good or any chance thing? Are there not some things about which it is [25] incredible that it should think? Evidently, then, it thinks that which is most divine and precious, and it does not change; for change would be change for the worse, and this would be already a movement. First, then, if it is not the act of thinking but a capacity, it would be reasonable to suppose that the continuity of its thinking is [30] wearisome to it. Secondly, there would evidently be something else more precious than thought, viz. that which is thought. For both thinking and the act of thought will belong even to one who has the worst of thoughts. Therefore if this ought to be avoided (and it ought, for there are even some things which it is better not to see than to see), the act of thinking cannot be the best of things. Therefore it must be itself that thought thinks (since it is the most excellent of things), and its thinking is a thinking on thinking.

[35] But evidently knowledge and perception and opinion and understanding have always something else as their object, and themselves only by the way. Further, if thinking and being thought are different, in respect of which does goodness belong to thought? For being an act of

thinking and being an object of thought are not the [1075<sup>a</sup>1] same. We answer that in some cases the knowledge is the object. In the productive sciences (if we abstract from the matter) the substance in the sense of essence, and in the theoretical sciences the formula or the act of thinking, is the object. As, then, thought and the object of thought are not different in the case of things that have not matter, they will be the same, i.e. the thinking will be one with the object of its thought.

A further question is left—whether the object of the thought is composite; for [5] if it were, thought would change in passing from part to part of the whole. We answer that everything which has not matter is indivisible. As human thought, or rather the thought of composite objects, is in a certain period of time (for it does not possess the good at this moment or at that, but its best, being something *different* from it, is attained only in a whole period of time), so throughout eternity is the thought which has *itself* for its object. [10]

10 · We must consider also in which of two ways the nature of the universe contains the good or the highest good, whether as something separate and by itself, or as the order of the parts. Probably in both ways, as an army does. For the good is found both in the order and in the leader, and more in the latter; for he does not depend on the order but it depends on him. And all things are ordered together [15] somehow, but not all alike,—both fishes and fowls and plants; and the world is not such that one thing has nothing to do with another, but they are connected. For all are ordered together to one end. (But it is as in a house, where the freemen are least at liberty to act as they will, but all things or most things are already ordained for [20] them, while the slaves and the beasts do little for the common good, and for the most part live at random; for this is the sort of principle that constitutes the nature of each.) I mean, for instance, that all must at least come to be dissolved into their elements, and there are other functions similarly in which all share for the good of the whole.

We must not fail to observe how many impossible or paradoxical results [25] confront those who hold different views from our own, and what are the views of the subtler thinkers, and which views are attended by fewest difficulties. All make all things out of contraries. But neither ‘all things’ nor ‘out of contraries’ is right; nor do they tell us how the things in which the contraries are present can be made out of the [30] contraries; for contraries are not affected by one another. Now for us this



difficulty is solved naturally by the fact that there is a third factor. These thinkers however make one of the two contraries matter; this is done for instance by those who make the unequal matter for the equal, or the many matter for the one. But this also is refuted in the same way; for the matter which is one is contrary to nothing. Further, all things, except the one, will, on the view we are criticizing, partake of evil; for the [35] bad is itself one of the two elements. But the other school does not treat the good and the bad even as principles; yet in all things the good is in the highest degree a principle. The school we first mentioned is right in saying that it is a principle, but *how* the good is a principle they do not say—whether as end or as mover or as [1075<sup>b</sup>1] form.

Empedocles also has a paradoxical view; for he identifies the good with love. But this is a principle both as mover (for it brings things together) and as matter (for it is part of the mixture). Now even if it happens that the same thing is a [5] principle both as matter and as mover, still *being* them is not the same. In which respect then is love a principle? It is paradoxical also that strife should be imperishable; strife is for him the nature of the bad.

Anaxagoras makes the good a motive principle; for thought moves things, but moves them for the sake of something, which must be something other than it, [10] except according to *our* way of stating the case; for the medical art is in a sense health. It is paradoxical also not to suppose a contrary to the good, i.e. to thought. But all who speak of the contraries make no use of the contraries, unless we bring their views into shape. And why some things are perishable and others imperishable, no one tells us; for they make all existing things out of the same principles. [15] Further, some make existing things out of the non-existent; and others to avoid the necessity of this make all things one.

Further, why should there always be becoming, and what is the cause of becoming?—this no one tells us. And those who suppose two principles must suppose another, a superior principle, and so must those who believe in the Forms; for why did things come to participate, or why do they participate, in the Forms? And all other thinkers are confronted by the necessary consequence that there is [20] something contrary to Wisdom, i.e. to the highest knowledge; but *we* are not. For there is nothing contrary to that which is primary (for all contraries have matter and are potentially); and the ignorance which is contrary would lead us to a contrary object; but what is primary has no contrary.

Again, if besides sensible things no others exist, there will be no first principle, [25] no order, no becoming, no heavenly bodies, but each

principle will have a principle before it, as in the accounts of the mythologists and all the natural philosophers. But if the Forms or the numbers are to exist, they will be causes of nothing; or if not that, at least not of movement.

Further, how is extension, i.e. a *continuum*, to be produced out of unextended [30] parts? For number will not, either as mover or as form, produce a *continuum*. But again there cannot be any contrary that is also a productive or moving principle; for it would be possible for it not to be. Or at least its action would be posterior to its capacity. The world then would not be eternal. But it is; one of these premises, then, must be denied. And we have said how this must be done. Further, in virtue of what [35] the numbers, or the soul and the body, or in general the form and the thing, are one—of this no one tells us anything; nor can any one tell, unless he says, as we do, that the mover makes them one. And those who say mathematical number is first and go on to generate one kind of substance after another and give different [1076<sup>a</sup>1] principles for each, make the substance of the universe a series of episodes (for one substance has no influence on another by its existence or non-existence), and they give us many principles; but the world must not be governed badly.

‘The rule of many is not good; let there be one ruler.’<sup>5</sup>

## BOOK XIII (M)

1 · We have stated what is the substance of sensible things, dealing in the treatise on physics with matter, and later with the substance which has actual existence. Now since our inquiry is whether there is or is not besides the sensible [10] substances any which is immovable and eternal, and, if there is, what it is, we must first consider what is said by others, so that, if there is anything which they say wrongly, we may not be liable to the same objections, while, if there is any opinion common to them and us, we shall not quarrel with ourselves on that account; for one [15] must be content to state some points better than one's predecessors, and others no worse.

Two opinions are held on this subject; it is said that the objects of mathematics—i.e. numbers and lines and the like—are substances, and again that the Ideas are substances. And since some recognize these as two different classes—the Ideas and the mathematical numbers—and some recognize both as having one nature, [20] while some others say that the mathematical substances are the only substances, we must consider first the objects of mathematics, not qualifying them by any other characteristic—not asking, for instance, whether they are Ideas or not, or whether they are the principles and substances of existing things or not, but only whether as [25] the objects of mathematics they exist or not, and if they do, how they exist; then after this we must separately consider the Ideas themselves in a general way, and only as far as systematic treatment demands; for most of what we have to say has been repeatedly stated in popular works. And the greater part of our account must attack the inquiry already mentioned, viz. whether the substances and the principles [30] of existing things are numbers and Ideas; for after the discussion of the Ideas this remains as a third inquiry.

If the objects of mathematics exist, then they must exist either in sensible objects, as some say, or separate from sensible objects (and this also is said by some), or if they exist in neither of these ways, either they do not exist, or they exist [35] in some other way. So that the subject of our discussion will be not whether they exist but how they exist.

2 · That it is impossible for mathematical objects to exist *in* sensible

things and at the same time that the doctrine in question is a fanciful one, has been said already in our discussion of difficulties,—the reasons being that it is impossible for [1076<sup>b</sup>1] two solids to be in the same place, and that according to the same argument all the other powers and characteristics also should exist in sensible things—none of them existing separately. This we have said already. But, further, it is obvious that on this theory it is impossible for any body whatever to be divided; for it would have to be [5] divided at a plane, and the plane at a line, and the line at a point, so that if the point cannot be divided, neither can the line, and if the line cannot, neither can the plane nor the solid. What difference then does it make whether sensible things are of this kind, or, without being so themselves, have such things in them? The result will be [10] the same; if the sensible things are divided the others will be divided too, or else not even the sensible things can be divided.

But, again, it is not possible that such entities should exist *separately*. For if besides the sensible solids there are to be other solids which are separate from them and prior to the sensible solids, it is plain that besides the planes also there must be [15] other and separate planes and points and lines; for consistency requires this. But if these exist, again besides the planes and lines and points of the mathematical solid there must be others which are separate. For the incomposite is prior to the compound; and if there are, prior to the sensible bodies, bodies which are not [20] sensible, by the same argument the planes which exist by themselves must be prior to those which are in the motionless solids. Therefore these will be planes and lines other than those that exist along with the separate mathematical solids; for the latter exist along with the mathematical solids, while the others are prior to the [25] mathematical solids. Again, there will be, belonging to these planes, lines, and prior to them there will have to be, by the same argument, other lines and points; and prior to these points in the prior lines there will have to be other points, though there will be no others prior to these. Now the accumulation becomes absurd; for we find [30] ourselves with one set of solids apart from the sensible solids; three sets of planes apart from the sensible planes—those which exist apart from the sensible planes, and those in the mathematical solids, and those which exist apart from those in the mathematical solids; four sets of lines, and five sets of points. With which of these, then, will the mathematical sciences deal? Certainly not with the planes and lines [35] and points in the motionless solid; for science always deals with what is prior. And the same account will apply also to numbers; for there will be another set of units apart from each set

of points, and also apart from each set of realities, from the objects of sense and again from those of thought; so that there will be various classes of mathematical numbers.

[1077<sup>a</sup>1] Again, how is it possible to solve the questions which we enumerated in our discussion of difficulties? For besides the sensible things there will be, on similar principles, the things with which astronomy and those with which geometry deals; but how is it possible that a heaven and its parts—or indeed anything which has movement—should exist apart from the sensible heaven? Similarly also the objects [5] of optics and harmonics will exist apart; for there will be voice and sight besides the sensible or individual voices and sights. Therefore it is plain that the other senses as well, and the other objects of sense, will exist apart; for why should one set of them do so and another not? And if this is so, animals also will exist apart, since the senses will.

Again, there are certain mathematical theorems of a universal character, [10] extending beyond these substances. Here then we shall have another substance intermediate between, and separate from, the Ideas and the intermediates,—a substance which is neither number nor points nor spatial magnitude nor time. And if this is impossible, plainly it is also impossible that the *former* substances should exist separate from sensible things.

[15] And, in general, conclusions contrary alike to the truth and to the usual views follow, if one supposes the objects of mathematics to exist thus as separate entities. For if they exist thus they must be prior to sensible spatial magnitudes, but in truth they must be posterior; for the incomplete spatial magnitude is in the order of generation prior, but in the order of substance posterior, as the lifeless is to the living.

Again, what in the world<sup>1</sup> will make mathematical magnitudes one? For things [20] in our perceptible world are one in virtue of soul, or of a part of soul, or of something else, reasonably enough; when these are not present, the thing is a plurality, and splits up into parts. But in the case of the objects of mathematics, which are divisible and are quantities, what is the cause of their being one and holding together?

Again, the modes of generation of the objects of mathematics show that we are right. For the dimension first generated is length, then comes breadth, lastly depth, [25] and the process is complete. If, then, that which is posterior in the order of generation is prior in the order of substance, body will be prior to the plane and the line. And in *this* way also it is more complete and more whole, because it can become animate. How, on the other hand, could a line or a plane be animate? The

supposition passes the power of our senses. [30]

Again, body is a sort of substance; for it already has in a sense completeness. But how can lines be substances? Neither as a form or shape, as the soul perhaps is, nor as matter, like body; for we have no experience of anything that can be put together out of lines or planes or points, while if these had been a sort of material [35] substance, we should have observed things which could be put together out of them.

Grant that they are prior in formula. Still not all things which are prior in [1077<sup>b</sup>1] formula are prior in substance. For those things are prior in substance which when separated from other things continue to exist, but those are prior in formula out of whose formulae the formulae of other things are compounded; and these two properties are not co-extensive. For if attributes, such as moving or white, do not exist apart from their substances, the white is prior to the white man in formula, but [5] not in substance. For it cannot exist separately, but is always along with the compound thing; and by the compound thing I mean the white man. Therefore it is plain that neither is the result of abstraction prior nor that which is produced by [10] adding posterior; for it is by adding to the white that we speak of the white man.

It has, then, been sufficiently pointed out that the objects of mathematics are not substances in a higher sense than bodies are, and that they are not prior to sensibles in being, but only in formula, and that they cannot in any way exist separately. But since they could not exist *in* sensibles either, it is plain that they [15] either do not exist at all or exist in a special way and therefore do not exist without qualification. For 'exist' has many senses.

3 · Just as the universal part of mathematics deals not with objects which exist separately, apart from magnitudes and from numbers, but with magnitudes [20] and numbers, not however *qua* such as to have magnitude or to be divisible, clearly it is possible that there should also be both formulae and demonstrations about sensible magnitudes, not however *qua* sensible but *qua* possessed of certain definite qualities. For as there are many formulae about things merely considered as in motion, apart from the essence of each such thing and from their accidents, and as it [25] is not therefore necessary that there should be either something in motion separate from sensibles, or a separate substance in the sensibles, so too in the case of moving things there will be formulae and sciences which treat them not *qua* moving but only *qua* bodies, or again only *qua*

planes, or only *qua* lines, or *qua* divisibles, or *qua* [30] indivisibles having position, or only *qua* indivisibles.

Thus since it is true to say without qualification that not only things which are separable but also things which are inseparable exist—for instance, that moving things exist,—it is true also to say, without qualification, that the objects of mathematics exist, and with the character ascribed to them by mathematicians. And it is true to say of the other sciences too, without qualification, that they deal [35] with such and such a subject—not with what is accidental to it (e.g. not with the white, if the white thing is healthy, and the science has the healthy as its subject), [1078<sup>a</sup>1] but with that which is the subject of each science—with the healthy if it treats things *qua* healthy, with man if *qua* man. So too is it with geometry; if its subjects happen to be sensible, though it does not treat them *qua* sensible, the mathematical sciences will not for that reason be sciences of sensibles—nor, on the other hand, of other things separate from sensibles.

[5] Many properties attach to things in virtue of their own nature as possessed of some such property; e.g. there are attributes peculiar to the animal *qua* female or *qua* male, yet there is no female nor male separate from animals. And so also there are attributes which belong to things merely as lengths or as planes. And in proportion as we are dealing with things which are prior in formula and simpler, our [10] knowledge will have more accuracy, i.e. simplicity. Thus a science which abstracts from the magnitude of things is more precise than one which takes it into account; and a science is most precise if it abstracts from movement, but if it takes account of movement, it is most precise if it deals with the primary movement, for this is the simplest; and of this again uniform movement is the simplest form. The same account may be given of harmonics and optics; for neither considers its objects *qua* [15] light-ray or *qua* voice, but *qua* lines and numbers; but the latter are attributes proper to the former. And mechanics too proceeds in the same way. Thus if we suppose things separated from their attributes and make any inquiry concerning them as such, we shall not for this reason be in error, any more than when one draws [20] a line on the ground and calls it a foot long when it is not; for the error is not included in the propositions.

Each question will be best investigated in this way—by supposing separate what is not separate, as the arithmetician and the geometer do. For a man *qua* man is one indivisible thing; and the arithmetician supposes one indivisible thing, and [25] then considers whether any attribute belongs to a man *qua* indivisible. But the geometer treats him

neither *qua* man nor *qua* indivisible, but as a solid. For evidently the attributes which would have belonged to him even if he had not been indivisible, can belong to him apart from these attributes. Thus, then, geometers speak correctly—they talk about existing things, and their subjects do exist; for being has two forms—it exists not only in fulfillment but also as matter. [30]

Now since the good and the beautiful are different (for the former always implies conduct as its subject, while the beautiful is found also in motionless things), those who assert that the mathematical sciences say nothing of the beautiful or the good are in error. For these sciences say and prove a very great deal about them; for if they do not expressly mention them, but prove attributes which are their results or [35] their formulae, it is not true to say that they tell us nothing about them. The chief forms of beauty are order and symmetry and definiteness, which the mathematical [1078<sup>b</sup>1] sciences demonstrate in a special degree. And since these (e.g. order and definiteness) are obviously causes of many things, evidently these sciences must treat this sort of cause also (i.e. the beautiful) as in some sense a cause. But we shall [5] speak more plainly elsewhere about these matters.

4 · So much then for the objects of mathematics; we have said that they exist and in what sense they exist, and in what sense they are prior and in what sense not prior. Now, regarding the Ideas, we must first examine the ideal theory by itself, not connecting it in any way with the nature of numbers, but treating it in the form in [10] which it was originally understood by those who first maintained the existence of Ideas. The supporters of the ideal theory were led to it because they were persuaded of the truth of the Heraclitean doctrine that all sensible things are ever passing away, so that if knowledge or thought is to have an object, there must be some other [15] and permanent entities, apart from those which are sensible; for there can be no knowledge of things which are in a state of flux. Socrates occupied himself with the excellences of character, and in connection with them became the first to raise the problem of universal definitions—for of the natural scientists, only Democritus touched on the matter and defined, after a fashion, the hot and the cold; while the [20] Pythagoreans had before this treated of a few things, whose formulae they connected with numbers—e.g. opportunity, justice, or marriage. But it was natural that Socrates should seek the essence. For he was seeking to deduce, and the essence is the starting-



point of deductions. For there was as yet none of the dialectical power [25] which enables people even without knowledge of the essence to speculate about contraries and inquire whether the same science deals with contraries. For two things may be fairly ascribed by Socrates—inductive arguments and universal definition, both of which are concerned with the starting-point of science. But Socrates did not make the universals or the definitions exist apart; his successors, [30] however, gave them separate existence, and this was the kind of thing they called Ideas.

Therefore it followed for them, almost by the same argument, that there must be Ideas of all things that are spoken of universally, and it was almost as if a man wished to count certain things, and while they were few thought he would not be [35] able to count them, but made them more and then counted them; for the Forms are almost more numerous than the groups of sensible things, yet it was in seeking the [1079<sup>a</sup>1] causes of sensible things that they proceeded from these to the Forms. For to each set of substances there answers a Form which has the same name and exists apart from the substances, and so also in the other categories there is one character common to many individuals, whether these be sensible or eternal.

[5] Again, of the ways in which it is proved that the Forms exist, none is convincing; for from some no inference necessarily follows, and from some it follows that there are Forms even of things of which they think there are no Forms.

For according to the arguments from the sciences there will be Forms of all things of which there are sciences, and according to the argument that there is one attribute common to many things there will be Forms even of negations, and according to the argument that thought has an object when the individual object [10] has perished, there will be Forms of perishable things; for we can have an image of these. Again, of the most accurate arguments, some lead to Ideas of relations, of which they say there is no independent class, and others involve the difficulty of the third man. And in general the arguments for the Forms destroy that for whose [15] existence the assertors of Forms are more anxious than for the existence of the Ideas; for it follows that not the dyad but number is first, and the relative is prior to that and prior to the self-dependent—and besides this there are all the other points on which certain people, by following out the opinions held about the Forms, have come into conflict with the principles of the theory.

Again, according to the assumption on which the belief in the Ideas

rests, there [20] will be Forms not only of substances but also of many other things; for the concept is single, not only in the case of substances, but also in that of non-substances, and there are sciences of other things than substance; and a thousand other such conclusions also follow. But according to the necessities of the case and the opinions [25] about the Forms, if they can be shared in there must be Ideas of substances only. For they are not shared in incidentally, but each Form must be shared in as something not predicated of a subject. (E.g. if a thing shares in the double itself, it [30] shares also in eternal, but incidentally; for the double happens to be eternal.) Therefore the Forms will be substance. And the same names indicate substance in this and in the ideal world (or what will be the meaning of saying that there is something apart from the particulars—the one over many?). And if the Ideas and the things that share in them have the same Form, there will be something common: [35] for why should 2 be one and the same in all the perishable 2's, or in the 2's which are many but eternal, and not the same in the 2 itself as in the individual 2? But if they [1079<sup>b</sup>1] have not the same Form, they will have only the name in common, and it is as if one were to call both Callias and a piece of wood 'man', without observing any community between them.

But if we are to suppose that in other respects the common formulae apply to [5] the Forms, e.g. that plane figure and the other parts of the formula apply to the circle itself, but that what it is must be added, we must inquire whether this is not absolutely empty. For to what will this be added? To 'centre' or to 'plane' or to all the parts of the formula? For all the elements in the substance are Ideas, e.g. animal and two-footed. Further, the added notion must be an Idea, like plane, a definite entity which will be present as genus in all its species. [10]

5 · Above all one might discuss the question what on earth the Forms contribute to sensible things, either to those that are eternal or to those which come into being and cease to be; for they cause neither movement nor any change in them. [15] But again they help in no way towards the *knowledge* of other things (for they are not even the substance of these, else they would have been in them), nor towards their being, at least if they are not *in* the individuals which share in them—for in that case they might be thought perhaps to be causes, as white is for the white thing in which it is mixed. But this argument, which was used first by Anaxagoras, and [20] later by Eudoxus in his discussion of difficulties and by certain

others, is too easily upset; for it is easy to collect many insuperable objections to such a view.

But further all other things cannot come from the Forms in any of the ways that are usually suggested. And to say that they are patterns and the other things [25] share in them is to use empty words and poetical metaphors. For what is it that works, looking to the Ideas? And any thing can both be and come into being without being copied from something else, so that, whether Socrates exists or not, a man like Socrates might come to be. And evidently this might be so even if Socrates were [30] eternal. And there will be several patterns of the same thing, and therefore several Forms, e.g. animal and two-footed, and also man-himself, will be Forms of man. Again, the Forms are patterns not only of sensible things, but of things-themselves also, e.g. the genus is the pattern of the species of the genus; therefore the same thing will be pattern and copy. [35]

Again, it might be thought impossible that substance and that whose substance it is should exist apart; how, therefore, could the Ideas, being substances of things, [1080<sup>a</sup>1] exist apart?

In the *Phaedo*<sup>2</sup> it is stated in this way—that the Forms are causes both of being and of becoming. Yet though the Forms exist, still things do not come into being, unless there is something to move them; and many other things come into being (e.g. [5] a house or a ring), of which they say there are no Forms. Clearly therefore even the things of which they say there are Ideas can both be and come into being owing to such causes as produce the things just mentioned, and not owing to the Forms. But regarding the Ideas it is possible, both in this way and by more abstract and more accurate arguments, to collect many objections like those we have considered. [10]

6 · Since we have discussed these points, it is well to consider again the results regarding numbers which confront those who say that numbers are separable substances and first causes of things. If number is a real thing and its [15] substance is nothing other than just number, as some say, it follows that either there is a first in it and a second, each being different in kind, and<sup>3</sup> this is true of the units without qualification, and any unit is non-comparable with any unit, or they are all [20] directly successive, and any of them is comparable with any, as they say is the case with mathematical number; for in mathematical number no unit is in any way different from another. Or some units must be

comparable and some not, e.g. 2 is [25] first after 1, and then comes 3 and then the other numbers, and the units in each number are comparable, e.g. those in the first 2 with one another, and those in the first 3 with one another, and so with the other numbers; but the units in the 2 itself are not comparable with those in the 3 itself; and similarly in the case of the other [30] successive numbers. Therefore while mathematical number is counted thus—after 1, 2 (which consists of another 1 besides the former 1), and 3 (which consists of another 1 besides these two), and the other numbers similarly, ideal number is counted thus—after 1, a distinct 2 which does not include the first 1, and a 3 which [35] does not include the 2, and the other numbers similarly. Or one kind of number is like the first that was named, one like that which the mathematicians speak of, and that which we have named last must be a third kind.

[1080<sup>b</sup>1] Again, these numbers must either be separable from things, or not separable but in sensible things (not however in the way which we first considered, but in the sense that sensible things consist of numbers which are present in them)—either some of them and not others, or all of them.

[5] These are of necessity the only ways in which the numbers can exist. And of those who say that the 1 is the beginning and substance and element of all things, and that number is formed from the 1 and something else, almost every one has described number in one of these ways; only no one has said *all* the units are [10] incomparable. And this has happened reasonably enough; for there can be no way besides those mentioned. Some say both kinds of number exist, that which has a before and after being identical with the Ideas, and mathematical number being different from the Ideas and from sensible things, and both being separable from [15] sensible things; and others say mathematical number alone exists, as the first of realities, separate from sensible things.

Now the Pythagoreans, also, believe in one kind of number—the mathematical; only they say it is not separate but sensible substances are formed out of it. For they construct the whole universe out of numbers—only not numbers consisting of [20] abstract units; they suppose the units to have spatial magnitude. But how the first 1 was constructed so as to have magnitude, they seem unable to say.

Another thinker says the first kind of number, that of the Forms, alone exists, and some say mathematical number is identical with this.

The case of lines, planes, and solids is similar. For some think that those which [25] are the objects of mathematics are different from those

which come after the Ideas; and of those who express themselves otherwise some speak of the objects of mathematics and in a mathematical way—viz. those who do not make the Ideas numbers nor say that Ideas exist; and others speak of the objects of mathematics, but not mathematically; for they say that neither is every spatial magnitude divisible into magnitudes, nor do any two units make 2. All who say the 1 is an [30] element and principle of things suppose numbers to consist of abstract units, except the Pythagoreans; but *they* suppose the numbers to have magnitude, as has been said before. It is clear from this statement, then, in how many ways numbers may be described, and that all the ways have been mentioned; and all are impossible, but [35] some perhaps more than others.

7 · First let us inquire if the units are comparable or non-comparable, and if non-comparable, in which of the two ways we distinguished. For it is possible that [1081<sup>a</sup>1] any unit is non-comparable with any, and it is possible that those in the ideal 2 are non-comparable with those in the ideal 3, and, generally, that those in each primary number are non-comparable with one another. If all units are comparable and [5] without difference, we get mathematical number and this alone, and the Ideas cannot be the numbers. For what sort of number will the ideal man or animal or any other Form be? There is one Idea of each thing, e.g. one of ideal man and another one of ideal animal; but the similar and undifferentiated numbers are infinitely [10] many, so that *this* 3 is no more the ideal man than any other 3. But if the Ideas are not numbers, neither can they exist at all. For from what principles will the Ideas come? *Number* comes from the 1 and the indefinite dyad, and the principles and the elements are said to be principles and elements of number, and the Ideas cannot be [15] ranked as either prior or posterior to the numbers.

But if the units are non-comparable, and non-comparable in the sense that none is comparable with any other, number of this sort cannot be mathematical number; for mathematical number consists of undifferentiated units, and the truths [20] proved of it suit this character. Nor can it be ideal number. For 2 will not come first after 1 and the indefinite dyad, and be followed directly by the successive numbers, as we say ‘2, 3, 4’ (for the units in the ideal 2 are generated at the same time, whether, as the first holder of the theory said, from unequals—coming into being when these were equalized—or in some other way).<sup>4</sup>

Besides, if one unit is to be [25] prior to the other, it will be prior to the 2 composed of these; for when there is one thing prior and another posterior, the compound of these will be prior to one and posterior to the other.

Again, since the ideal 1 is first, and then there is a 1 which is first among the others and next after the ideal 1, and again a third which is next after the second [30] and next but one after the first 1, the units must be prior to the numbers by which they are named in counting, e.g. there will be a third unit in 2 before 3 exists, and a fourth and a fifth in 3 before the numbers 4 and 5 exist.—None of these thinkers [35] has said the units are non-comparable in this way, but according to their principles even this way is reasonable, though in truth it is impossible. For it is reasonable that [1081<sup>b</sup>1] the units should have priority and posteriority if there is a first unit and a first 1, and the 2's also if there is a first 2; for after the first it is reasonable and necessary that there should be a second, and if a second, a third, and so with the others [5] successively. (And to say both at the same time, that a *unit* is first and another unit is second after the ideal 1, and that a 2 is first after it, is impossible.) But they make a first unit and 1, but not a second and a third, and a first 2, but not a second and a third.

[10] Clearly, also, it is not possible, if all the units are non-comparable, that there should be an ideal 2 and 3; and similarly in the case of the other numbers. For whether the units are undifferentiated or each differs from each, number must be [15] counted by addition, e.g. 2 by adding another one to the one, 3 by adding another one to the two, and 4 similarly. This being so, numbers cannot be generated, as they generate them, from the dyad and the 1; for 2 becomes part of 3, and 3 of 4, and the [20] same happens in the case of the succeeding numbers, but for them 4 came from the first 2 and the indefinite 2,—which makes it two 2's *other* than the ideal 2; if not, the ideal 2 will be a part of 4 and one other 2 will be added. And similarly 2 will [25] consist of the ideal 1 and another 1; but if this is so, the other element cannot be an indefinite 2; for it generates a unit, but not a definite 2. Again, besides the ideal 3 and the ideal 2 how can there be other 3's and 2's? And how do they consist of prior [30] and posterior units? All these doctrines are absurd and fiction, and there cannot be a first 2 and then an ideal 3. Yet there must, if the 1 and the indefinite dyad are to be the elements. But if the results are impossible, it is also impossible that these are the principles.

If the units, then, are differentiated, each from each, these results and others [35] similar to these follow of necessity. But if those in different

numbers are differentiated, but those in the same number are alone undifferentiated from one [1082<sup>a</sup>1] another, even so the difficulties that follow are no less. E.g. in the ideal 10 there are ten units, and the 10 is composed both of them and of two 5's. But since the ideal 10 is not any chance number nor composed of any chance 5's—or, for that matter, [5] units—the units in this 10 must differ. For if they do not differ, neither will the 5's of which the 10 consists differ; but since they differ, the units also will differ. But if they differ, will there be no other 5's in the 10 but only these two, or will there be [10] others? If there are not, this is paradoxical; and if there are, what sort of 10 will consist of them? For there is no other 10 in the 10 but itself. But it is also necessary that the 4 should not consist of any chance 2's; for the indefinite 2, as they say, took the definite 2 and made two 2's; for its nature was to double what it took.

[15] Again, as to the 2 being a thing apart from the two units, and the 3 a thing apart from the three units, how is this possible? Either by one's sharing in the other, as white man is different from white and man (for it shares in these), or when one is a differentia of the other, as man is different from animal and two-footed. Again, [20] some things are one by contact, some by intermixture, some by position; none of which relations can belong to the units of which the 2 or the 3 consists; but as two men are not a unity apart from both, so must it be with the units. And their being [25] indivisible will make no difference to them; for points are indivisible, but yet a pair of them is nothing apart from the two.

But this consequence also we must not forget, that it follows that there are prior and posterior 2's, and similarly with the other numbers. For let the 2's in the 4 [30] be simultaneous; yet these are prior to those in the 8, and as the 2 generated them, they generated the 4's in the ideal 8. Therefore if the first 2 is an Idea, these 2's also will be Ideas. And the same account applies to the units; for the units in the first 2 generate the four in 4, so that all the units come to be Ideas and an Idea will be [35] composed of Ideas. Clearly therefore those things also, of which these are Ideas, will be composite, e.g. one might say that animals are composed of animals, if there are [1082<sup>b</sup>1] Ideas of them.

In general, to differentiate the units in any way is an absurd fiction; and by a fiction I mean that which is brought in forcibly to suit a hypothesis. For neither in quantity nor in quality do we see unit differing from unit, and number must be [5] either equal or unequal—all number but especially that which consists of abstract units—so that if one number is neither greater nor less than another, it is equal; but what is equal and in no wise differentiated we take to be the same when we are speaking of

numbers. If not, even the 2's in the ideal 10 will be differentiated though they are equal; for what reason will the man who says they are not differentiated be [10] able to allege?

Again, if every unit plus another unit makes two, a unit from the ideal 2 and one from the ideal 3 will make a 2. Now this consists of differentiated units; and will it be prior to the 3 or posterior? It rather seems that it must be prior; for one of the [15] units is simultaneous with the 3, and the other is simultaneous with the 2. And we, for our part, suppose that in general 1 and 1, whether the things are equal or unequal, is 2, e.g. the good and the bad, or a man and a horse; but those who hold these views say that not even two *units* are 2.

If the number of the ideal 3 is not greater than that of the 2, this is surprising; [20] and if it is, clearly there is a number in it equal to the 2, so that this is not different from the ideal 2. But this is not possible, if there is a first and a second number. Nor will the Ideas be numbers. For in this particular point they are right who claim that the units must be different, if there are to be Ideas, as has been said before. For the [25] Form is unique; but if the units are not different, the 2's and the 3's also will not be different. Therefore they must say that when we count thus —'1, 2,' we do not add to the previous number; for if we do, neither will the numbers be generated from the [30] indefinite dyad, nor can a number be an Idea; for one Idea will be in another, and all the Forms will be parts of one Form. Therefore with a view to their hypothesis they are right, but absolutely they are wrong; for their view is very destructive, since they will admit that this question itself affords some difficulty—whether, when we count and say '1, 2, 3,' we count by addition or by partitions. But we do both; therefore it is [35] absurd to refer this to so great a difference of substance.

8 · First of all it is well to determine what is the differentia of a [1083<sup>a1</sup>] number—and of a unit, if it has a differentia. Units must differ either in quantity or in quality; and neither of these seems to be possible. But number *qua* number differs in quantity. And if the units also differed in quantity, number would differ from [5] number, though equal in number of units. Again, are the first units greater or smaller, and do the later ones increase or diminish? All these are irrational suppositions. But neither can they differ in quality. For no attribute can attach to them; for even to numbers quality is said to belong *after* quantity. Again, quality [10] could not come to them either from the 1 or from the dyad; for the



former has no quality, and the latter gives *quantity*; for its nature is to cause things to be many. If [15] the facts are really otherwise, they should above all state this at the beginning and determine if possible, regarding the differentia of the unit, why it must exist; otherwise, what do they mean by it?

Evidently then, if the Ideas are numbers, the units cannot all be comparable, [20] nor can they be non-comparable in either of the two ways. But neither is the way in which some others speak about numbers correct. These are those who do not think there are Ideas, either without qualification or as identified with certain numbers, but think the objects of mathematics exist and the numbers are the first of real [25] things, and the ideal 1 is the starting-point of them. It is paradoxical that there should be a 1 which is first of 1's, as they say, but not a 2 which is first of 2's, nor a 3 of 3's; for the same reasoning applies to all. If, then, the facts with regard to number are so, and one supposes mathematical number alone to exist, the 1 is not the [30] starting point. For this sort of 1 must differ from the other units; and if this is so, there must also be a 2 which is first of 2's, and similarly with the other successive numbers. But if the 1 is the starting-point, the truth about the numbers must rather [35] be what Plato used to say, and there must be a first 2 and 3, and the numbers must not be comparable with one another. But if on the other hand one supposes this, many impossible results, as we have said, follow. But either this or the other must be [1083<sup>b</sup>1] the case, so that if neither is, number cannot exist separately.

It is evident from this that the third view is the worst,—that ideal and mathematical number is the same. For two mistakes evidently meet in the one [5] opinion. (1) Mathematical number cannot be of this sort, but the holder of this view has to spin it out by making suppositions peculiar to himself. And (2) he must also admit all the consequences that confront those who speak of numbers as Forms.

The doctrine of the Pythagoreans in one way affords fewer difficulties than those before named, but in another way has others peculiar to itself. For not [10] thinking of number as capable of existing separately removes many of the impossible consequences; but that bodies should be composed of numbers, and that this should be mathematical number, is impossible. For it is not true to speak of indivisible magnitudes; and however much there might be magnitudes of this sort, [15] units at least have no magnitude; and how can a magnitude be composed of indivisibles? But arithmetical number, at least, consists of abstract units, while these thinkers identify number with real things; at any rate they

apply their propositions to bodies as if they consisted of those numbers.

[20] If then it is necessary, if number is a self-subsistent real thing, that it should be conceived in one of these ways which have been mentioned, and if it cannot be conceived in any of these, evidently number has no such nature as those who make it separable construct for it.

Again, does each unit come from the great and the small, equalized, or one [25] from the small, another from the great? If the latter, neither does each thing contain all the elements, nor are the units without difference; for in one there is the great and in another the small, which is contrary in its nature to the great. Again, how is it with the units in the ideal 3? There is one over. But perhaps it is for this reason that they give the ideal 1 the middle place in odd numbers. But if each of the two units consists of both the great and the small, equalized, how will the 2, which is [30] one thing, consist of the great and the small? Or how will it differ from the unit? Again, the unit is prior to the 2; for when it is destroyed the 2 is destroyed. It must, then, be the Idea of an Idea since it is prior to an Idea, and it must have come into being before it. From what, then? Not from the indefinite dyad, for *its* function was [35] to double.

Again, number must be either infinite or finite; for these thinkers think of number as capable of existing separately, so that it is not possible that neither of [1084<sup>a</sup>1] those alternatives should be true. Clearly it cannot be *infinite*; for infinite number is neither odd nor even, but the generation of numbers is always the generation either of an odd or of an even number,—when 1 operates in one way on an even number, an odd number is produced, and when 2 (or an odd number) operates in the other [5] way, the numbers got from 1 by doubling (or the other even numbers) are produced. Again, if every Idea is an Idea of something, and the numbers are Ideas, infinite number will be an Idea of something, either of some sensible thing or of something else. Yet this is not possible in view of their hypothesis any more than it is reasonable in itself, if they conceive of the Ideas as they do. [10]

But if number is *finite*, how far does it go? With regard to this not only the fact but the reason should be stated. But if number goes only up to 10, as some say, firstly the Forms will soon run short; e.g. if 3 is man-in-himself, what number will be the horse-in-itself? The numbers which are Ideas of the several things go up to 10. It [15] must, then, be one of the numbers within these limits; for it is these that are substances and Ideas. Yet they will run short; for the various kinds of animal will exceed them. At the same time it is clear that if in this way the 3 is the Idea of

man, the other 3's are so also (for those in the same number are similar), so that there will [20] be an infinite number of men, and if each 3 is an Idea, each of the men will be man-in-himself, and if not, they will at least be men. And if the smaller number is part of the greater (being number of such a sort that the units in the same number are comparable), then if the ideal 4 is an Idea of something, e.g. of horse or of white, man will be a part of horse, if man is 2. It is paradoxical also that there should be an [25] Idea of 10, but not of 11, nor of the succeeding numbers. Again, there both are and come to be certain things of which there are no Forms; why, then, are there not Forms of them also? We infer that the Forms are not causes. Again, it is paradoxical if the number-series up to 10 is more of a real thing and a Form than 10 [30] itself. There is no generation of the former as one thing, and there is of the latter. But they try to form a theory on the assumption that the series of numbers up to 10 is a complete series. At least they generate other things—the void, proportion, the odd, and the others of this kind—within the 10. For some things, e.g. movement, rest, good, bad, they assign to the principles, and the others to the numbers. This is [35] why they identify 1 with the odd; for if the odd implied 3, how would 5 be odd? Again, magnitudes and all such things are explained without going beyond a definite number, e.g. the first indivisible line, then the 2, then the others up to [1084<sup>b</sup>1] 10.

Again, if number can exist separately, one might ask which is prior—1, or 2 or 3? Inasmuch as the number is composite, 1 is prior, but inasmuch as the universal [5] and the form is prior, the number is prior; for each of the units is part of the number as its matter, and the number acts as form. And in a sense the right angle is prior to the acute, because it is definite and in virtue of its formula; but in a sense the acute is prior, because it is a part and the right angle is divided into acute angles. As matter, then, the acute angle and the element and the unit are prior, but as regards [10] the form and the substance (in the sense of the formula), the right angle, and the whole consisting of the matter and the form, are prior; for the compound thing is nearer the form and the object of the formula, but in generation it is later. How then is 1 the starting-point? Because it is not divisible, they say. But both the universal, [15] and the particular or the element, are indivisible; but in different ways, one in formula and the other in time. In which way then is 1 the starting-point? As has been said, the right angle is thought to be prior to the acute, and the acute to the right, and each is one. They make 1 the starting-point in both ways. But this is impossible. For one kind of starting-point is the form or substance, the other the [20] part or matter. For each is in a way

one—in truth, each unit exists potentially (at least if the number is a unity and not like a heap, i.e. if different numbers consist of different units, as they say), but not actually.

The cause of the mistake they fell into is that they conducted their inquiry at the same time from the standpoint of mathematics and from that of universal [25] formulae, so that from the former standpoint they treated unity, their first principle, as a point; for the unit is a point without position. They put things together out of the smallest parts, as some others have done. Therefore the unit becomes the matter of numbers and at the same time prior to 2; and again posterior, [30] 2 being treated as a whole, a unity, and a form. But because their inquiry was universal they treated the unity which can be predicated of a number, as in this sense also a part of the number. But these characteristics cannot belong at the same time to the same thing.

If the ideal 1 must be merely without position<sup>5</sup> (for it differs in nothing from other 1's except that it is the starting-point), and the 2 is divisible but the unit is not, [35] the unit must be more like the ideal 1. But if so, *it* must be more like the unit than the 2; therefore each of the units must be prior to the 2. But they deny this; at least [1085<sup>a</sup>1] they generate the 2 first. Again, if the ideal 2 is a unity and the ideal 3 is one also, both form a 2. From what, then, is this 2 produced?

9 · Since there is not contact in numbers, but the units between which there [5] is nothing, e.g. those in 2 or in 3, are successive, one might ask whether they succeed the ideal 1 or not, and whether, of the terms that succeed it, 2 or either of the units in 2 is prior.

Similar difficulties occur with regard to the classes of things posterior to number,—the line, the plane, and body. For some construct these out of the forms [10] of great and small; e.g. lines from long and short, planes from broad and narrow; masses from deep and shallow; which are forms of great and small. And the principle of these which answers to the 1 different men describe in different ways. And in these also the impossibilities, the fictions, and the contradictions of all [15] probability are seen to be innumerable. For they are severed from one another, unless the principles of these imply one another in such a way that the broad and narrow is also long and short; but if this is so, the plane will be a line and the solid a plane. Again, how will angles and figures and such things be explained? And the [20] same happens as in regard to number; for these things are attributes of magnitude, but magnitude does not *consist*

of these, any more than the line consists of straight and curved, or solids of smooth and rough.

All these cases share a difficulty which occurs with regard to species of a genus, when one posits the universals, viz. whether it is the ideal animal or [25] something other than the ideal animal that is in animals. True, if the universal is not separable, this will present no difficulty; but if the 1 and the numbers are separable, as those who express these views say, it is not easy to solve the difficulty, if one may call the impossible 'not easy'. For when we apprehend the unity in 2, or in general in [30] a number, do we apprehend a thing-in-itself or something else?

Some, then, generate magnitudes from matter of this sort, others from the point—and the point is thought by them to be not 1 but something like 1—and from other matter like plurality, but not identical with it; about which principles none the less the same difficulties occur. For if the matter is one, line and plane and solid will [35] be the same; for from the same elements will come one and the same thing. But if the matters are more than one, and there is one for the line and a second for the [1085<sup>b</sup>1] plane and another for the solid, they either imply one another or not, so that the same results will follow even so; for either the plane will not contain a line or it will be a line.

Again, how number can consist of the one and plurality, they make no attempt [5] to explain; at least as they state the case, the same objections arise as confront those who construct number out of the one and the indefinite dyad. For the one view generates number from the universally predicated plurality, and not from a particular plurality; and the other generates it from a particular plurality, but the first; for 2 is said to be a first plurality. Therefore there is practically no difference, [10] but the same difficulties will follow,—is it intermixture or position or fusion or generation? and so on. Above all one might press the question, if each unit is one, what does it come from? Certainly each is not the one-in-itself. It must, then, come from the one-in-itself and plurality, or a part of plurality. To say that the unit is a [15] plurality is impossible, for it is indivisible; and to generate it from a part of plurality involves many other objections; for each of the parts must be indivisible (or it will be a plurality and the unit will be divisible) and the elements will not be the one and *plurality*; for the single units do not come from plurality and the one. Again, the [20] holder of this view does nothing but produce another number; for his plurality of indivisibles is a number. Again, we must inquire, in view of this theory also, whether the number is infinite or finite. For there was at first, as it seems, a finite plurality, from which and

from the one comes the finite number of units. And plurality in [25] itself is different from infinite plurality; what sort of plurality, then, is the element which co-operates with the one?

One might inquire similarly about the point, i.e. the element out of which they make magnitudes. For surely this is not the one and only point; at any rate, then, let [30] them say out of what each of the other points is formed. Certainly not of some *distance* together with the point-in-itself. Nor again can *parts* of a distance be indivisible parts, as the parts of plurality out of which the units are said to be made are indivisible; for number consists of indivisibles, but magnitudes do not.

[35] All these objections and others of the sort make it evident that number and magnitudes cannot exist apart from things. Again, the fact that the chief thinkers [1086<sup>a</sup>1] disagree about numbers is a sign that it is the incorrectness of the alleged facts themselves that brings confusion into the theories. For those who make the objects of mathematics alone exist apart from sensible things, seeing the difficulty about [5] the Forms and their fictitiousness, abandoned ideal number and posited mathematical. But those who wished to make the Forms at the same time numbers, but did not see, if one assumed these principles, how mathematical number was to exist apart from ideal, made ideal and mathematical number the same—in *name*, since in *fact* [10] mathematical number is destroyed; for they state hypotheses peculiar to themselves and not those of mathematics. But he who first supposed that the Forms exist and that the Forms are numbers and that the objects of mathematics exist, naturally separated the two. Therefore it turns out that all of them are right in some respect, but on the whole not right. And they themselves confirm this, for their statements [15] conflict. The cause is that their hypotheses and their principles are false. And it is hard to make a good case out of bad materials, according to Epicharmus: 'as soon as 'tis said, 'tis seen to be wrong.' But regarding numbers the questions we have raised and the conclusions we have reached are sufficient; for he who is already convinced [20] might be further convinced by a longer discussion, but one not yet convinced would not come any nearer to conviction.

But regarding the first principles and the primary causes and elements, the views expressed by those who discuss only sensible substance have been partly [25] stated in the *Physics*, and partly do not belong to the present inquiry; but the views of those who say there are other substances besides the sensible must be discussed next after those we have been mentioning. Since, then, some say that the Ideas and the

numbers are such substances, and that the elements of these are elements and principles of real things, we must inquire regarding these what they say and in what sense they say it.

[30] Those who posit numbers only, and these mathematical, must be considered later; but as regards those who believe in the Ideas one might survey at the same time their way of thinking and the difficulties into which they fall. For they at the same time treat the Ideas as universal, and again as separable and individual. That [35] this is not possible has been shown before. The reason why those who say substances are universal combined these two views in one, is that they did not make them identical with sensible things. They thought that the sensible particulars were in a [1086<sup>b</sup>1] state of flux and none of them remained, but that the universal was apart from these and different. And Socrates gave the impulse to this theory, as we said before, by means of his definitions, but he did not *separate* them from the particulars; and in this he thought rightly, in not separating them. This is plain from the results; for [5] without the universal it is not possible to get knowledge, but the separation is the cause of the objections that arise with regard to the Ideas. His successors, treating it as necessary, if there are to be substances besides the sensible and transient substances, that they must be separable, had no others, but gave separate existence to these universally predicated substances, so that it followed that universals and [10] individuals were almost the same sort of thing. This in itself, then, would be one difficulty in the view we have mentioned.

10 · Let us now mention a point which presents a certain difficulty both to those who believe in the Ideas and to those who do not, and which was stated at the [15] beginning among the problems. If we do not suppose substances to be separate, and in the way in which particular things are said to be separate, we shall destroy that sort of substance which we wish to maintain; but if we conceive substances to be separable, how are we to conceive their elements and their principles? [20]

If they are individual and not universal, real things will be just of the same number as the elements, and the elements will not be knowable. For let the syllables in speech be substances, and their elements elements of substances; then there must be only one *ba* and one of each of the syllables, if they are not universal and the same [25] in form but each is one in number and a 'this' and not homonymous (and again they suppose

each thing-in-itself to be one). And if the syllables are unique, so are the parts of which they consist; there will not, then, be more *a*'s than one, nor more than one of any of the other elements, on the same principle on which none of the syllables can exist in the plural number. But if this is so, there will not be other [30] things existing besides the elements, but only the elements. Again, the elements will not be even knowable; for they are not universal, and knowledge is of universals. This is clear both from demonstrations and from definitions; for we do not conclude that this triangle has its angles equal to two right angles, unless every triangle has [35] its angles equal to two right angles, nor that this man is an animal, unless every man is an animal.

But if the principles are universal either the substances composed of them are universal too, or non-substance will be prior to substance; for the universal is not a [1087<sup>a</sup>1] substance, and the element or principle is universal, and the element or principle is prior to the things of which it is the principle or element.

All these difficulties follow naturally, when they make the Ideas out of elements and claim that there are separate unities apart from the substances which [5] have the same form. But if, e.g., in the case of the elements of speech, the *a*'s and the *b*'s may quite well be many and there need be no ideal *a* and ideal *b* besides the many, there may be, as far as this goes, an infinite number of similar syllables. The [10] statement that all knowledge is universal, so that the principles of things must also be universal and not separate substances, presents indeed, of all the points we have mentioned, the greatest difficulty, but yet the statement is in a sense true, although [15] in a sense it is not. For knowledge, like knowing, is spoken of in two ways—as potential and as actual. The potentiality, being, as matter, universal and indefinite, deals with the universal and indefinite; but the actuality, being definite, deals with a definite object,—being a 'this', it deals with a 'this'. But *per accidens* sight sees [20] universal colour, because this individual colour which it sees is colour; and this individual *a* which the grammarian investigates is an *a*. For if the principles must be universal, what is derived from them must also be universal, as in demonstrations; and if this is so, there will be nothing capable of separate existence—i.e. no [25] substance. But evidently in a sense knowledge is universal, and in a sense it is not.



## BOOK XIV (N)

1 · Regarding this kind of substance, what we have said must be taken as [30] sufficient. All philosophers make the first principles contraries: as in natural things, so also in the case of unchangeable substances. But since there cannot be anything prior to the first principle of all things, the principle cannot be the principle as being something else. To suggest this is like saying that the white is the first principle, not *qua* anything else but *qua* white, but yet that it is predicable of a subject, and is [35] white as being something else; for then that subject will be prior. But all things are generated from contraries as belonging to an underlying subject; a subject, then, [1087<sup>b</sup>1] must be present in the case of contraries, if anywhere. All contraries, then, are always predicable of a subject, and none can exist apart. But appearances suggest that there is nothing contrary to substance, and argument confirms this. No contrary, then, is the first principle of all things in the full sense; the first principle is something different.

[5] But these thinkers make one of the contraries matter, some making the unequal—which they take to be the essence of plurality—matter for the one, which is the equal,<sup>1</sup> and others making plurality matter for the one. (The former generate numbers out of the dyad of the unequal, i.e. of the great and small, and the other thinker we have referred to generates them out of plurality, while according to both it is generated *by* the substance of one.) For even the philosopher who says the [10] unequal and one are the elements, and the unequal is a dyad composed of the great and small, treats the unequal, or the great and the small, as being one, and does not draw the distinction that they are one in formula, but not in number. But they do not describe rightly even the principles which they call elements, for some name the [15] great and the small with the one and treat these three as elements of numbers, two being matter, one form; while others name the many and few, because the great and the small are more appropriate in their nature to magnitude than to number; and others name rather the universal character common to these—that which exceeds and that which is exceeded. None of these varieties of opinion makes any difference to speak of, in view of some of the consequences; they affect only the abstract objections, which these thinkers take care to avoid because their own demonstrations [20] are

abstract,—with this exception, that if the exceeding and the exceeded are the principles, and not the great and the small, consistency requires that number should come from the elements before 2 does; for both are more universal than 2, as the exceeding and exceeded are more universal. But as it is, they say one of these [25] things but do not say the other. Others oppose the different and the other to the one, and others oppose plurality to the one. But if, as they claim, things consist of contraries, and to the one either there is nothing contrary, or if there must be something it is plurality, and the unequal is contrary to the equal and the different to the same and the other to the thing itself, those who oppose the one to plurality [30] have most claim to plausibility, but even their view is inadequate, for the one would on their view be a few; for plurality is opposed to fewness, and the many to the few.

‘One’ evidently means a measure. And in every case it is some underlying thing with a distinct nature of its own, e.g. in the scale a quarter-tone, in magnitude a finger or a foot or something of the sort, in rhythms a beat or a syllable; and [35] similarly in weight it is a definite weight; and in the same way in all cases, in qualities a quality, in quantities a quantity (and the measure is indivisible, in the [1088<sup>a</sup>1] former case in kind, and in the latter to the sense); which implies that the one is not, in any instance, in itself a substance. And this is reasonable; for the one means the measure of some plurality, and number means a measured plurality and a plurality [5] of measures. Thus it is natural that one is not a number; for the measure is not measures, but both the measure and the one are starting-points. The measure must always be something predicable of all alike, e.g. if the things are horses, the measure is horse, and if they are men, man. If they are a man, a horse, and a god, the [10] measure is perhaps living beings, and the number of them will be a number of living beings. If the things are man and white and walking, these will scarcely have a number, because all belong to a subject which is one and the same in number, yet the number of these will be a number of classes, or of some equivalent term.

Those who treat the unequal as one thing, and the dyad as an indefinite [15] compound of great and small, say what is very far from being probable or possible. For these are modifications and accidents, rather than substrata, of numbers and magnitudes—the many and few of number, and the great and small of magnitude—like even and odd, smooth and rough, straight and curved. Again, apart from [20] this mistake, the great and the small, and the like, must be relative to something; but the relative is least of all things a real thing or substance,

and is posterior to quality and quantity; and the relatives are accidents of quantity, as was said, but not [25] its matter, since there is something else both for relative in general and for its parts and kinds. For there is nothing either great or small, many or few, or, in general, relative, which is many or few, great or small, or relative without being so as something else. A sign that the relative is least of all a substance and a real thing is the fact that it alone has no proper generation or destruction or movement, as in [30] quantity there is increase and diminution, in quality alteration, in place locomotion, in substance simple generation and destruction. The relative has no proper change; for, without changing, a thing will be now greater and now less or equal, if that with [1088<sup>b</sup>1] which it is compared has changed in quantity. And the matter of each thing, and therefore of substance, must be that which is potentially of the nature in question; but the relative is neither potentially nor actually substance. It is strange, then, or rather impossible, to make non-substance an element in, and prior to, substance; for [5] all the categories are posterior. Again, the elements are not predicated of the things of which they are elements, but many and few are predicated both apart and together of number, and long and short of the line, and both broad and narrow apply to the plane. If there is a plurality, then, of which the one term, viz. few, is always predicated, e.g. 2 (which cannot be many for if it were many, 1 would be few), there [10] must be also one which is absolutely many, e.g. 10 is many (if there is no number which is greater than 10), or 10,000. How then, in view of this, can number consist of few and many? Either both ought to be predicated of it, or neither; but according to the present account only the one *or* the other is predicated.

2 · We must inquire generally, whether eternal things can consist of [15] elements. If they do, they will have matter; for everything that consists of elements is composite. Since, then, a thing must have come into being out of that of which it consists (and if it is eternal, then if it *had* come into being it would have done so in that way), and since everything comes to be what it comes to be out of that which is it potentially (for it could not have come to be out of that which had not this capacity, nor could it consist of such elements), and since the potential can be either [20] actual or not,—this being so, however everlasting number or anything else that has matter is, it must be capable of not existing, just like anything which is a single day or any number of years old; if this is capable of not existing, so is that which has lasted for

a time so long that it has no limit. They cannot, then, be eternal, since that which is capable of not existing is not eternal, as we had occasion to show in another [25] context. If that which we are now saying is true universally—that no substance is eternal unless it is actuality, and if the elements are matter that underlies substance, no eternal substance can have elements present in it, of which it consists.

There are some who describe the element which acts with the one as the [30] indefinite dyad, and object to the unequal, reasonably enough, because of the ensuing difficulties; but they have got rid only of those objections which inevitably arise from the treatment of the unequal, i.e. the relative, as an element; those which arise apart from this opinion must confront even these thinkers, whether it is ideal [35] number, or mathematical, that they construct out of those elements.

There are many causes which led them off into these explanations, and [1089<sup>a</sup>1] especially the fact that they framed the difficulty in an old-fashioned way. For they thought that all things that are would be one—viz. Being itself, if one did not join issue with and refute the saying of Parmenides:<sup>2</sup>

For never will this be proved, that things that are not are.

They thought it necessary to prove that that which is not is; for thus—of that [5] which is and something else—could the things that are be composed, if they are many.

But firstly, if ‘being’ has many senses (for it means sometimes substance, sometimes quality, sometimes quantity, and at other times the other categories), what sort of one are all the things that are, if non-being is to be supposed not to be? Is it the substances that are one, or the affections and the other categories as well, or [10] everything—so that the ‘this’ and the ‘such’ and the ‘so much’ and the other categories that indicate each some one thing will all be one? But it is strange, or rather impossible, that a single nature should bring it about that part of that which is is a ‘this’, part a ‘such’, part a ‘so much’, part somewhere.

Secondly, of what sort of non-being and being do the things that are consist? [15] For ‘non-being’ also has many senses, since ‘being’ has; and not being a man means not being a certain ‘this’, not straight not being of a certain quality, not three cubits long not being of a certain quantity. From what sort of being and non-being, then, do the things that are come to be many? He means by the non-being, the union of [20] which with being makes the things that are many, the false and the character of

falsity. This is also why it was said that we must assume something that is false, as geometers assume the line which is not a foot long to be a foot long. But this cannot be so. For neither do geometers assume anything false (for the proposition in [25] question is extraneous to the inference), nor are the things that are, generated from or resolved into non-being in this sense. But since non-being in the various cases has as many senses as there are categories, and besides this the false is said not to be and so is the potential, generation proceeds from the *latter*, man from that which is not man but potentially man, and white from that which is not white but potentially [30] white, and this whether it is one thing that is generated or many.

The question evidently is, how being in the sense of *substances* is many; for the things that are generated are numbers and lines and bodies. It is strange to inquire how being in the sense of essence is many, and not how either qualities or quantities are many. For surely the indefinite dyad or the great and the small are not a cause of there being two kinds of white or many colours or flavors or shapes; for then these [1089<sup>b</sup>1] also would be numbers and units. But if they had attacked this point, they would have seen the cause of the plurality in substances also; for the cause is the same or analogous. This aberration is the reason also why in seeking the opposite of being and the one, from which and being and the one the things that are proceed, they [5] posited the relative (i.e. the unequal), which is neither the contrary nor the contradictory of these, but is one kind of being as substance and quality are.

They should have inquired also how relatives are many and not one. But as it is, they inquire how there are many units besides the first 1, but do not go on to inquire [10] how there are many unequals besides *the* unequal. Yet they use them and speak of great and small, many and few (from which proceed numbers), long and short (from which proceeds the line), broad and narrow (from which proceeds the plane), deep and shallow (from which proceed solids); and they speak of yet more kinds of relatives. What is the reason, then, why there is a plurality of these? [15]

It is necessary, as we say, to presuppose for each thing that which is it potentially; and the holder of these views further declared what that is which is potentially a 'this' and a substance but is not in itself being—viz. that it is the relative (as if he had said the qualitative), which is neither potentially the one or [20] being, nor the contradictory of the one nor of being, but one among beings. And it was much more necessary, as we said, if he was inquiring how beings are many, not to inquire about those in the same category—how there are many substances or many qualities

—but how beings as a whole are many; for some are substances, some modifications, some relations. In the categories other than substance there is [25] another matter to give us pause, viz. how can there be many? For since they are not separable, qualities and quantities are many only because their substrate becomes and is many. Yet there *ought* to be a matter for each category; only it cannot be separable from substances. But in the case of a ‘this’, it is possible to explain how the [30] ‘this’ is many things, unless a thing is to be treated as both a ‘this’ and a general character. The difficulty arising from these facts is rather this, how there are actually many substances and not one.

But further, if the ‘this’ and the quantitative are not the same, we are not told how and why the things that are are many, but how quantities are many. For all [35] number means a quantity, and so does the unit, unless it means merely a measure or the indivisible in quantity. If then the quantitative and essence are different, we are [1090<sup>a</sup>1] not told whence or how essence is many; but if any one says they are the same, he has to face many inconsistencies.

One might fix one’s attention also on the question, regarding the numbers,—what justifies the belief that they exist. To the believer in the Ideas they provide a [5] cause for existing things, since each number is an Idea, and the Idea is to other things somehow or other the cause of their being; for let this supposition be granted them. But as for him who does not hold this view because he sees the inherent objections to the Ideas (so that it is not for this reason that he posits numbers), but [10] who posits *mathematical* number, why must we believe his statement that such number exists, and of what use is such number to other things? Neither does he who says it exists maintain that it is the cause of anything (he rather says it is a thing in itself), nor is it observed to be the cause of anything; for the theorems of [15] arithmeticians will all be found true even of sensible things, as was said.

3 · Those who suppose the Ideas to exist and to be numbers, take each to be one thing by setting each out apart from the many—so that they try at least to explain somehow why numbers exist. Since their reasons, however, are neither conclusive nor in themselves possible, one must not, on this account at least, assert [20] the existence of number. But the Pythagoreans, because they saw many attributes of numbers belonging to sensible bodies, supposed real things to be numbers—not separable numbers, however, but numbers of which real things consist.

But why? Because the attributes of numbers are present in a musical scale and in the heavens [25] and in many other things. But those who say that mathematical number alone exists cannot according to their hypotheses say anything of this sort; indeed, they used to say that those numbers could not be objects of the sciences. But we maintain that they are, as we said before. And it is evident that the objects of mathematics do not exist apart; for if they existed apart their attributes would not have been present in [30] bodies. The Pythagoreans in this point are open to no objection; but in that they construct natural bodies out of numbers, things that have lightness and weight out of things that have not weight or lightness, they seem to speak of another heaven and other bodies, not of the sensible. But those who make number separable assume [35] that it exists and is separable because the axioms would not be true of sensible things, while the statements of mathematics *are* true and delight the soul; and similarly with the magnitudes of mathematics. It is evident, then, both that our [1090<sup>b</sup>1] contrary theory will say the contrary of this, and that the difficulty we raised just now, why if numbers are in no way present in sensible things their attributes are present in sensible things, is solved for those who hold our views.

There are some who, because the point is the limit and extreme of the line, the [5] line of the plane, and the plane of the solid, think there must be real things of this sort. We must therefore examine this argument too, and see whether it is not remarkably weak. For extremes are not substances, but rather all these things are mere limits. For even walking, and movement in general, has a limit, so that on their [10] theory this will be a 'this' and a substance. But that is absurd. Even if they are substances, they will all be the substances of particular sensible things; for it is to these that the argument applied. Why then should they be capable of existing apart?

Again, if we are not too easily satisfied, we may, regarding all number and the objects of mathematics, press this difficulty, that they contribute nothing to one [15] another, the prior to the posterior; for if number did not exist, none the less magnitudes would exist for those who maintain the existence of the objects of mathematics only, and if magnitudes did not exist, soul and sensible bodies would exist. But the phenomena show that nature is not a series of episodes, like a bad [20] tragedy. The believers in the Ideas escape this difficulty; for they construct magnitudes out of matter and number, lines out of 2, planes doubtless out of 3, solids out of 4, or they use other numbers, which makes no difference. But will these magnitudes be Ideas, or what is their

manner of existence, and what do they [25] contribute to things? These contribute nothing, as the objects of mathematics contribute nothing. But not even is any theorem true of them, unless we want to change mathematics and invent doctrines of our own. But it is not hard to assume any random hypotheses and spin out a long string of conclusions. These thinkers, [30] then, are wrong in this way, in wanting to unite the objects of mathematics with the Ideas.

And those who first posited two kinds of number, that of the Forms and the other which is mathematical, neither have said nor can say in the least how mathematical number is to exist and of what it is to consist. For they place it [35] between ideal and sensible number. If it consists of the great and small, it will be the same as the other—ideal number. (And from what other<sup>3</sup> great and small can he [1091<sup>a</sup>1] produce magnitudes?) And if he names some other element, he will be making his elements rather many. And if the principle of each of the two kinds of number is a 1, unity will be something common to these. And we must inquire how the one is these *many* things, while at the same time *number*, according to him, cannot be generated [5] except from one and the indefinite dyad.

All this is absurd, and conflicts both with itself and with the probabilities, and we seem to see in it Simonides' 'long story'; for the long story comes into play, like those which slaves tell, when men have nothing sound to say. And the very [10] elements—the great and the small—seem to cry out against the violence that is done to them; for they cannot in any way generate numbers other than those got from 1 by doubling.

It is strange also to attribute generation to eternal things, or rather this is one of the things that are impossible. There need be no doubt whether the Pythagoreans [15] attribute generation to them or not; for they obviously say that when the one had been constructed, whether out of planes or of surface or of seed or of elements which they cannot express, immediately the nearest part of the unlimited began to be drawn in and limited by the limit. But since they are constructing a world and wish to speak the language of natural science, it is fair to make some explanation of their [20] account of nature, but to let them off from the present inquiry; for we are investigating the principles at work in *unchangeable* things, so that it is numbers of *this* kind whose genesis we must study.

4 · These thinkers say there is no generation of the odd number,



which evidently implies that there *is* generation of the even; and some say the even is [25] produced first from unequals—the great and the small—when these are equalized. The inequality, then, must belong to them *before* they are equalized. If they had always been equalized, they would not have been unequal before; for there is nothing before that which is always. Therefore evidently they are not giving their account of the generation of numbers merely as a theoretical account.

[30] A difficulty, and a reproach to any one who finds it *no* difficulty, are contained in the question how the elements and the principles are related to the good and the beautiful; the difficulty is this, whether any of the elements is such a thing as we mean by the good itself and the best, or this is not so, but these are later in origin. The mythologists seem to agree with some thinkers of the present day, who answer the question in the negative, and say that both the good and the beautiful appear [35] only when nature has made some progress. This they do to avoid a real objection which confronts those who say, as some do, that the one is a first principle. [1091<sup>b</sup>1] (The objection arises not from their ascribing goodness to the first principle as an attribute, but from their making the one a principle—and a principle in the sense of an element—and generating number from the one.) And the old poets agree with [5] this inasmuch as they say that not those who are first in time, e.g. Night and Heaven or Chaos or Ocean, reign and rule, but Zeus. These poets, however, speak thus only because they think of the rulers of the world as changing; for those of them who combine two characters in that they do not use mythical language throughout, e.g. Pherecydes and some others, make the original generating agent the Best, and [10] so do the Magi, and some of the later sages also, e.g. Empedocles and Anaxagoras, of whom one made friendship an element, and the other made thought a principle. Of those who maintain the existence of the unchangeable substances some say the one itself is the good itself; but they thought its substance lay mainly in its unity.

This, then, is the problem,—which of the two ways of speaking is right. It [15] would be strange if to that which is primary and eternal and most self-sufficient this very quality—self-sufficiency and self-maintenance—belongs primarily in some other way than *as a good*. But indeed it can be for no other reason indestructible or self-sufficient than because its nature is good. Therefore to say that the first principle is good is probably correct; but that this principle should be the one or, if [20] not that, an element, and an element of numbers, is impossible. Powerful objections arise, to avoid which some have given up the theory (viz. those

who agree that the one is a first principle and element, but only of *mathematical* number). For all the units become identical with species of good, and there is a great profusion of goods. [25] Again, if the Forms are numbers, all the Forms are identical with species of good. But let a man assume Ideas of anything he pleases. If these are Ideas only of goods, the Ideas will not be substances; but if the Ideas are also Ideas of substances, all animals and plants and all things that share in Ideas will be good. [30]

These absurdities follow, and it also follows that the contrary element, whether it is plurality or the unequal, i.e. the great and small, is the bad-itself. (Hence one thinker avoided attaching the good to the one, because it would necessarily follow, since generation is from contraries, that badness is the fundamental nature of plurality; others say inequality is the nature of the bad.) It follows, then, that all [35] things partake of the bad except one—the one itself, and that numbers partake of it in a more undiluted form than magnitudes, and that the bad is the space in which [1092<sup>a</sup>1] the good is realized, and that it partakes in and desires that which tends to destroy it; for contrary tends to destroy contrary. And if, as we said, the matter is that which is potentially each thing, e.g. that of actual fire is that which is potentially fire, the bad will be just the potentially good. [5]

All these objections, then, follow, partly because they make every principle an element, partly because they make contraries principles, partly because they make the one a principle, partly because they treat the numbers as the first substances, and as capable of existing apart, and as Forms.

5 · If, then, it is equally impossible not to put the good among first principles and to put it among them in this way, evidently the principles are not being correctly [10] described, nor are the first substances. Nor do we conceive the matter correctly if we compare the principles of the universe to that of animals and plants, on the ground that the more complete always comes from the indefinite and incomplete—which is what leads this thinker to say that this is also true of the first principles of reality, so that the one itself is not even an existing thing. For here too the principles [15] from which these come are complete; for it is a man that produces a man, and the seed is not first.

It is strange, also, to generate place simultaneously with the mathematical solids (for place is peculiar to the individual things, and hence they are separable in [20] place, but mathematical objects are

nowhere), and to say that they must be somewhere, but not say what the place is.

Those who say that the things that are come from elements and that the first of things that are are the numbers, should have first distinguished the senses in which one thing comes from another, and then said in which sense number comes from its elements.

By intermixture? But not everything is capable of intermixture, and that [25] which is produced by it is different, and on this view the one will not be separate or a distinct entity; but they want it to be so.

By juxtaposition, like a syllable? But then the elements must have position; and he who thinks of the one and plurality must think of them apart; number then will be this—a unit *and* plurality, or the one *and* the unequal.

Coming from certain things means in one sense that these are still to be found [30] in the product and in another that they are not; in which sense does number come from these elements? Only things that are generated can come from elements which are present in them. Does number come from its elements as from seed? But nothing can come from that which is indivisible. Does it come from its contrary, its contrary not persisting? But all things that come in this way come also from something else which does persist. Since, then, one thinker places the 1 as contrary [1092<sup>b</sup>1] to plurality, and another places it as contrary to the unequal, treating the 1 as equal, number is treated as coming from contraries. There will then be something else that persists, from which and from one contrary the compound is or has come to be. Again, why in the world do the other things that come from contraries, or that have contraries, perish (even when all of the contrary is used to produce them), while [5] number does not? Nothing is said about this. Yet whether present or not present in the compound the contrary destroys it, e.g. strife destroys the mixture (yet it should not; for it is not to that that it is contrary).

Once more, it has in no sense been determined in which way numbers are the causes of substances and of being—whether as limits (as points are of magnitudes). [10] This is how Eurytus decided what was the number of what (e.g. of man, or of horse), viz. by imitating the figures of living things with pebbles, as some people bring numbers into the forms of triangle and square. Or is it because harmony is a ratio of [15] numbers, and so is man and everything else? But how are the attributes—white and sweet and hot—numbers? Evidently the numbers are not the substance nor causes of the form; for the ratio is the substance, while the number is the matter. E.g. the substance of flesh or bone is number only

in this way, 'three parts of fire and two of earth.' And a number, whatever it is, is always a number of certain things, either [20] of fire or earth or of units; but the substance is that there is so much of one thing to so much of another in the mixture; and this is no longer a number but a ratio of mixture of numbers, whether these are corporeal or of any other kind.

Number, then, whether number in general or the number which consists of abstract units, is neither the cause as agent, nor the matter, nor the formula and form of things. Nor, of course, is it that for the sake of which. [25]

6 · One might also raise the question what the good is that things get from numbers because their composition is expressible by a number, either by one which is easily calculable or by an odd number. For in fact honey-water is no more wholesome if it is mixed in the proportion of three times three, but it would do more good if it were in no particular ratio but well diluted than if it were numerically [30] expressible but strong. Again, the ratios of mixtures are expressed by the *adding* of numbers, not by mere numbers, e.g. it is three parts to two, not three times two. For the same genus must underlie things that are multiplied together; therefore the product  $1 \times 2 \times 3$  must be measurable by 1, and  $4 \times 5 \times 7$  by 4, and therefore all products into which the same factor enters must be measurable by that factor. The number of fire, then, cannot be  $2 \times 5 \times 3 \times 7$ , and at the same time that of water [1093<sup>a</sup>1]  $2 \times 3$ .

If all things must share in number, it must follow that many things are the same, and the same number must belong to one thing and to another. Is number the cause, then, and does the thing exist because of its number, or is this not certain? E.g. the motions of the sun have a number, and again those of the moon, and so do [5] the life and prime of each animal. Why, then, should not some of these numbers be squares, some cubes, and some equal, others double? There is no reason why they should not, and indeed they must be comprised within these descriptions, since all things were assumed to share in number and things that differed might fall under [10] the same number. Therefore if the same number had belonged to certain things, these would have been the same as one another, since they would have had the same form of number; e.g. sun and moon would have been the same. But why are these numbers causes? There are seven vowels, the scale has seven strings, the Pleiades are seven, at seven animals lose their teeth (at least some, though some do

not), and [15] the champions who fought against Thebes were seven. Is it then because the number is what it is, that the champions were seven or the Pleias consists of seven stars? Surely the champions were seven because there were seven gates or for some other reason, and the Pleias we count as seven, as we count the Bear as twelve, while other peoples count more stars in both. They even say that  $\Xi$  and  $\Psi$   $Z$  are concords, and [20] because there are three concords, the double consonants also are three. They quite neglect the fact that there might be a thousand such letters; for one sign might be attached to  $\Gamma$   $P$ . But if they say that each of these three is equal to two of the other letters, and no other is so, and if the cause is that there are three parts of the mouth and one letter is applied to  $\Sigma$  in each, it is for this reason that there are only three, not because the concords are three; since as a matter of fact the concords are more [25] than three, but of double consonants there cannot be more. These people are like the old Homeric scholars, who see small resemblances but neglect great ones. Some say that there are many such cases, e.g. that the middle strings are represented by nine and eight, and that the epic verse has seventeen syllables, which is equal in number to the two strings; and the scansion is, in the right half of the line nine syllables, and [1093<sup>b</sup>1] in the left eight. And they say that the distance in the letters from alpha to omega is equal to that from the lowest note of the flute to the highest, and that the number of this note is equal to that of the whole system of the heavens. We must observe that [5] no one could find difficulty either in stating such analogies or in finding them in eternal things, since they can be found even in perishable things.

But the celebrated characteristics of numbers and their contraries, and generally the mathematical relations, if we view them as some do, making them [10] causes of nature, seem to escape us; for none of them is a cause in any of the senses that have been distinguished in reference to the first principles. Yet if mathematical objects be conceived as these thinkers conceive them, evidently goodness is predicable of them, and the odd, the straight, the equal-by-equal, and the powers of certain numbers, are in the column of the beautiful. For the seasons and a particular [15] number go together; and the other agreements that they collect from the theorems of mathematics all have this meaning. Hence they are like coincidences. For they are accidents, but appropriate to one another, and one by analogy. For in each category of being an analogous term is found—as the straight line is in length, so is [20] the plane in surface, perhaps the odd in number, and the white in colour.

Again, it is not the *ideal* numbers that are the causes of musical

phenomena and the like (for equal ideal numbers differ from one another in form; for even the units do); so that we need not assume Ideas for this reason at least.

These, then, are the results of the theory, and yet more might be brought [25] together. The fact that they have much trouble with the generation of ideal numbers and can in no way make a system of them, seems to indicate that the objects of mathematics are not separable from sensible things, as some say, and that they are not the first principles.

**\*\***TEXT: W. D. Ross, *Aristotle's Metaphysics*, Clarendon Press, Oxford, 1924

<sup>1</sup>In the translation of the *Metaphysics* 'formula' (or 'definitory formula') renders 'λόγος'.

<sup>2</sup>Some authorities read: 'For Alcmaeon lived during the old age of Pythagoras, and he expressed himself. . . '.

<sup>3</sup>Reading τὸ ὄν ἐν μέν.

<sup>4</sup>The MSS read τὰ εἶδη εἶναι τοὺς ἀριθμούς. 'come the Forms, i.e. the numbers'.

<sup>1</sup>Retaining τὴν ὕλην ἐν κινουμένῳ.

<sup>2</sup>Excised by Ross (see 995<sup>b</sup>6).

<sup>1</sup>Excised by Ross.

<sup>1</sup>Origin' translates 'ἀρχή', elsewhere often 'source' or '(first) principle'. In Greek 'ἀρχή' also means 'rule' or 'office', whence the illustration under (5).

<sup>2</sup>Frag. 8 Diels-Kranz.

<sup>3</sup>*Electra* 256.

<sup>4</sup>I.e. a power.

<sup>1</sup>Excised by Ross.

<sup>1</sup>Excised by Jaeger.

<sup>2</sup>Excised by Ross.

<sup>1</sup>See V (Δ) 12, where 'δύναμις' was translated 'capacity'.

<sup>2</sup>Omitting πεσεῖν.

<sup>3</sup>Omitting ὅτι.

<sup>4</sup>Ross excises 'in the strictest sense'.

<sup>1</sup>Retaining ἢ συνεχές.

<sup>1</sup>*Physics* I 8.

<sup>1</sup>Reading ἀλλ' οὐ τοῦτων.

<sup>2</sup>Reading κινοῦν μέσον, κινοῦν ἐστὶ.

<sup>3</sup>*Physics* VIII 8–9.

<sup>4</sup>Reading ἐννέα for ἐπτά.

<sup>5</sup>*Iliad* II 204.

<sup>1</sup>Reading ποτ' for πότ'.

<sup>2</sup>*Phaedo* 100D.

<sup>3</sup>Omitting ἦ.

<sup>4</sup>Retaining ἔπειτα.

<sup>5</sup>Ross marks this clause as corrupt.

<sup>1</sup>Retaining τῷ ἴσῳ.

<sup>2</sup>Frag. 7 Diels-Kranz.

<sup>3</sup>Reading ἐξ ἄλλου δὲ τίνος.



# NICOMACHEAN ETHICS\*\*

W. D. Ross

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## BOOK I

1 · Every art and every inquiry, and similarly every action and choice, is [1094<sup>a</sup>1] thought to aim at some good; and for this reason the good has rightly been declared to be that at which all things aim. But a certain difference is found among ends; some are activities, others are products apart from the activities that produce them. Where there are ends apart from the actions, it is the nature of the products to be [5] better than the activities. Now, as there are many actions, arts, and sciences, their ends also are many; the end of the medical art is health, that of shipbuilding a vessel, that of strategy victory, that of economics wealth. But where such arts fall under a single capacity—as bridle-making and the other arts concerned with the [10] equipment of horses fall under the art of riding, and this and every military action under strategy, in the same way other arts fall under yet others—in all of these the ends of the master arts are to be preferred to all the subordinate ends; for it is for the [15] sake of the former that the latter are pursued. It makes no difference whether the activities themselves are the ends of the actions, or something else apart from the activities, as in the case of the sciences just mentioned.

2 · If, then, there is some end of the things we do, which we desire for its own sake (everything else being desired for the sake of this), and if we do not choose everything for the sake of something else (for at that rate the process would go on to [20] infinity, so that our desire would be empty and vain), clearly this must be the good and the chief good. Will not the knowledge of it, then, have a great influence on life? Shall we not,

like archers who have a mark to aim at, be more likely to hit upon what we should? If so, we must try, in outline at least, to determine what it is, and [25] of which of the sciences or capacities it is the object. It would seem to belong to the most authoritative art and that which is most truly the master art. And politics appears to be of this nature; for it is this that ordains which of the sciences should be studied in a state, and which each class of citizens should learn and up to what point [1094<sup>b</sup>1] they should learn them; and we see even the most highly esteemed of capacities to fall under this, e.g. strategy, economics, rhetoric; now, since politics uses the rest of [5] the sciences, and since, again, it legislates as to what we are to do and what we are to abstain from, the end of this science must include those of the others, so that this end must be the good for man. For even if the end is the same for a single man and for a state, that of the state seems at all events something greater and more complete both to attain and to preserve; for though it is worth while to attain the end [10] merely for one man, it is finer and more godlike to attain it for a nation or for city-states. These, then, are the ends at which our inquiry, being concerned with politics, aims.

3 · Our discussion will be adequate if it has as much clearness as the subject-matter admits of; for precision is not to be sought for alike in all discussions, any more than in all the products of the crafts. Now fine and just actions, which political [15] science investigates, exhibit much variety and fluctuation, so that they may be thought to exist only by convention, and not by nature. And goods also exhibit a similar fluctuation because they bring harm to many people; for before now men have been undone by reason of their wealth, and others by reason of their courage. We must be content, then, in speaking of such subjects and with such premisses to [20] indicate the truth roughly and in outline, and in speaking about things which are only for the most part true and with premisses of the same kind to reach conclusions that are no better. In the same spirit, therefore, should each of our statements be *received*; for it is the mark of an educated man to look for precision in each class of [25] things just so far as the nature of the subject admits: it is evidently equally foolish to accept probable reasoning from a mathematician and to demand from a rhetorician demonstrative proofs.

Now each man judges well the things he knows, and of these he is a good judge. And so the man who has been educated in a subject is a good judge of that subject, [1095<sup>a</sup>1] and the man who has received an all-round education is a good judge in general. Hence a young man is not a

proper hearer of lectures on political science; for he is inexperienced in the actions that occur in life, but its discussions start from these and are about these; and, further, since he tends to follow his passions, his study will [5] be vain and unprofitable, because the end aimed at is not knowledge but action. And it makes no difference whether he is young in years or youthful in character; the defect does not depend on time, but on his living and pursuing each successive object as passion directs. For to such persons, as to the incontinent, knowledge brings no [10] profit; but to those who desire and act in accordance with a rational principle knowledge about such matters will be of great benefit.

These remarks about the student, the way in which our statements should be received, and the purpose of the inquiry, may be taken as our preface.

4 · Let us resume our inquiry and state, in view of the fact that all knowledge [15] and choice aims at some good, what it is that we say political science aims at and what is the highest of all goods achievable by action. Verbally there is very general agreement; for both the general run of men and people of superior refinement say that it is happiness, and identify living well and faring well with being happy; but with regard to what happiness is they differ, and the many do not give the same [20] account as the wise. For the former think it is some plain and obvious thing, like pleasure, wealth, or honour; they differ, however, from one another—and often even the same man identifies it with different things, with health when he is ill, with wealth when he is poor; but, conscious of their ignorance, they admire those who [25] proclaim some great thing that is above their comprehension. Now some thought that apart from these many goods there is another which is good in itself and causes the goodness of all these as well. To examine all the opinions that have been held would no doubt be somewhat fruitless: it is enough to examine those that are most prevalent or that seem to have some reason in their favour. [30]

Let us not fail to notice, however, that there is a difference between arguments from and those to the first principles. For Plato, too, was right in raising this question and asking, as he used to do, ‘are we on the way from or to the first principles?’ There is a difference, as there is in a race-course between the course from the judges to the turning-point and the way back. For, while we must begin [1095<sup>b</sup>1] with what is familiar, things are so in two ways—some to us, some without qualification.

Presumably, then, *we* must begin with things familiar to *us*. Hence any one who is to listen intelligently to lectures about what is noble and just and, generally, about the subjects of political science must have been brought up in good [5] habits. For the facts are the starting-point, and if they are sufficiently plain to him, he will not need the reason as well; and the man who has been well brought up has or can easily get starting-points. And as for him who neither has nor can get them, let him hear the words of Hesiod:<sup>1</sup>

Far best is he who knows all things himself; [10]  
Good, he that hearkens when men counsel right;  
But he who neither knows, nor lays to heart  
Another's wisdom, is a useless wight.

5 · Let us, however, resume our discussion from the point at which we digressed. To judge from the lives that men lead, most men, and men of the most vulgar type, seem (not without some reason) to identify the good, or happiness, with [15] pleasure; which is the reason why they love the life of enjoyment. For there are, we may say, three prominent types of life—that just mentioned, the political, and thirdly the contemplative life. Now the mass of mankind are evidently quite slavish in their tastes, preferring a life suitable to beasts, but they get some reason for their [20] view from the fact that many of those in high places share the tastes of Sardanapallus. But people of superior refinement and of active disposition identify happiness with honour; for this is, roughly speaking, the end of the political life. But it seems too superficial to be what we are looking for, since it is thought to depend on those who bestow honour rather than on him who receives it, but the good we divine to [25] be something of one's own and not easily taken from one. Further, men seem to pursue honour in order that they may be assured of their merit; at least it is by men of practical wisdom that they seek to be honoured, and among those who know them, and on the ground of their excellence; clearly, then, according to them, at any [30] rate, excellence is better. And perhaps one might even suppose this to be, rather than honour, the end of the political life. But even this appears somewhat incomplete; for possession of excellence seems actually compatible with being asleep, or with lifelong inactivity, and, further, with the greatest sufferings and [1096<sup>a</sup>1] misfortunes; but a man who was living so no one would call happy, unless he were maintaining a thesis at all costs. But enough of this; for the subject has been sufficiently treated even in ordinary discussions.

Third comes the contemplative [5] life, which we shall consider later.

The life of money-making is one undertaken under compulsion, and wealth is evidently not the good we are seeking; for it is merely useful and for the sake of something else. And so one might rather take the aforementioned objects to be ends; for they are loved for themselves. But it is evident that not even these are ends—although [10] many arguments have been thrown away in support of them. Let us then dismiss them.

6 · We had perhaps better consider the universal good and discuss thoroughly what is meant by it, although such an inquiry is made an uphill one by the fact that the Forms have been introduced by friends of our own. Yet it would perhaps be thought to be better, indeed to be our duty, for the sake of maintaining [15] the truth even to destroy what touches us closely, especially as we are philosophers; for, while both are dear, piety requires us to honour truth above our friends.

The men who introduced this doctrine did not posit Ideas of classes within which they recognized priority and posteriority (which is the reason why they did not maintain the existence of an Idea embracing all numbers); but things are called [20] good both in the category of substance and in that of quality and in that of relation, and that which is *per se*, i.e. substance, is prior in nature to the relative (for the latter is like an offshoot and accident of what is); so that there could not be a common Idea set over all these goods. Further, since things are said to be good in as many ways as they are said to be (for things are called good both in the category of [25] substance, as God and reason, and in quality, e.g. the virtues, and in quantity, e.g. that which is moderate, and in relation, e.g. the useful, and in time, e.g. the right opportunity, and in place, e.g. the right locality and the like), clearly the good cannot be something universally present in all cases and single; for then it would not have been predicated in all the categories but in one only. Further, since of the [30] things answering to one Idea there is one science, there would have been one science of all the goods; but as it is there are many sciences even of the things that fall under one category, e.g. of opportunity (for opportunity in war is studied by strategy and in disease by medicine), and the moderate in food is studied by medicine and in exercise by the science of gymnastics. And one might ask the question, what in the world they *mean* by ‘a thing itself’, if in man himself and in a particular man the [1096<sup>b1</sup>] account of man is one and the same. For in so far as they are men, they will in no respect differ; and if this is so, neither will there be a

difference in so far as they are good. But again it will not be good any the more for being eternal, since that which lasts long is no whiter than that which perishes in a day. The Pythagoreans seem to give a more plausible account of the good, when they place the one in the column of [5] goods; and it is they that Speusippus seems to have followed.

But let us discuss these matters elsewhere; an objection to what we have said, however, may be discerned in the fact that the Platonists have not been speaking about *all* goods, and that the goods that are pursued and loved for themselves are [10] called good by reference to a single Form, while those which tend to produce or to preserve these somehow or to prevent their contraries are called so by reference to these, and in a different sense. Clearly, then, goods must be spoken of in two ways, and some must be good in themselves, the others by reason of these. Let us separate, then, things good in themselves from things useful, and consider whether the former [15] are called good by reference to a single Idea. What sort of goods would one call good in themselves? Is it those that are pursued even when isolated from others, such as intelligence, sight, and certain pleasures and honours? Certainly, if we pursue these also for the sake of something else, yet one would place them among things good in themselves. Or is nothing other than the Idea good in itself? In that case the Form [20] will be empty. But if the things we have named are also things good in themselves, the account of the good will have to appear as something identical in them all, as that of whiteness is identical in snow and in white lead. But of honour, wisdom, and pleasure, just in respect of their goodness, the accounts are distinct and diverse. The [25] good, therefore, is not something common answering to one Idea.

But then in what way are things called good? They do not seem to be like the things that only chance to have the same name. Are goods one, then, by being derived from one good or by all contributing to one good, or are they rather one by analogy? Certainly as sight is in the body, so is reason in the soul, and so on in other cases. But perhaps these subjects had better be dismissed for the present; for perfect [30] precision about them would be more appropriate to another branch of philosophy. And similarly with regard to the Idea; even if there is some one good which is universally predicable of goods or is capable of separate and independent existence, clearly it could not be achieved or attained by man; but we are now seeking something attainable. Perhaps, however, some one might think it worth while to have knowledge of it with a view to the goods that *are* attainable and achievable; for [1097<sup>a</sup>1] having this as a sort of pattern we shall know better the goods that are good for us, and if we

know them shall attain them. This argument has some plausibility, but seems to clash with the procedure of the sciences; for all of these, though they aim at some good and seek to supply the deficiency of it, leave on one side the knowledge of [5] *the* good. Yet that all the exponents of the arts should be ignorant of, and should not even seek, so great an aid is not probable. It is hard, too, to see how a weaver or a carpenter will be benefited in regard to his own craft by knowing this 'good itself', or how the man who has viewed the Idea itself will be a better doctor or general [10] thereby. For a doctor seems not even to study health in this way, but the health of man, or perhaps rather the health of a particular man; for it is individuals that he is healing. But enough of these topics.

[15] **7** · Let us again return to the good we are seeking, and ask what it can be. It seems different in different actions and arts; it is different in medicine, in strategy, and in the other arts likewise. What then is the good of each? Surely that for whose sake everything else is done. In medicine this is health, in strategy victory, in [20] architecture a house, in any other sphere something else, and in every action and choice the end; for it is for the sake of this that all men do whatever else they do. Therefore, if there is an end for all that we do, this will be the good achievable by action, and if there are more than one, these will be the goods achievable by action.

So the argument has by a different course reached the same point; but we must [25] try to state this even more clearly. Since there are evidently more than one end, and we choose some of these (e.g. wealth, flutes, and in general instruments) for the sake of something else, clearly not all ends are complete ends; but the chief good is evidently something complete. Therefore, if there is only one complete end, this will be what we are seeking, and if there are more than one, the most complete of these [30] will be what we are seeking. Now we call that which is in itself worthy of pursuit more complete than that which is worthy of pursuit for the sake of something else, and that which is never desirable for the sake of something else more complete than the things that are desirable both in themselves and for the sake of that other thing, and therefore we call complete without qualification that which is always desirable in itself and never for the sake of something else.

Now such a thing happiness, above all else, is held to be; for this we choose [1097<sup>b</sup>1] always for itself and never for the sake of something else, but honour, pleasure, reason, and every excellence we choose indeed

for themselves (for if nothing resulted from them we should still choose each of them), but we choose them also [5] for the sake of happiness, judging that through them we shall be happy. Happiness, on the other hand, no one chooses for the sake of these, nor, in general, for anything other than itself.

From the point of view of self-sufficiency the same result seems to follow; for the complete good is thought to be self-sufficient. Now by self-sufficient we do not mean that which is sufficient for a man by himself, for one who lives a solitary life, [10] but also for parents, children, wife, and in general for his friends and fellow citizens, since man is sociable by nature. But some limit must be set to this; for if we extend our requirement to ancestors and descendants and friends' friends we are in for an infinite series. Let us examine this question, however, on another occasion; the [15] self-sufficient we now define as that which when isolated makes life desirable and lacking in nothing; and such we think happiness to be; and further we think it most desirable of all things, without being counted as one good thing among others—if it were so counted it would clearly be made more desirable by the addition of even the least of goods; for that which is added becomes an excess of goods, and of goods the greater is always more desirable. Happiness, then, is something complete and [20] self-sufficient, and is the end of action.

Presumably, however, to say that happiness is the chief good seems a platitude, and a clearer account of what it is is still desired. This might perhaps be given, if we could first ascertain the function of man. For just as for a flute-player, a sculptor, or [25] any artist, and, in general, for all things that have a function or activity, the good and the 'well' is thought to reside in the function, so would it seem to be for man, if he has a function. Have the carpenter, then, and the tanner certain functions or activities, and has man none? Is he naturally functionless? Or as eye, hand, foot, [30] and in general each of the parts evidently has a function, may one lay it down that man similarly has a function apart from all these? What then can this be? Life seems to be common even to plants, but we are seeking what is peculiar to man. Let [1098<sup>a</sup>1] us exclude, therefore, the life of nutrition and growth. Next there would be a life of perception, but *it* also seems to be common even to the horse, the ox, and every animal. There remains, then, an active life of the element that has a rational principle (of this, one part has such a principle in the sense of being obedient to one, the other in the sense of possessing one and exercising thought); and as this too can [5] be taken in two ways, we must state that life in the sense of activity is what we mean; for this



seems to be the more proper sense of the term. Now if the function of man is an activity of soul in accordance with, or not without, rational principle, and if we say a so-and-so and a good so-and-so have a function which is the same in kind, e.g. a lyre-player and a good lyre-player, and so without qualification in all cases, [10] eminence in respect of excellence being added to the function (for the function of a lyre-player is to play the lyre, and that of a good lyre-player is to do so well): if this is the case, [and we state the function of man to be a certain kind of life, and this to be an activity or actions of the soul implying a rational principle, and the function of a good man to be the good and noble performance of these, and if any action is well performed when it is performed in accordance with the appropriate excellence: if [15] this is the case,]<sup>2</sup> human good turns out to be activity of soul in conformity with excellence, and if there are more than one excellence, in conformity with the best and most complete.

But we must add 'in a complete life'. For one swallow does not make a summer, nor does one day; and so too one day, or a short time, does not make a man blessed and happy.

Let this serve as an outline of the good; for we must presumably first sketch it [20] roughly, and then later fill in the details. But it would seem that any one is capable of carrying on and articulating what has once been well outlined, and that time is a good discoverer or partner in such a work; to which facts the advances of the arts are due; for any one can add what is lacking. And we must also remember what has [25] been said before, and not look for precision in all things alike, but in each class of things such precision as accords with the subject-matter, and so much as is appropriate to the inquiry. For a carpenter and a geometer look for right angles in [30] different ways; the former does so in so far as the right angle is useful for his work, while the latter inquires what it is or what sort of thing it is; for he is a spectator of the truth. We must act in the same way, then, in all other matters as well, that our main task may not be subordinated to minor questions. Nor must we demand the [1098<sup>b</sup>1] cause in all matters alike; it is enough in some cases that the *fact* be well established, as in the case of the first principles; the fact is a primary thing or first principle. Now of first principles we see some by induction, some by perception, some by a certain habituation, and others too in other ways. But each set of principles we must [5] try to investigate in the natural way, and we must take pains to determine them correctly, since they have a great influence on what follows. For the beginning is thought to be more than half of the whole, and many of the

questions we ask are cleared up by it.

8 · We must consider it, however, in the light not only of our conclusion and [10] our premisses, but also of what is commonly said about it; for with a true view all the facts harmonize, but with a false one they<sup>3</sup> soon clash. Now goods have been divided into three classes, and some are described as external, others as relating to soul or to body; and we call those that relate to soul most properly and truly goods. But we are [15] positing actions and activities relating to soul.<sup>4</sup> Therefore our account must be sound, at least according to this view, which is an old one and agreed on by philosophers. It is correct also in that we identify the end with certain actions and activities; for thus it falls among goods of the soul and not among external goods. [20] Another belief which harmonizes with our account is that the happy man lives well and fares well; for we have practically defined happiness as a sort of living and faring well. The characteristics that are looked for in happiness seem also, all of excellence, some with practical wisdom, others with a kind of philosophic wisdom, [25] others with these, or one of these, accompanied by pleasure or not without pleasure; while others include also external prosperity. Now some of these views have been held by many men and men of old, others by a few persons; and it is not probable that either of these should be entirely mistaken, but rather that they should be right in at least some one respect or even in most respects.

[30] With those who identify happiness with excellence or some one excellence our account is in harmony; for to excellence belongs activity in accordance with excellence. But it makes, perhaps, no small difference whether we place the chief good in possession or in use, in state or in activity. For the state may exist without [1099a1] producing any good result, as in a man who is asleep or in some other way quite inactive, but the activity cannot; for one who has the activity will of necessity be acting, and acting well. And as in the Olympic Games it is not the most beautiful and the strongest that are crowned but those who compete (for it is some of these [5] that are victorious), so those who act rightly win the noble and good things in life.

Their life is also in itself pleasant. For pleasure is a state of soul, and to each [5] man that which he is said to be a lover of is pleasant; e.g. not only is a horse pleasant to the lover of horses, and a spectacle to the lover of sights, but also in the same way [10] just acts are pleasant to the lover of justice and in general excellent acts to the lover of excellence. Now for

most men their pleasures are in conflict with one another because these are not by nature pleasant, but the lovers of what is noble find pleasant the things that are by nature pleasant; and excellent actions are such, so that these are pleasant for such men as well as in their own nature. Their life, therefore, has no further need of pleasure as a sort of adventitious charm, but has its [15] pleasure in itself. For, besides what we have said, the man who does not rejoice in noble actions is not even good; since no one would call a man just who did not enjoy acting justly, nor any man liberal who did not enjoy liberal actions; and similarly in [20] all other cases. If this is so, excellent actions must be in themselves pleasant. But they are also *good* and *noble*, and have each of these attributes in the highest degree, since the good man judges well about these attributes and he judges in the way we have described. Happiness then is the best, noblest, and most pleasant thing, and these attributes are not severed as in the inscription at Delos—[25]

Most noble is that which is justest, and best is health;  
But pleasantest is it to win what we love.

For all these properties belong to the best activities; and these, or one—the best—of [30] these, we identify with happiness.

Yet evidently, as we said, it needs the external goods as well; for it is impossible, or not easy, to do noble acts without the proper equipment. In many actions we use friends and riches and political power as instruments; and there are [1099<sup>b1</sup>] some things the lack of which takes the lustre from blessedness, as good birth, satisfactory children, beauty; for the man who is very ugly in appearance or ill-born or solitary and childless is hardly happy, and perhaps a man would be still less so if he had thoroughly bad children or friends or had lost good children or friends by [5] death. As we said, then, happiness seems to need this sort of prosperity in addition; for which reason some identify happiness with good fortune, though others identify it with excellence.

9 · For this reason also the question is asked, whether happiness is to be acquired by learning or by habituation or some other sort of training, or comes in [10] virtue of some divine providence or again by chance. Now if there is *any* gift of the gods to men, it is reasonable that happiness should be god-given, and most surely god-given of all human things inasmuch as it is the best. But this question would perhaps be more appropriate to another inquiry; happiness seems, however, even if it is

not god-sent but comes as a result of excellence and some process of learning or [15] training, to be among the most godlike things; for that which is the prize and end of excellence seems to be the best thing and something godlike and blessed.

It will also on this view be very generally shared; for all who are not maimed as regards excellence may win it by a certain kind of study and care. But if it is better [20] to be happy thus than by chance, it is reasonable that the facts should be so, since everything that depends on the action of nature is by nature as good as it can be, and similarly everything that depends on art or any cause, and especially if it depends on the best of all causes. To entrust to chance what is greatest and most noble would be a very defective arrangement.

[25] The answer to the question we are asking is plain also from the definition<sup>5</sup>; for it has been said to be a certain kind of activity of soul. Of the remaining goods, some are necessary and others are naturally co-operative and useful as instruments. And this will be found to agree with what we said at the outset; for we stated the end of [30] political science to be the best end, and political science spends most of its pains on making the citizens to be of a certain character, viz. good and capable of noble acts.

It is natural, then, that we call neither ox nor horse nor any other of the [1100<sup>a</sup>1] animals happy; for none of them is capable of sharing in such activity. For this reason also a boy is not happy; for he is not yet capable of such acts, owing to his age; and boys who are called happy are being congratulated by reason of the hopes we have for them. For there is required, as we said, not only complete excellence but [5] also a complete life, since many changes occur in life, and all manner of chances, and the most prosperous may fall into great misfortunes in old age, as is told of Priam in the Trojan Cycle; and one who has experienced such chances and has ended wretchedly no one calls happy.

[10] **10** · Must no one at all, then, be called happy while he lives; must we, as Solon says, see the end? Even if we are to lay down this doctrine, is it also the case that a man is happy when he is *dead*? Or is not this quite absurd, especially for us [15] who say that happiness is an activity? But if we do not call the dead man happy, and if Solon does not mean this, but that one can then safely *call* a man blessed as being at last beyond evils and misfortunes, this also affords matter for discussion; for both evil and good are thought to exist for a dead man, as much as for

one who is alive but [20] not aware of them; e.g. honours and dishonours and the good or bad fortunes of children and in general of descendants. And this also presents a problem; for though a man has lived blessedly up to old age and has had a death worthy of his life, many [25] reverses may befall his descendants—some of them may be good and attain the life they deserve, while with others the opposite may be the case; and clearly too the degrees of relationship between them and their ancestors may vary indefinitely. It would be odd, then, if the dead man were to share in these changes and become at one time happy, at another wretched; while it would also be odd if the fortunes of [30] the descendants did not for *some* time have *some* effect on the happiness of their ancestors.

But we must return to our first difficulty; for perhaps by a consideration of it our present problem might be solved. Now if we must see the end and only then call a man blessed, not as being blessed but as having been so before, surely it is odd that when he is happy the attribute that belongs to him is not to be truly predicated of him because we do not wish to call living men happy, on account of the changes that [1100<sup>b1</sup>] may befall them, and because we have assumed happiness to be something permanent and by no means easily changed, while a single man may suffer many turns of fortune's wheel. For clearly if we were to follow his fortunes, we should often call the same man happy and again wretched, making the happy man out to be [5] a 'chameleon and insecurely based'. Or is this following his fortunes quite wrong? Success or failure in life does not depend on these, but human life, as we said, needs these as well, while excellent activities or their opposites are what determine [10] happiness or the reverse.

The question we have now discussed confirms our definition. For no function of man has so much permanence as excellent activities (these are thought to be more durable even than knowledge), and of these themselves the most valuable are more [15] durable because those who are blessed spend their life most readily and most continuously in these; for this seems to be the reason why we do not forget them. The attribute in question, then, will belong to the happy man, and he will be happy throughout his life; for always, or by preference to everything else, he will do and contemplate what is excellent, and he will bear the chances of life most nobly and [20] altogether decorously, if he is 'truly good' and 'foursquare beyond reproach'.

Now many events happen by chance, and events differing in importance; small pieces of good fortune or of its opposite clearly do not weigh down the scales of life one way or the other, but a multitude of

great events if they turn out well will make [25] life more blessed (for not only are they themselves such as to add beauty to life, but the way a man deals with them may be noble and good), while if they turn out ill they crush and maim blessedness; for they both bring pain with them and hinder many activities. Yet even in these nobility shines through, when a man bears with [30] resignation many great misfortunes, not through insensibility to pain but through nobility and greatness of soul.

If activities are, as we said, what determines the character of life, no blessed man can become miserable; for he will never do the acts that are hateful and mean. For the man who is truly good and wise, we think, bears all the chances of life [1101<sup>a</sup>1] becomingly and always makes the best of circumstances, as a good general makes the best military use of the army at his command and a shoemaker makes the best shoes out of the hides that are given him; and so with all other craftsmen. And if this [5] is the case, the happy man can never become miserable—though he will not reach *blessedness*, if he meet with fortunes like those of Priam.

Nor, again, is he many-coloured and changeable; for neither will he be moved from his happy state easily or by any ordinary misadventures, but only by many [10] great ones, nor, if he has had many great misadventures, will he recover his happiness in a short time, but if at all, only in a long and complete one in which he has attained many splendid successes.

Why then should we not say that he is happy who is active in conformity with complete excellence and is sufficiently equipped with external goods, not for some [15] chance period but throughout a complete life? Or must we add ‘and who is destined to live thus and die as befits his life’? Certainly the future is obscure to us, while happiness, we claim, is an end and something in every way final. If so, we shall call [20] blessed those among living men in whom these conditions are, and are to be, fulfilled—but blessed *men*. So much for these questions.

11 · That the fortunes of descendants and of all a man’s friends should not affect his happiness at all seems a very unfriendly doctrine, and one opposed to the opinions men hold; but since the events that happen are numerous and admit of all [25] sorts of difference, and some come more near to us and others less so, it seems a long—indeed an endless—task to discuss each in detail; a general outline will perhaps suffice. If, then, as some of a man’s own misadventures have a certain weight and influence on life while others are, as it were, lighter, so too

there are [30] differences among the misadventures of all our friends, and it makes a difference whether the various sufferings befall the living or the dead (much more even than whether lawless and terrible deeds are presupposed in a tragedy or done on the stage), this difference also must be taken into account; or rather, perhaps, the fact that doubt is felt whether the dead share in any good or evil. For it seems, from these [1101<sup>b</sup>1] considerations, that even if anything whether good or evil penetrates to them, it must be something weak and negligible, either in itself or for them, or if not, at least it must be such in degree and kind as not to make happy those who are not happy [5] nor to take away their blessedness from those who are. The good or bad fortunes of friends, then, seem to have some effects on the dead, but effects of such a kind and degree as neither to make the happy unhappy nor to produce any other change of the kind.

[10] **12** · These questions having been answered, let us consider whether happiness is among the things that are praised or rather among the things that are prized; for clearly it is not to be placed among *potentialities*. Everything that is praised seems to be praised because it is of a certain kind and is related somehow to something else; for we praise the just or brave man and in general both the good [15] man and excellence itself because of the actions and functions involved, and we praise the strong man, the good runner, and so on, because he is of a certain kind and is related in a certain way to something good and important. This is clear also from the praises of the gods; for it seems absurd that the gods should be referred to [20] our standard, but this is done because praise involves a reference, as we said, to something else. But if praise is for things such as we have described, clearly what applies to the best things is not praise, but something greater and better, as is indeed obvious; for what we do to the gods and the most godlike of men is to call them [25] blessed and happy. And so too with good things; no one praises happiness as he does justice, but rather calls it blessed, as being something more divine and better.

Eudoxus also seems to have been right in his method of advocating the supremacy of pleasure; he thought that the fact that, though a good, it is not praised [30] indicated it to be better than the things that are praised, and that this is what God and the good are; for by reference to these all other things are judged. Praise is appropriate to excellence; for as a result of excellence men tend to do noble deeds (*encomia* are

bestowed on acts, whether of the body or of the soul—but perhaps nicety in these matters is more proper to those who have made a study of encomia); but to us it is clear from what has been said that happiness is among the things that [1102<sup>a</sup>1] are prized and complete. It seems to be so also from the fact that it is a first principle; for it is for the sake of this that we all do everything else, and the first principle and cause of goods is, we claim, something prized and divine.

13 · Since happiness is an activity of soul in accordance with complete [5] excellence, we must consider the nature of excellence; for perhaps we shall thus see better the nature of happiness. The true student of politics, too, is thought to have studied this above all things; for he wishes to make his fellow citizens good and obedient to the laws. As an example of this we have the lawgivers of the Cretans and [10] the Spartans, and any others of the kind that there may have been. And if this inquiry belongs to political science, clearly the pursuit of it will be in accordance with our original plan. But clearly the excellence we must study is human excellence; for the good we were seeking was human good and the happiness human [15] happiness. By human excellence we mean not that of the body but that of the soul; and happiness also we call an activity of soul. But if this is so, clearly the student of politics must know somehow the facts about soul, as the man who is to heal the eyes must know about the whole body also; and all the more since politics is more prized [20] and better than medicine; but even among doctors the best educated spend much labour on acquiring knowledge of the body. The student of politics, then, must study the soul, and must study it with these objects in view, and do so just to the extent which is sufficient for the questions we are discussing; for further precision is perhaps something more laborious than our purposes require. [25]

Some things are said about it, adequately enough, even in the discussions outside our school, and we must use these; e.g. that one element in the soul is irrational and one has a rational principle. Whether these are separated as the parts of the body or of anything divisible are, or are distinct by definition but by nature [30] inseparable, like convex and concave in the circumference of a circle, does not affect the present question.

Of the irrational element one division seems to be widely distributed, and vegetative in its nature, I mean that which causes nutrition and growth; for it is this kind of power of the soul that one must assign to all



nurslings and to embryos, and [1102<sup>b</sup>1] this same power to full-grown creatures; this is more reasonable than to assign some different power to them. Now the excellence of this seems to be common to all and not specifically human; for this part or faculty seems to function most in sleep, while goodness and badness are least manifest in sleep (whence comes the saying that the [5] happy are not better off than the wretched for half their lives; and this happens naturally enough, since sleep is an inactivity of the soul in that respect in which it is called good or bad), unless perhaps to a small extent some of the movements actually penetrate, and in this respect the dreams of good men are better than those [10] of ordinary people. Enough of this subject, however; let us leave the nutritive faculty alone, since it has by its nature no share in human excellence.

There seems to be also another irrational element in the soul—one which in a sense, however, shares in a rational principle. For we praise the reason of the continent man and of the incontinent, and the part of their soul that has reason, [15] since it urges them aright and towards the best objects; but there is found in them also another natural element beside reason, which fights against and resists it. For exactly as paralysed limbs when we choose to move them to the right turn on the contrary to the left, so is it with the soul; the impulses of incontinent people move in [20] contrary directions. But while in the body we see that which moves astray, in the soul we do not. No doubt, however, we must none the less suppose that in the soul too there is something beside reason, resisting and opposing it. In what sense it is [25] distinct from the other elements does not concern us. Now even this seems to have a share in reason, as we said; at any rate in the continent man it obeys reason—and presumably in the temperate and brave man it is still more obedient; for in them it speaks, on all matters, with the same voice as reason.

Therefore the irrational element also appears to be two-fold. For the vegetative [30] element in no way shares in reason, but the appetitive and in general the desiring element in a sense shares in it, in so far as it listens to and obeys it; this is the sense in which we speak of paying heed to one's father or one's friends, not that in which we speak of 'the rational' in mathematics.<sup>6</sup> That the irrational element is in some sense persuaded by reason is indicated also by the giving of advice and by all reproof and [1103<sup>a</sup>1] exhortation. And if this element also must be said to have reason, that which has reason also will be twofold, one subdivision having it in the strict sense and in itself, and the other having a tendency to obey as one does one's father.

Excellence too is distinguished into kinds in accordance with this difference; [5] for we say that some excellences are intellectual and others moral,<sup>7</sup> philosophic wisdom and understanding and practical wisdom being intellectual, liberality and temperance moral. For in speaking about a man's character we do not say that he is wise or has understanding but that he is good-tempered or temperate; yet we praise the wise man also with respect to his state; and of states we call those which merit [10] praise excellences.

## BOOK II

1 · Excellence, then, being of two kinds, intellectual and moral, intellectual [15] excellence in the main owes both its birth and its growth to teaching (for which reason it requires experience and time), while moral excellence comes about as a result of habit, whence also its name is one that is formed by a slight variation from the word for 'habit'.<sup>8</sup> From this it is also plain that none of the moral excellences [20] arises in us by nature; for nothing that exists by nature can form a habit contrary to its nature. For instance the stone which by nature moves downwards cannot be habituated to move upwards, not even if one tries to train it by throwing it up ten thousand times; nor can fire be habituated to move downwards, nor can anything else that by nature behaves in one way be trained to behave in another. Neither by nature, then, nor contrary to nature do excellences arise in us; rather we are adapted by nature to receive them, and are made perfect by habit. [25]

Again, of all the things that come to us by nature we first acquire the potentiality and later exhibit the activity (this is plain in the case of the senses; for it was not by often seeing or often hearing that we got these senses, but on the contrary we had them before we used them, and did not come to have them by using them); [30] but excellences we get by first exercising them, as also happens in the case of the arts as well. For the things we have to learn before we can do, we learn by doing, e.g. men become builders by building and lyre-players by playing the lyre; so too we become just by doing just acts, temperate by doing temperate acts, brave by doing [1103<sup>b</sup>1] brave acts.

This is confirmed by what happens in states; for legislators make the citizens good by forming habits in them, and this is the wish of every legislator; and those who do not effect it miss their mark, and it is in this that a good constitution differs [5] from a bad one.

Again, it is from the same causes and by the same means that every excellence is both produced and destroyed, and similarly every art; for it is from playing the lyre that both good and bad lyre-players are produced. And the corresponding statement is true of builders and of all the rest; men will be good or bad builders as a [10] result of building well or badly. For if this were not so, there would have been no need of a teacher, but all men would have been born good or bad at their craft.

This, then, is the case with the excellences also; by doing the acts that we do in our transactions with other men we become just or unjust, and by doing the acts that we [15] do in the presence of danger, and being habituated to feel fear or confidence, we become brave or cowardly. The same is true of appetites and feelings of anger; some men become temperate and good-tempered, others self-indulgent and irascible, by behaving in one way or the other in the appropriate circumstances. Thus, in one [20] word, states arise out of like activities. This is why the activities we exhibit must be of a certain kind; it is because the states correspond to the differences between these. It makes no small difference, then, whether we form habits of one kind or of another from our very youth; it makes a very great difference, or rather *all* the [25] difference.

2 · Since, then, the present inquiry does not aim at theoretical knowledge like the others (for we are inquiring not in order to know what excellence is, but in order to become good, since otherwise our inquiry would have been of no use), we must examine the nature of actions, namely how we ought to do them; for these [30] determine also the nature of the states that are produced, as we have said. Now, that we must<sup>9</sup> act according to right reason is a common principle and must be assumed—it will be discussed later, i.e. both what it is, and how it is related to the other excellences. But this must be agreed upon beforehand, that the whole account [1104<sup>a</sup>1] of matters of conduct must be given in outline and not precisely, as we said at the very beginning that the accounts we demand must be in accordance with the subject-matter; matters concerned with conduct and questions of what is good for us [5] have no fixity, any more than matters of health. The general account being of this nature, the account of particular cases is yet more lacking in exactness; for they do not fall under any art or set of precepts, but the agents themselves must in each case consider what is appropriate to the occasion, as happens also in the art of medicine or of navigation.

[10] But though our present account is of this nature we must give what help we can. First, then, let us consider this, that it is the nature of such things to be destroyed by defect and excess, as we see in the case of strength and of health (for to gain light on things imperceptible we must use the evidence of sensible things); both [15] excessive and defective exercise destroys the strength, and similarly drink or food which is above or below a certain amount destroys the health, while that which is proportionate both produces and increases and preserves it. So too is it,

then, in the case of temperance and courage and the other excellences. For the man who flies [20] from and fears everything and does not stand his ground against anything becomes a coward, and the man who fears nothing at all but goes to meet every danger becomes rash; and similarly the man who indulges in every pleasure and abstains from none becomes self-indulgent, while the man who shuns every pleasure, as [25] boors do, becomes in a way insensible; temperance and courage, then, are destroyed by excess and defect, and preserved by the mean.

But not only are the sources and causes of their origination and growth the same as those of their destruction, but also the sphere of their activity will be the [30] same; for this is also true of the things which are more evident to sense, e.g. of strength; it is produced by taking much food and undergoing much exertion, and it is the strong man that will be most able to do these things. So too is it with the excellences; by abstaining from pleasures we become temperate, and it is when we have become so that we are most able to abstain from them; and similarly too in the [1104<sup>b</sup>1] case of courage; for by being habituated to despise things that are terrible and to stand our ground against them we become brave, and it is when we have become so that we shall be most able to stand our ground against them.

**3** · We must take as a sign of states the pleasure or pain that supervenes on [5] acts; for the man who abstains from bodily pleasures and delights in this very fact is temperate, while the man who is annoyed at it is self-indulgent, and he who stands his ground against things that are terrible and delights in this or at least is not pained is brave, while the man who is pained is a coward. For moral excellence is [10] concerned with pleasures and pains; it is on account of pleasure that we do bad things, and on account of pain that we abstain from noble ones. Hence we ought to have been brought up in a particular way from our very youth, as Plato says, so as both to delight in and to be pained by the things that we ought; for this is the right education.

Again, if the excellences are concerned with actions and passions, and every passion and every action is accompanied by pleasure and pain, for this reason also [15] excellence will be concerned with pleasures and pains. This is indicated also by the fact that punishment is inflicted by these means; for it is a kind of cure, and it is the nature of cures to be effected by contraries.

Again, as we said but lately, every state of soul has a nature relative

to and concerned with the kind of things by which it tends to be made worse or better; but [20] it is by reason of pleasures and pains that men become bad, by pursuing and avoiding these—either the pleasures and pains they ought not or when they ought not or as they ought not, or by going wrong in one of the other similar ways that reason can distinguish. Hence men even define the excellences as certain states of impassivity and rest; not well, however, because they speak absolutely, and do not [25] say ‘as one ought’ and ‘as one ought not’ and ‘when one ought or ought not’, and the other things that may be added. We assume, then, that this kind of excellence tends to do what is best with regard to pleasures and pains, and badness does the contrary.

The following facts also may show us that they are concerned with these same things. There being three objects of choice and three of avoidance, the noble, the [30] advantageous, the pleasant, and their contraries, the base, the injurious, the painful, about all of these the good man tends to go right and the bad man to go wrong, and especially about pleasure; for this is common to the animals, and also it accompanies all objects of choice; for even the noble and the advantageous appear pleasant. [1105<sup>a</sup>1]

Again, it has grown up with us all from our infancy; this is why it is difficult to rub off this passion, engrained as it is in our life. And we measure even our actions, some of us more and others less, by pleasure and pain. For this reason, then, our [5] whole inquiry must be about these; for to feel delight and pain rightly or wrongly has no small effect on our actions.

Again, it is harder to fight with pleasure than with anger, to use Heraclitus’ phrase, but both art and excellence are always concerned with what is harder; for even the good is better when it is harder. Therefore for this reason also the whole [10] concern both of excellence and of political science is with pleasures and pains; for the man who uses these well will be good, he who uses them badly bad.

That excellence, then, is concerned with pleasures and pains, and that by the acts from which it arises it is both increased and, if they are done differently, [15] destroyed, and that the acts from which it arose are those in which it actualizes itself—let this be taken as said.

4 · The question might be asked, what we mean by saying that we must become just by doing just acts, and temperate by doing temperate acts; for if men do just and temperate acts, they are already just and

temperate, exactly as, if they do [20] what is grammatical or musical they are proficient in grammar and music.

Or is this not true even of the arts? It is possible to do something grammatical either by chance or under the guidance of another. A man will be proficient in grammar, then, only when he has both done something grammatical and done it grammatically; and this means doing it in accordance with the grammatical [25] knowledge in himself.

Again, the case of the arts and that of the excellences are not similar; for the products of the arts have their goodness in themselves, so that it is enough that they should have a certain character, but if the acts that are in accordance with the excellences have themselves a certain character it does not follow that they are done [30] justly or temperately. The agent also must be in a certain condition when he does them; in the first place he must have knowledge, secondly he must choose the acts, and choose them for their own sakes, and thirdly his action must proceed from a [1105<sup>b1</sup>] firm and unchangeable character. These are not reckoned in as conditions of the possession of the arts, except the bare knowledge; but as a condition of the possession of the excellences, knowledge has little or no weight, while the other conditions count not for a little but for everything, i.e. the very conditions which result from often doing just and temperate acts.

[5] Actions, then, are called just and temperate when they are such as the just or the temperate man would do; but it is not the man who does these that is just and temperate, but the man who also does them as just and temperate men do them. It is well said, then, that it is by doing just acts that the just man is produced, and by [10] doing temperate acts the temperate man; without doing these no one would have even a prospect of becoming good.

But most people do not do these, but take refuge in theory and think they are being philosophers and will become good in this way, behaving somewhat like [15] patients who listen attentively to their doctors, but do none of the things they are ordered to do. As the latter will not be made well in body by such a course of treatment, the former will not be made well in soul by such a course of philosophy.

5 · Next we must consider what excellence is. Since things that are found in [20] the soul are of three kinds—passions, faculties, states—excellence must be one of these. By passions I mean appetite, anger, fear, confidence, envy, joy, love, hatred, longing, emulation, pity, and in

general the feelings that are accompanied by pleasure or pain; by faculties the things in virtue of which we are said to be capable [25] of feeling these, e.g. of becoming angry or being pained or feeling pity; by states the things in virtue of which we stand well or badly with reference to the passions, e.g. with reference to anger we stand badly if we feel it violently or too weakly, and well if we feel it moderately; and similarly with reference to the other passions.

Now neither the excellences nor the vices are *passions*, because we are not [30] called good or bad on the ground of our passions, but are so called on the ground of our excellences and our vices, and because we are neither praised nor blamed for our passions (for the man who feels fear or anger is not praised, nor is the man who [1106<sup>a</sup>1] simply feels anger blamed, but the man who feels it in a certain way), but for our excellences and our vices we *are* praised or blamed.

Again, we feel anger and fear without choice, but the excellences are choices or involve choice. Further, in respect of the passions we are said to be moved, but in [5] respect of the excellences and the vices we are said not to be moved but to be disposed in a particular way.

For these reasons also they are not *faculties*; for we are neither called good nor bad, nor praised nor blamed, for the simple capacity of feeling the passions; again, we have the faculties by nature, but we are not made good or bad by nature; we have [10] spoken of this before.

If, then, the excellences are neither passions nor faculties, all that remains is that they should be *states*.

Thus we have stated what excellence is in respect of its genus.

6 · We must, however, not only describe it as a state, but also say what sort of state it is. We may remark, then, that every excellence both brings into good [15] condition the thing of which it is the excellence and makes the work of that thing be done well; e.g. the excellence of the eye makes both the eye and its work good; for it is by the excellence of the eye that we see well. Similarly the excellence of the horse makes a horse both good in itself and good at running and at carrying its rider and [20] at awaiting the attack of the enemy. Therefore, if this is true in every case, the excellence of man also will be the state which makes a man good and which makes him do his own work well.

How this is to happen we have stated already, but it will be made plain also by the following consideration of the nature of excellence. In everything that is [25] continuous and divisible it is possible to take



more, less, or an equal amount, and that either in terms of the thing itself or relatively to us; and the equal is an intermediate between excess and defect. By the intermediate in the object I mean that which is equidistant from each of the extremes, which is one and the same for [30] all men; by the intermediate relatively to us that which is neither too much nor too little—and this is not one, nor the same for all. For instance, if ten is many and two is few, six is intermediate, taken in terms of the object; for it exceeds and is exceeded by an equal amount; this is intermediate according to arithmetical proportion. But [35] the intermediate relatively to us is not to be taken so; if ten pounds are too much for a particular person to eat and two too little, it does not follow that the trainer will [1106<sup>b</sup>1] order six pounds; for this also is perhaps too much for the person who is to take it, or too little—too little for Milo, too much for the beginner in athletic exercises. The same is true of running and wrestling. Thus a master of any art avoids excess and defect, but seeks the intermediate and chooses this—the intermediate not in the [5] object but relatively to us.

If it is thus, then, that every art does its work well—by looking to the intermediate and judging its works by this standard (so that we often say of good works of the art that it is not possible either to take away or to add anything, [10] implying that excess and defect destroy the goodness of works of art, while the mean preserves it; and good artists, as we say, look to this in their work), and if, further, excellence is more exact and better than any art, as nature also is, then it must have [15] the quality of aiming at the intermediate. I mean moral excellence; for it is this that is concerned with passions and actions, and in these there is excess, defect, and the intermediate. For instance, both fear and confidence and appetite and anger and pity and in general pleasure and pain may be felt both too much and too little, and in [20] both cases not well; but to feel them at the right times, with reference to the right objects, towards the right people, with the right aim, and in the right way, is what is both intermediate and best, and this is characteristic of excellence. Similarly with regard to actions also there is excess, defect, and the intermediate. Now excellence is concerned with passions and actions, in which excess is a form of failure, and so is [25] defect, while the intermediate is praised and is a form of success; and both these things are characteristics of excellence. Therefore excellence is a kind of mean, since it aims at what is intermediate.

Again, it is possible to fail in many ways (for evil belongs to the class of the [30] unlimited, as the Pythagoreans conjectured, and good to that

of the limited), while to succeed is possible only in one way (for which reason one is easy and the other difficult—to miss the mark easy, to hit it difficult); for these reasons also, then, excess and defect are characteristic of vice, and the mean of excellence;

[35] For men are good in but one way, but bad in many.

Excellence, then, is a state concerned with choice, lying in a mean relative to [1107<sup>a</sup>1] us, this being determined by reason and in the way in<sup>10</sup> which the man of practical wisdom would determine it. Now it is a mean between two vices, that which depends on excess and that which depends on defect; and again it is a mean because the vices respectively fall short of or exceed what is right in both passions and actions, while [5] excellence both finds and chooses that which is intermediate. Hence in respect of its substance and the account which states its essence is a mean, with regard to what is best and right it is an extreme.

But not every action nor every passion admits of a mean; for some have names [10] that already imply badness, e.g. spite, shamelessness, envy, and in the case of actions adultery, theft, murder; for all of these and suchlike things imply by their names that they are themselves bad, and not the excesses or deficiencies of them. It is not possible, then, ever to be right with regard to them; one must always be wrong. [15] Nor does goodness or badness with regard to such things depend on committing adultery with the right woman, at the right time, and in the right way, but simply to do any of them is to go wrong. It would be equally absurd, then, to expect that in unjust, cowardly, and self-indulgent action there should be a mean, an excess, and a [20] deficiency; for at that rate there would be a mean of excess and of deficiency, an excess of excess, and a deficiency of deficiency. But as there is no excess and deficiency of temperance and courage because what is intermediate is in a sense an extreme, so too of the actions we have mentioned there is no mean nor any excess [25] and deficiency, but however they are done they are wrong; for in general there is neither a mean of excess and deficiency, nor excess and deficiency of a mean.

7 · We must, however, not only make this general statement, but also apply it to the individual facts. For among statements about conduct those which are [30] general apply more widely, but those which are particular are more true, since conduct has to do with individual cases, and our statements must harmonize with the facts in these cases. We may take these cases from the diagram. With regard to feelings of fear and

confidence courage is the mean; of the people who exceed, he [1107<sup>b</sup>1] who exceeds in fearlessness has no name (many of the states have no name), while the man who exceeds in confidence is rash, and he who exceeds in fear and falls short in confidence is a coward. With regard to pleasures and pains—not all of [5] them, and not so much with regard to the pains—the mean is temperance, the excess self-indulgence. Persons deficient with regard to the pleasures are not often found; hence such persons also have received no name. But let us call them ‘insensible’.

With regard to giving and taking of money the mean is liberality, the excess and the defect prodigality and meanness. They exceed and fall short in contrary [10] ways to one another:<sup>11</sup> the prodigal exceeds in spending and falls short in taking, while the mean man exceeds in taking and falls short in spending. (At present we are giving a mere outline or summary, and are satisfied with this; later these states [15] will be more exactly determined.) With regard to money there are also other dispositions—a mean, magnificence (for the magnificent man differs from the liberal man; the former deals with large sums, the latter with small ones), an excess, tastelessness and vulgarity, and a deficiency, niggardliness; these differ from the [20] states opposed to liberality, and the mode of their difference will be stated later.

With regard to honour and dishonour the mean is proper pride, the excess is known as a sort of empty vanity, and the deficiency is undue humility; and as we said liberality was related to magnificence, differing from it by dealing with small [25] sums, so there is a state similarly related to proper pride, being concerned with small honours while that is concerned with great. For it is possible to desire small honours<sup>12</sup> as one ought, and more than one ought, and less, and the man who exceeds in his desires is called ambitious, the man who falls short unambitious, while the intermediate person has no name. The dispositions also are nameless, [30] except that that of the ambitious man is called ambition. Hence the people who are at the extremes lay claim to the middle place; and we ourselves sometimes call the intermediate person ambitious and sometimes unambitious, and sometimes praise the ambitious man and sometimes the unambitious. The reason of our doing this [1108<sup>a</sup>1] will be stated in what follows; but now let us speak of the remaining states according to the method which has been indicated.

With regard to anger also there is an excess, a deficiency, and a mean. Although they can scarcely be said to have names, yet since we call the intermediate [5] person good-tempered let us call the mean good temper; of the persons at the extremes let the one who exceeds be called

irascible, and his vice irascibility, and the man who falls short an inirascible sort of person, and the deficiency inirascibility.

There are also three other means, which have a certain likeness to one another, [10] but differ from one another: for they are all concerned with intercourse in words and actions, but differ in that one is concerned with truth in this sphere, the other two with pleasantness; and of this one kind is exhibited in giving amusement, the other in all the circumstances of life. We must therefore speak of these too, that we may the better see that in all things the mean is praiseworthy, and the extremes neither [15] praiseworthy nor right, but worthy of blame. Now most of these states also have no names, but we must try, as in the other cases, to invent names ourselves so that we may be clear and easy to follow. With regard to truth, then, the intermediate is a [20] truthful sort of person and the mean may be called truthfulness, while the pretence which exaggerates is boastfulness and the person characterized by it a boaster, and that which understates is mock modesty and the person characterized by it mock-modest. With regard to pleasantness in the giving of amusement the intermediate person is ready-witted and the disposition ready wit, the excess is [25] buffoonery and the person characterized by it a buffoon, while the man who falls short is a sort of boor and his state is boorishness. With regard to the remaining kind of pleasantness, that which is exhibited in life in general, the man who is pleasant in the right way is friendly and the mean is friendliness, while the man who exceeds is an obsequious person if he has no end in view, a flatterer if he is aiming at his own advantage, and the man who falls short and is unpleasant in all circumstances is a [30] quarrelsome and surly sort of person.

There are also means in the passions and concerned with the passions; since shame is not an excellence, and yet praise is extended to the modest man. For even in these matters one man is said to be intermediate, and another to exceed, as for instance the bashful man who is ashamed of everything; while he who falls short or is not ashamed of anything at all is shameless, and the intermediate person is [1108<sup>b</sup>1] modest. Righteous indignation is a mean between envy and spite, and these states are concerned with the pain and pleasure that are felt at the fortunes of our neighbours; the man who is characterized by righteous indignation is pained at undeserved good fortune, the envious man, going beyond him, is pained at all good [5] fortune, and the spiteful man falls so far short of being pained that he even rejoices. But these states there will be an opportunity of describing elsewhere; with regard to justice,

since it has not one simple meaning, we shall, after describing the other states, distinguish its two kinds and say how each of them is a mean; and similarly [10] we shall treat also of the rational excellences.

8 · There are three kinds of disposition, then, two of them vices, involving excess and deficiency and one an excellence, viz. the mean, and all are in a sense opposed to all; for the extreme states are contrary both to the intermediate state and [15] to each other, and the intermediate to the extremes; as the equal is greater relatively to the less, less relatively to the greater, so the middle states are excessive relatively to the deficiencies, deficient relatively to the excesses, both in passions and in actions. For the brave man appears rash relatively to the coward, and cowardly [20] relatively to the rash man; and similarly the temperate man appears self-indulgent relatively to the insensible man, insensible relatively to the self-indulgent, and the liberal man prodigal relatively to the mean man, mean relatively to the prodigal. Hence also the people at the extremes push the intermediate man each over to the [25] other, and the brave man is called rash by the coward, cowardly by the rash man, and correspondingly in the other cases.

These states being thus opposed to one another, the greatest contrariety is that of the extremes to each other, rather than to the intermediate; for these are further from each other than from the intermediate, as the great is further from the small [30] and the small from the great than both are from the equal. Again, to the intermediate some extremes show a certain likeness, as that of rashness to courage and that of prodigality to liberality; but the extremes show the greatest unlikeness to each other; now contraries are defined as the things that are furthest from each other, so that things that are further apart are more contrary.

To the mean in some cases the deficiency, in some the excess is more opposed; [1109<sup>a</sup>1] e.g. it is not rashness, which is an excess, but cowardice, which is a deficiency, that is more opposed to courage, and not insensibility, which is a deficiency, but self-indulgence, which is an excess, that is more opposed to temperance. This happens from two reasons, one being drawn from the thing itself; for because one [5] extreme is nearer and liker to the intermediate, we oppose not this but rather its contrary to the intermediate. E.g., since rashness is thought liker and nearer to courage, and cowardice more unlike, we oppose rather the latter to courage; for [10] things that are further from the

intermediate are thought more contrary to it. This, then, is one cause, drawn from the thing itself; another is drawn from ourselves; for the things to which we ourselves more naturally tend seem more contrary to the intermediate. For instance, we ourselves tend more naturally to pleasures, and [15] hence are more easily carried away towards self-indulgence than towards propriety. We describe as contrary to the mean, then, the states into which we are more inclined to lapse; and therefore self-indulgence, which is an excess, is the more contrary to temperance.

9 · That moral excellence is a mean, then, and in what sense it is so, and that [20] it is a mean between two vices, the one involving excess, the other deficiency, and that it is such because its character is to aim at what is intermediate in passions and in actions, has been sufficiently stated. Hence also it is no easy task to be good. For in everything it is no easy task to find the middle, e.g. to find the middle of a circle is [25] not for every one but for him who knows; so, too, any one can get angry—that is easy—or give or spend money; but to do this to the right person, to the right extent, at the right time, with the right aim, and in the right way, *that* is not for every one, nor is it easy; that is why goodness is both rare and laudable and noble.

Hence he who aims at the intermediate must first depart from what is the more [30] contrary to it, as Calypso advises—

Hold the ship out beyond that surf and spray.<sup>13</sup>

For of the extremes one is more erroneous, one less so; therefore, since to hit the mean is hard in the extreme, we must as a second best, as people say, take the least of the evils; and this be done best in the way we describe. [1109<sup>b</sup>1]

But we must consider the things towards which we ourselves also are easily carried away; for some of us tend to one thing, some to another; and this will be recognizable from the pleasure and the pain we feel. We must drag ourselves away to the contrary extreme; for we shall get into the intermediate state by drawing well [5] away from error, as people do in straightening sticks that are bent.

Now in everything the pleasant or pleasure is most to be guarded against; for we do not judge it impartially. We ought, then, to feel towards pleasure as the elders [10] of the people felt towards Helen, and in all circumstances repeat their saying; for if we dismiss pleasure thus we are less likely to go astray. It is by doing this, then, (to sum the matter

up) that we shall best be able to hit the mean.

But this is no doubt difficult, and especially in individual cases; for it is not [15] easy to determine both how and with whom and on what provocation and how long one should be angry; for we too sometimes praise those who fall short and call them good-tempered, but sometimes we praise those who get angry and call them manly. The man, however who deviates little from goodness is not blamed, whether he do so in the direction of the more or of the less, but only the man who deviates more [20] widely; for *he* does not fail to be noticed. But up to what point and to what extent a man must deviate before he becomes blameworthy it is not easy to determine by reasoning, any more than anything else that is perceived by the senses; such things depend on particular facts, and the decision rests with perception. So much, then, makes it plain that the intermediate state is in all things to be praised, but that we [25] must incline sometimes towards the excess, sometimes towards the deficiency; for so shall we most easily hit the mean and what is right.

## BOOK III

[30] 1 · Since excellence is concerned with passions and actions, and on voluntary passions and actions praise and blame are bestowed, on those that are involuntary forgiveness, and sometimes also pity, to distinguish the voluntary and the involuntary is presumably necessary for those who are studying excellence and useful also for legislators with a view to the assigning both of honours and of punishments.

Those things, then, are thought involuntary, which take place under compulsion [1110<sup>a</sup>1] or owing to ignorance; and that is compulsory of which the moving principle is outside, being a principle in which nothing is contributed by the person who acts or is acted upon, e.g. if he were to be carried somewhere by a wind, or by men who had him in their power.

But with regard to the things that are done from fear of greater evils or for [5] some noble object (e.g. if a tyrant were to order one to do something base, having one's parents and children in his power, and if one did the action they were to be saved, but otherwise would be put to death), it may be debated whether such actions are involuntary or voluntary. Something of the sort happens also with regard to the throwing of goods overboard in a storm; for in the abstract no one throws goods [10] away voluntarily, but on condition of its securing the safety of himself and his crew any sensible man does so. Such actions, then, are mixed, but are more like voluntary actions; for they are worthy of choice at the time when they are done, and the end of an action is relative to the occasion. Both the terms, then, 'voluntary' and 'involuntary', must be used with reference to the moment of action. Now the man [15] acts voluntarily; for the principle that moves the instrumental parts of the body in such actions is in him, and the things of which the moving principle is in a man himself are in his power to do or not to do. Such actions, therefore, are voluntary, but in the abstract perhaps involuntary; for no one would choose any such act in itself.

For such actions men are sometimes even praised, when they endure something [20] base or painful in return for great and noble objects gained; in the opposite case they are blamed, since to endure the greatest indignities for no noble end or for a trifling end is the mark of an inferior person. On some actions praise indeed is not bestowed, but forgiveness is, when one does what he ought not under pressure which overstrains



human nature and which no one could withstand. But some acts, [25] perhaps, we cannot be forced to do, but ought rather to face death after the most fearful sufferings; for the things that forced Euripides' Alcmæon to slay his mother seem absurd. It is difficult sometimes to determine what should be chosen at what cost, and what should be endured in return for what gain, and yet more difficult to [30] abide by our decisions; for as a rule what is expected is painful, and what we are forced to do is base, whence praise and blame are bestowed on those who have been compelled or have not.

What sort of acts, then, should be called compulsory? We answer that without [1110<sup>b</sup>1] qualification actions are so when the cause is in the external circumstances and the agent contributes nothing. But the things that in themselves are involuntary, but now and in return for these gains are worthy of choice, and whose moving principle is in the agent, are in themselves involuntary, but now and in return for these gains [5] voluntary. They are more like voluntary acts; for actions are in the class of particulars, and the particular acts here are voluntary. What sort of things are to be chosen in return for what it is not easy to state; for there are many differences in the particular cases.

But if some one were to say that pleasant and noble objects have a compelling power, forcing us from without, all acts would be for him compulsory; for it is for [10] these objects that all men do everything they do. And those who act under compulsion and unwillingly act with pain, but those who do acts for their pleasantness and nobility do them with pleasure; it is absurd to make external circumstances responsible, and not oneself, as being easily caught by such attractions, and to make oneself responsible for noble acts but the pleasant objects responsible for base acts. The compulsory, then, seems to be that whose moving [15] principle is outside, the person compelled contributing nothing.

Everything that is done by reason of ignorance is *non*-voluntary; it is only what produces pain and regret that is *involuntary*. For the man who has done something owing to ignorance, and feels not the least vexation at his action, has not acted [20] voluntarily, since he did not know what he was doing, nor yet involuntarily, since he is not pained. Of people, then, who act by reason of ignorance he who regrets is thought an involuntary agent, and the man who does not regret may, since he is different, be called a non-voluntary agent; for, since he differs from the other, it is better that he should have a name of his own.

Acting by reason of ignorance seems also to be different from acting *in* [25] ignorance; for the man who is drunk or in a rage is thought to act

as a result not of ignorance but of one of the causes mentioned, yet not knowingly but in ignorance.

Now every wicked man is ignorant of what he ought to do and what he ought to abstain from, and error of this kind makes men unjust and in general bad; but the [30] term 'involuntary' tends to be used not if a man is ignorant of what is to his advantage—for it is not ignorance in choice that makes action involuntary (it makes men wicked), nor ignorance of the universal (for *that* men are *blamed*), but ignorance of particular circumstances of the action and the objects with which it is [1111<sup>a</sup>1] concerned. For it is on these that both pity and forgiveness depend, since the person who is ignorant of any of these acts involuntarily.

Perhaps it is just as well, therefore, to determine their nature and number. A man may be ignorant, then, of who he is, what he is doing, what or whom he is acting on, and sometimes also what (e.g. what instrument) he is doing it with, and to [5] what end (e.g. for safety), and how he is doing it (e.g. whether gently or violently). Now of all of these no one could be ignorant unless he were mad, and evidently also he could not be ignorant of the agent; for how could he not know himself? But of what he is doing a man might be ignorant, as for instance people say 'it slipped out of their mouths as they were speaking',<sup>14</sup> or 'they did not know it was a secret', as [10] Aeschylus said of the mysteries, or a man might say he 'let it go off when he merely wanted to show its working', as the man did with the catapult. Again, one might think one's son was an enemy, as Merope did, or that a pointed spear had a button on it, or that a stone was pumice-stone; or one might give a man a draught to save him, and really kill him; or one might want to touch a man, as people do in sparring, [15] and really strike him. The ignorance may relate, then, to any of these things, i.e. of the circumstances of the action, and the man who was ignorant of any of these is thought to have acted involuntarily, and especially if he was ignorant on the most important points; and these are thought to be what<sup>15</sup> he is doing and with what aim. [20] Further,<sup>16</sup> the doing of an act that is called involuntary in virtue of ignorance of this sort must be painful and involve regret.

Since that which is done under compulsion or by reason of ignorance is involuntary, the voluntary would seem to be that of which the moving principle is in the agent himself, he being aware of the particular circumstances of the action. [25] Presumably acts done by reason of anger or appetite are not rightly called involuntary. For in the first place, on that showing none of the other animals will act voluntarily, nor will children; and secondly, is it meant that we do not do voluntarily *any* of

the acts that are due to appetite or anger, or that we do the noble acts voluntarily and the base acts involuntarily? Is not this absurd, when one and the same thing is the cause? But it would surely be odd to describe as involuntary the [30] things one ought to desire; and we ought both to be angry at certain things and to have an appetite for certain things, e.g. for health and for learning. Also what is involuntary is thought to be painful, but what is in accordance with appetite is thought to be pleasant. Again, what is the difference in respect of involuntariness between errors committed upon calculation and those committed in anger? Both [1111<sup>b</sup>1] are to be avoided, but the irrational passions are thought not less human than reason is, and therefore also the actions which proceed from anger or appetite are the man's actions. It would be odd, then, to treat them as involuntary.

2 · Both the voluntary and the involuntary having been delimited, we must next discuss choice; for it is thought to be most closely bound up with excellence and [5] to discriminate characters better than actions do.

Choice, then, seems to be voluntary, but not the same thing as the voluntary; the latter extends more widely. For both children and the other animals share in voluntary action, but not in choice, and acts done on the spur of the moment we describe as voluntary, but not as chosen. [10]

Those who say it is appetite or anger or wish or a kind of opinion do not seem to be right. For choice is not common to irrational creatures as well, but appetite and anger are. Again, the incontinent man acts with appetite, but not with choice; while the continent man on the contrary acts with choice, but not with appetite. Again, [15] appetite is contrary to choice, but not appetite to appetite. Again, appetite relates to the pleasant and the painful, choice neither to the painful nor to the pleasant.

Still less is it anger; for acts due to anger are thought to be less than any other objects of choice.

But neither is it wish, though it seems near to it; for choice cannot relate to [20] impossibles, and if any one said he chose them he would be thought silly; but there may be a wish even for impossibles, e.g. for immortality. And wish may relate to things that could in no way be brought about by one's own efforts, e.g. that a particular actor or athlete should win in a competition; but no one chooses such things, but only the things that he thinks could be brought about by his own efforts. [25] Again, wish relates rather to the end, choice to what contributes to the end; for instance, we wish to be healthy, but we choose the acts which

will make us healthy, and we wish to be happy and say we do, but we cannot well say we choose to be so; for, in general, choice seems to relate to the things that are in our own power. [30]

For this reason, too, it cannot be opinion; for opinion is thought to relate to all kinds of things, no less to eternal things and impossible things than to things in our own power; and it is distinguished by its falsity or truth, not by its badness or goodness, while choice is distinguished rather by these.

Now with opinion in general perhaps no one really says it is identical. But it is [1112<sup>a</sup>1] not identical even with any kind of opinion; for by choosing what is good or bad we are men of a certain character, which we are not by holding certain opinions. And we choose to get or avoid something good or bad, but we have opinions about what a thing is or whom it is good for or how it is good for him; we can hardly be said to opine to get or avoid anything. And choice is praised for being related to the right [5] object rather than for being rightly related to it, opinion for being truly related to its object. And we choose what we best know to be good, but we opine what we do not know at all; and it is not the same people that are thought to make the best choices and to have the best opinions, but some are thought to have fairly good opinions, but [10] by reason of vice to choose what they should not. If opinion precedes choice or accompanies it, that makes no difference; for it is not this that we are considering, but whether it is *identical* with some kind of opinion.

What, then, or what kind of thing is it, since it is none of the things we have mentioned? It seems to be voluntary, but not all that is voluntary to be an object of [15] choice. Is it, then, what has been decided on by previous deliberation? For choice involves reason and thought. Even the name seems to suggest that it is what is chosen before other things.<sup>17</sup>

3 · Do we deliberate about everything, and is everything a possible subject of deliberation, or is deliberation impossible about some things? We ought presumably [20] to call not what a fool or a madman would deliberate about, but what a sensible man would deliberate about, a subject of deliberation. Now about eternal things no one deliberates, e.g. about the universe or the incommensurability of the diagonal and the side of a square. But no more do we deliberate about the things that involve movement but always happen in the same way, whether of necessity or by nature or [25] from any other cause, e.g. the solstices and the risings of the stars; nor about things that happen now in one way, now in

another, e.g. droughts and rains; nor about chance events, like the finding of treasure. But we do not deliberate even about all human affairs; for instance, no Spartan deliberates about the best constitution for [30] the Scythians. For none of these things can be brought about by our own efforts.

We deliberate about things that are in our power and can be done; and these are in fact what is left. For nature, necessity, and chance are thought to be causes, and also thought and everything that depends on man. Now every class of men deliberates about the things that can be done by their own efforts. And in the case of [1112<sup>b</sup>1] exact and self-contained sciences there is no deliberation, e.g. about the letters of the alphabet (for we have no doubt how they should be written); but the things that are brought about by our own efforts, but not always in the same way, are the things about which we deliberate, e.g. questions of medical treatment or of money-making. [5] And we do so more in the case of the art of navigation than in that of gymnastics, inasmuch as it has been less exactly worked out, and again about other things in the same ratio, and more also in the case of the arts than in that of the sciences; for we have more doubt about the former. Deliberation is concerned with things that happen in a certain way for the most part, but in which the event is obscure, and [10] with things in which it is indeterminate. We call in others to aid us in deliberation on important questions, distrusting ourselves as not being equal to deciding.

We deliberate not about ends but about what contributes to ends. For a doctor does not deliberate whether he shall heal, nor an orator whether he shall convince, nor a statesman whether he shall produce law and order, nor does any one else [15] deliberate about his end. Having set the end they consider how and by what means it is to be attained; and if it seems to be produced by several means they consider by which it is most easily and best produced, while if it is achieved by one only they consider how it will be achieved by this and by what means *this* will be achieved, till they come to the first cause, which in the order of discovery is last. For the person who deliberates seems to inquire and analyse in the way described as though he [20] were analysing a geometrical construction (not all inquiry appears to be deliberation—for instance mathematical inquiries—but all deliberation is inquiry), and what is last in the order of analysis seems to be first in the order of becoming. And if we come on an impossibility, we give up the search, e.g. if we need money and this [25] cannot be got; but if a thing appears possible we try to do it. By ‘possible’ things I mean things that might be brought about by our own efforts; and

these in a sense include things that can be brought about by the efforts of our friends, since the moving principle is in ourselves. The subject of investigation is sometimes the instruments, sometimes the use of them; and similarly in the other cases—sometimes the means, sometimes the mode of using it or the means of bringing it [30] about. It seems, then, as has been said, that man is a moving principle of actions; now deliberation is about the things to be done by the agent himself, and actions are for the sake of things other than themselves. For the end cannot be a subject of deliberation, but only what contributes to the ends; nor indeed can the particular facts be a subject of it, as whether this is bread or has been baked as it should; for [1113<sup>a</sup>1] these are matters of perception. If we are to be always deliberating, we shall have to go on to infinity.

The same thing is deliberated upon and is chosen, except that the object of choice is already determinate, since it is that which has been decided upon as a result of deliberation that is the object of choice. For every one ceases to inquire how [5] he is to act when he has brought the moving principle back to himself and to the ruling part of himself; for this is what chooses. This is plain also from the ancient constitutions, which Homer represented; for the kings announced their choices to the people. The object of choice being one of the things in our own power which is [10] desired after deliberation, choice will be deliberate desire of things in our own power; for when we have decided as a result of deliberation, we desire in accordance with our deliberation.

We may take it, then, that we have described choice in outline, and stated the nature of its objects and the fact that it is concerned with what contributes to the ends.

4 · That *wish* is for the end has already been stated; some think it is for the [15] good, others for the apparent good. Now those who say that the good is the object of wish must admit in consequence that that which the man who does not choose aright wishes for is not an object of wish (for if it is to be so, it must also be good; but it was, if it so happened, bad); while those who say the apparent good is the object of [20] wish must admit that there is no natural object of wish, but only what seems so to each man. Now different things appear so to different people, and, if it so happens, even contrary things.

If these consequences are displeasing, are we to say that absolutely and in truth the good is the object of wish, but for each person the apparent good; that that which is in truth an object of wish is an object of

wish to the good man, while any [25] chance thing may be so to the bad man, as in the case of bodies also the things that are in truth wholesome are wholesome for bodies which are in good condition, while for those that are diseased other things are wholesome—or bitter or sweet or hot or [30] heavy, and so on; since the good man judges each class of things rightly, and in each the truth appears to him? For each state of character has its own ideas of the noble and the pleasant, and perhaps the good man differs from others most by seeing the truth in each class of things, being as it were the norm and measure of them. In most things the error seems to be due to pleasure; for it appears a good when it is not. We [1113<sup>b</sup>1] therefore choose the pleasant as a good, and avoid pain as an evil.

5 · The end, then, being what we wish for, the things contributing to the end what we deliberate about and choose, actions concerning the latter must be [5] according to choice and voluntary. Now the exercise of the excellences is concerned with these. Therefore excellence also is in our own power, and so too vice. For where it is in our power to act it is also in our power not to act, and *vice versa*; so that, if to act, where this is noble, is in our power, not to act, which will be base, will also be in [10] our power, and if not to act, where this is noble, is in our power, to act, which will be base, will also be in our power. Now if it is in our power to do noble or base acts, and likewise in our power not to do them, and this was what being good or bad meant, then it is in our power to be virtuous or vicious.

[15] The saying that ‘no one is voluntarily wicked nor involuntarily blessed’ seems to be partly false and partly true; for no one is involuntarily blessed, but wickedness is voluntary. Or else we shall have to dispute what has just been said, at any rate, and deny that man is a moving principle or begetter of his actions as of children. But [20] if these facts are evident and we cannot refer actions to moving principles other than those in ourselves, the acts whose moving principles are in us must themselves also be in our power and voluntary.

Witness seems to be borne to this both by individuals in their private capacity and by legislators themselves; for these punish and take vengeance on those who do wicked acts (unless they have acted under compulsion or as a result of ignorance for [25] which they are not themselves responsible), while they honour those who do noble acts, as though they meant to encourage the latter and deter the former. But no

one is encouraged to do the things that are neither in our power nor voluntary; it is assumed that there is no gain in being persuaded not to be hot or in pain or hungry or the like, since we shall experience these feelings none the less. Indeed, we punish [30] a man for his very ignorance, if he is thought responsible for the ignorance, as when penalties are doubled in the case of drunkenness; for the moving principle is in the man himself, since he had the power of not getting drunk and his getting drunk was the cause of his ignorance. And we punish those who are ignorant of anything in the [1114<sup>a</sup>1] laws that they ought to know and that is not difficult, and so too in the case of anything else that they are thought to be ignorant of through carelessness; we assume that it is in their power not to be ignorant, since they have the power of taking care.

But perhaps a man is the kind of man not to take care. Still they are themselves by their slack lives responsible for becoming men of that kind, and men are [5] themselves responsible for being unjust or self-indulgent, in that they cheat or spend their time in drinking bouts and the like; for it is activities exercised on particular objects that make the corresponding character. This is plain from the case of people training for any contest or action; they practise the activity the whole time. Now not to know that it is from the exercise of activities on particular objects that states of character are produced is the mark of a thoroughly senseless person. Again, it is [10] irrational to suppose that a man who acts unjustly does not wish to be unjust or a man who acts self-indulgently to be self-indulgent. But if without being ignorant a man does the things which will make him unjust, he will be unjust voluntarily. Yet it does not follow that if he wishes he will cease to be unjust and will be just. For neither does the man who is ill become well on those terms—although<sup>18</sup> he may, [15] perhaps, be ill voluntarily, through living incontinently and disobeying his doctors. In that case it was *then* open to him not to be ill, but not now, when he has thrown away his chance, just as when you have let a stone go it is too late to recover it; but yet it was in your power to throw it, since the moving principle was in you. So, too, to the unjust and to the self-indulgent man it was open at the beginning not to become [20] men of this kind, and so they are such voluntarily; but now that they have become so it is not possible for them not to be so.

But not only are the vices of the soul voluntary, but those of the body also for some men, whom we accordingly blame; while no one blames those who are ugly by nature, we blame those who are so owing to want of exercise and care. So it is, too, with respect to weakness and infirmity; no one would reproach a man blind from [25] birth or by disease or from



a blow, but rather pity him, while every one would blame a man who was blind from alcoholism or some other form of self-indulgence. Of vices of the body, then, those in our own power are blamed, those not in our power are not. And if this be so, in the other cases also the vices that are blamed must be in [30] our own power.

Now some one may say that all men aim at the apparent good, but have no control over how things appear to him; but the end appears to each man in a form [1114<sup>b</sup>1] answering to his character. We reply that if each man is somehow responsible for the state he is in, he will also be himself somehow responsible for how things appear; but if not, no one is responsible for his own evil-doing, but everyone does evil acts through ignorance of the end, thinking that by these he will get what is best, and the [5] aiming at the end is not self-chosen but one must be born with an eye, as it were, by which to judge rightly and choose what is truly good, and he is well endowed by nature who is well endowed with this. For it is what is greatest and most noble, and what we cannot get or learn from another, but must have just such as it was when [10] given us at birth, and to be well and nobly endowed with this will be complete and true natural endowment. If this is true, then, how will excellence be more voluntary than vice? To both men alike, the good and the bad, the end appears and is fixed by nature or however it may be, and it is by referring everything else to this that men [15] do whatever they do.

Whether, then, it is not by nature that the end appears to each man such as it does appear, but something also depends on him, or the end is natural but because the good man does the rest voluntarily excellence is voluntary, vice also will be none [20] the less voluntary; for in the case of the bad man there is equally present that which depends on himself in his actions even if not in his end. If, then, as is asserted, the excellences are voluntary (for we are ourselves somehow part-causes of our states of character, and it is by being persons of a certain kind that we assume the end to be [25] so and so), the vices also will be voluntary; for the same is true of them.

With regard to the excellences in *general* we have stated their genus in outline, viz. that they are means and that they are states, and that they tend by their own nature to the doing of the acts by which they are produced, and that they are in our [30] power and voluntary, and act as right reason prescribes. But actions and states are not voluntary in the same way; for we are masters of our actions from the beginning right to the end, if we know the particular facts, but though we control the [1115<sup>a</sup>1] beginning of our states the gradual progress is not obvious, any

more than it is in illnesses; because it was in our power, however, to act in this way or not in this way, therefore the states are voluntary.

Let us take up the several excellences, however, and say which they are and what sort of things they are concerned with and how they are concerned with them; [5] at the same time it will become plain how many they are. And first let us speak of courage.

6 · That it is a mean with regard to fear and confidence has already been made evident; and plainly the things we fear are terrible things, and these are, to speak without qualification, evils; for which reason people even define fear as [10] expectation of evil. Now we fear all evils, e.g. disgrace, poverty, disease, friendless-ness, death, but the brave man is not thought to be concerned with all; for to fear some things is even right and noble, and it is base not to fear them—e.g. disgrace; he who fears this is good and modest, and he who does not is shameless. He is, however, [15] by some people called brave, by an extension of the word; for he has in him something which is like the brave man, since the brave man also is a fearless person. Poverty and disease we perhaps ought not to fear, nor in general the things that do not proceed from vice and are not due to a man himself. But not even the man who is fearless of these is brave. Yet we apply the word to him also in virtue of a similarity; [20] for some who in the dangers of war are cowards are liberal and are confident in face of the loss of money. Nor is a man a coward if he fears insult to his wife and children or envy or anything of the kind; nor brave if he is confident when he is about to be flogged. With what sort of terrible things, then, is the brave man concerned? Surely [25] with the greatest; for no one is more likely than he to stand his ground against what is dreadful. Now death is the most terrible of all things; for it is the end, and nothing is thought to be any longer either good or bad for the dead. But the brave man would not seem to be concerned even with death in *all* circumstances, e.g. at sea or in disease. In what circumstances, then? Surely in the noblest. Now such deaths are [30] those in battle; for these take place in the greatest and noblest danger. And this agrees with the ways in which honours are bestowed in city-states and at the courts of monarchs. Properly, then, he will be called brave who is fearless in face of a noble death, and of all emergencies that involve death; and the emergencies of war are in the highest degree of this kind. Yet at sea also, and in disease, the brave man is fearless, but not in the same way as the seamen; for he has given up hope for safety, [1115<sup>b1</sup>] and is disliking the

thought of death in this shape, while they are hopeful because of their experience. At the same time, we show courage in situations where there is the opportunity of showing prowess or where death is noble; but in these forms of death [5] neither of these conditions is fulfilled.

7 · What is terrible is not the same for all men; but we say there are things terrible even beyond human strength. These, then, are terrible to every one—at least to every sensible man; but the terrible things that are *not* beyond human strength differ in magnitude and degree, and so too do the things that inspire [10] confidence. Now the brave man is as dauntless as man may be. Therefore, while he will fear even the things that are not beyond human strength, he will fear them as he ought and as reason directs, and<sup>19</sup> he will face them for the sake of what is noble; for this is the end of excellence. But it is possible to fear these more, or less, and again to fear things that are not terrible as if they were. Of the faults that are committed one [15] consists in fearing what one should not, another in fearing as we should not, another in fearing when we should not, and so on; and so too with respect to the things that inspire confidence. The man, then, who faces and who fears the right things and with the right aim, in the right way and at the right time, and who feels confidence under the corresponding conditions, is brave; for the brave man feels and acts according to the merits of the case and in whatever way reason directs. Now the end [20] of every activity is conformity to the corresponding state. This is true, therefore, of the brave man as well as of others. But courage is noble.<sup>20</sup> Therefore the end also is noble; for each thing is defined by its end. Therefore it is for a noble end that the brave man endures and acts as courage directs.

Of those who go to excess he who exceeds in fearlessness has no name (we have said previously that many states have no names), but he would be a sort of madman [25] or insensible person if he feared nothing, neither earthquakes nor the waves, as they say the Celts do not; while the man who exceeds in confidence about what really is terrible is rash. The rash man, however, is also thought to be boastful and only a pretender to courage; at all events, as the brave man is with regard to what is [30] terrible, so the rash man wishes to *appear*; and so he imitates him in situations where he can. Hence also most of them are a mixture of rashness and cowardice; for, while in these situations they display confidence, they do not hold their ground against what is really terrible. The man who exceeds in fear is a coward; for he fears both what he ought

not and as he ought not, and all the similar characterizations attach to him. He is lacking also in confidence; but he is more conspicuous for his [1116<sup>a1</sup>] excess of fear in painful situations. The coward, then, is a despairing sort of person; for he fears everything. The brave man, on the other hand, has the opposite disposition; for confidence is the mark of a hopeful disposition. The coward, the rash man, and the brave man, then, are concerned with the same objects but are [5] differently disposed towards them; for the first two exceed and fall short, while the third holds the middle, which is the right, position; and rash men are precipitate, and wish for dangers beforehand but draw back when they are in them, while brave men are keen in the moment of action, but quiet beforehand.

[10] As we have said, then, courage is a mean with respect to things that inspire confidence or fear, in the circumstances that have been stated; and it chooses or endures things because it is noble to do so, or because it is base not to do so. But to die to escape from poverty or love or anything painful is not the mark of a brave man, but rather of a coward; for it is softness to fly from what is troublesome, and [15] such a man endures death not because it is noble but to fly from evil.

8 · Courage, then, is something of this sort, but the name is also applied to five other kinds. (1) First comes political courage; for this is most like true courage. Citizens seem to face dangers because of the penalties imposed by the laws and the reproaches they would otherwise incur, and because of the honours they win by such [20] action; and therefore those peoples seem to be bravest among whom cowards are held in dishonour and brave men in honour. This is the kind of courage that Homer depicts, e.g. in Diomedes and in Hector:

First will Polydamas be to heap reproach on me then;<sup>21</sup>

and

[25] For Hector one day ‘mid the Trojans shall utter his vaulting harangue:  
“Afraid was Tydeides, and fled from my face,”<sup>22</sup>

This kind of courage is most like that which we described earlier, because it is due to excellence; for it is due to shame and to desire of a noble object (i.e. honour) and [30] avoidance of disgrace, which is ignoble. One might rank in the same class even those who are compelled by their rulers; but they are inferior, inasmuch as they act not from shame but

from fear, and to avoid not what is disgraceful but what is painful; for their masters compel them, as Hector does:

But if I shall spy any dastard that cowers far from the fight,  
Vainly will such an one hope to escape from the dogs.<sup>23</sup>[35]

And those who give them their posts, and beat them if they retreat, do the same, and [1116<sup>b</sup>1] so do those who draw them up with trenches or something of the sort behind them; all of these apply compulsion. But one ought to be brave not under compulsion but because it is noble to be so.

(2) Experience with regard to particular facts is also thought to be courage; [5] this is indeed the reason why Socrates thought courage was knowledge. Other people exhibit this quality in other dangers, and soldiers exhibit it in the dangers of war; for there seem to be many empty alarms in war, of which these have had the most comprehensive experience; therefore they seem brave, because the others do not know the nature of the facts. Again, their experience makes them most capable of doing without being done to, since they can use their arms and have the kind that [10] are likely to be best both for doing and for not being done to; therefore they fight like armed men against unarmed or like trained athletes against amateurs; for in such contests too it is not the bravest men that fight best, but those who are strongest and have their bodies in the best condition. Soldiers turn cowards, [15] however, when the danger puts too great a strain on them and they are inferior in numbers and equipment; for they are the first to fly, while citizen-forces die at their posts, as in fact happened at the temple of Hermes. For to the latter flight is disgraceful and death is preferable to safety on those terms; while the former from [20] the very beginning faced the danger on the assumption that they were stronger, and when they know the facts they fly, fearing death more than disgrace; but the brave man is not that sort of person.

(3) Passion also is sometimes reckoned as courage; those who act from passion, like wild beasts rushing at those who have wounded them, are thought to be brave, [25] because brave men also are passionate; for passion above all things is eager to rush on danger, and hence Homer's 'put strength into his passion' and 'aroused their spirit and passion' and 'bitter spirit in his nostrils' and 'his blood boiled'.<sup>24</sup> For all such expressions seem to indicate the stirring and onset of passion. Now brave men [30] act for the sake of the noble, but passion aids them; while wild beasts act under the influence of pain; for they attack because they have been wounded or because they are afraid, since if they are in a forest they

do not come near one. Thus they are not brave because, driven by pain and passion, they rush on danger without foreseeing [35] any of the perils, since at that rate even asses would be brave when they are hungry; for blows will not drive them from their food; and lust also makes adulterers do [1117<sup>a</sup>1] many daring things. [Those creatures are not brave, then, which are driven on to danger by pain or passion.]<sup>25</sup> The courage that is due to passion seems to be the most natural, and to be courage if choice and aim be added. [5]

Men, then, as well as beasts, suffer pain when they are angry, and are pleased when they exact their revenge; those who fight for these reasons, however, are pugnacious but not brave; for they do not act for the sake of the noble nor as reason directs, but from feeling; they have, however, something akin to courage.

(4) Nor are sanguine people brave; for they are confident in danger only [10] because they have conquered often and against many foes. Yet they closely resemble brave men, because both are confident; but brave men are confident for the reasons stated earlier, while these are so because they think they are the strongest and can suffer nothing. (Drunken men also behave in this way; they become sanguine). When their adventures do not succeed, however, they run away; [15] but it was the mark of a brave man to face things that are, and seem, terrible for a man, because it is noble to do so and disgraceful not to do so. Hence also it is thought the mark of a braver man to be fearless and undisturbed in sudden alarms than to be so in those that are foreseen; for it must have proceeded more from a state of character, because less from preparation; for acts that are foreseen may be [20] chosen by calculation and reason, but sudden actions in accordance with one's state of character.

(5) People who are ignorant also appear brave, and they are not far removed from those of a sanguine temper, but are inferior inasmuch as they have no self-reliance while these have. Hence also the sanguine hold their ground for a time; [25] but those who have been deceived fly if they know or suspect that things are different as happened to the Argives when they fell in with the Spartans and took them for Sicyonians.

9 · We have, then, described the character both of brave men and of those who are thought to be brave.

Though courage is concerned with confidence and fear, it is not concerned with [30] both alike, but more with the things that inspire fear; for he who is undisturbed in face of these and bears himself as he

should towards these is more truly brave than the man who does so towards the things that inspire confidence. It is for facing what is painful, then, as has been said, that men are called brave. Hence also courage involves pain, and is justly praised; for it is harder to face what is painful than to abstain from what is pleasant. Yet the end which courage sets before it would seem [1117<sup>b</sup>1] to be pleasant, but to be concealed by the attending circumstances, as happens also in athletic contests; for the end at which boxers aim is pleasant—the crown and the honours—but the blows they take are distressing to flesh and blood, and painful, [5] and so is their whole exertion; and because the blows and the exertions are many the end, which is but small, appears to have nothing pleasant in it. And so, if the case of courage is similar, death and wounds will be painful to the brave man and against his will, but he will face them because it is noble to do so or because it is base not to [10] do so. And the more he is possessed of excellence in its entirety and the happier he is, the more he will be pained at the thought of death; for life is best worth living for such a man, and he is knowingly losing the greatest goods, and this is painful. But he is none the less brave, and perhaps all the more so, because he chooses noble deeds of [15] war at that cost. It is not the case, then, with all the excellences that the exercise of them is pleasant, except in so far as it reaches its end. But it is quite possible that the best soldiers may be not men of this sort but those who are less brave but have no [20] other good; for these are ready to face danger, and they sell their life for trifling gains.

So much, then, for courage; it is not difficult to grasp its nature in outline, at any rate, from what has been said.

10 · After courage let us speak of temperance; for these seem to be the [25] excellences of the irrational parts. We have said that temperance is a mean with regard to pleasures (for it is less, and not in the same way, concerned with pains); self-indulgence also is manifested in the same sphere. Now, therefore, let us determine with what sort of pleasures they are concerned. We may assume the distinction between bodily pleasures and those of the soul, such as love of honour [30] and love of learning; for the lover of each of these delights in that of which he is a lover, the body being in no way affected, but rather the mind; but men who are concerned with such pleasures are called neither temperate nor self-indulgent. Nor, again, are those who are concerned with the other pleasures that are not bodily; for those who are fond of hearing and

telling stories and who spend their days on anything that turns up are called gossips, but not self-indulgent, nor are those who are pained at the loss of money or of friends. [1118<sup>a</sup>1]

Temperance must be concerned with bodily pleasures, but not all even of these; for those who delight in objects of vision, such as colours and shapes and painting, are called neither temperate nor self-indulgent; yet it would seem possible to delight [5] even in these either as one should or to excess or to a deficient degree.

And so too is it with objects of hearing; no one calls those who delight extravagantly in music or acting self-indulgent, nor those who do so as they ought temperate.

Nor do we apply these names to those who delight in odour, unless it be incidentally; we do not call those self-indulgent who delight in the odour of apples or [10] roses or incense, but rather those who delight in the odour of unguents or of dainty dishes; for self-indulgent people delight in these because these remind them of the objects of their appetite. And one may see even other people, when they are hungry, delighting in the smell of food; but to delight in this kind of thing is the mark of the [15] self-indulgent man; for these are objects of appetite to him.

Nor is there in animals other than man any pleasure connected with these senses except incidentally. For dogs do not delight in the scent of hares, but in the eating of them, but the scent told them the hares were there; nor does the lion delight in the lowing of the ox, but in eating it; but he perceived by the lowing that it [20] was near, and therefore appears to delight in the lowing; and similarly he does not delight because he sees 'a stag or a wild goat',<sup>26</sup> but because he is going to make a meal of it. Temperance and self-indulgence, however, are concerned with the kind of pleasures that the other animals share in, which therefore appear slavish and [25] brutish; these are touch and taste. But even of taste they appear to make little or no use; for the business of taste is the discriminating of flavours, which is done by wine-tasters and people who season dishes; but they hardly take pleasure in making these discriminations, or at least self-indulgent people do not, but in the actual [30] enjoyment, which in all cases comes through touch, both in the case of food and in that of drink and in that of sexual intercourse. This is why a certain gourmand prayed that his throat might become longer than a crane's, implying that it was the contact that he took pleasure in. Thus the sense with which self-indulgence is [1118<sup>b</sup>1] connected is the most widely shared of the senses; and self-indulgence would seem to be justly a



matter of reproach, because it attaches to us not as men but as animals. To delight in such things, then, and to love them above all others, is brutish. For even of the pleasures of touch the most liberal have been eliminated, [5] e.g. those produced in the gymnasium by rubbing and by the consequent heat; for the contact characteristic of the self-indulgent man does not affect the whole body but only certain parts.

11 · Of the appetites some seem to be common, others to be peculiar to individuals and acquired; e.g. the appetite for food is natural, since every one who is [10] without it craves for food or drink, and sometimes for both, and for love also (as Homer says) if he is young and lusty; but not every one craves for this or that kind of nourishment or love, nor for the same things. Hence such craving appears to be our very own. Yet it has of course something natural about it; for different things are pleasant to different kinds of people, and some things are more pleasant to every one [15] than chance objects. Now in the natural appetites few go wrong, and only in one direction, that of excess; for to eat or drink whatever offers itself till one is surfeited is to exceed the natural amount, since natural appetite is the replenishment of one's deficiency. Hence these people are called belly-gods, this implying that they fill [20] their belly beyond what is right. It is people of entirely slavish character that become like this. But with regard to the pleasures peculiar to individuals many people go wrong and in many ways. For while the people who are fond of so and so are so called because they delight either in the wrong things, or more than most people do, or in the wrong way, the self-indulgent exceed in all three ways; they both [25] delight in some things that they ought not to delight in (since they are hateful), and if one ought to delight in some of the things they delight in, they do so more than one ought and than most men do.

Plainly, then, excess with regard to pleasures is self-indulgence and is culpable; with regard to pains one is not, as in the case of courage, called temperate for facing [30] them or self-indulgent for not doing so, but the self-indulgent man is so called because he is pained more than he ought at not getting pleasant things (even his pain being caused by pleasure), and the temperate man is so called because he is not pained at the absence of what is pleasant and at his abstinence from it.

[1119<sup>a</sup>1] The self-indulgent man, then, craves for all pleasant things or those that are most pleasant, and is led by his appetite to choose these at the cost of everything else; hence he is pained both when he fails to get

them and when he is craving for [5] them (for appetite involves pain); but it seems absurd to be pained for the sake of pleasure. People who fall short with regard to pleasures and delight in them less than they should are hardly found; for such insensibility is not human. Even the other animals distinguish different kinds of food and enjoy some and not others; and if there is any one who finds nothing pleasant and nothing more attractive than [10] anything else, he must be something quite different from a man; this sort of person has not received a name because he hardly occurs. The temperate man occupies a middle position with regard to these objects. For he neither enjoys the things that the self-indulgent man enjoys most—but rather dislikes them—nor in general the things that he should not, nor anything of this sort to excess, nor does he feel pain or craving when they are absent, or does so only to a moderate degree, and not more [15] than he should, nor when he should not, and so on; but the things that, being pleasant, make for health or for good condition, he will desire moderately and as he should, and also other pleasant things if they are not hindrances to these ends, or contrary to what is noble, or beyond his means. For he who neglects these conditions loves such pleasures more than they are worth, but the temperate man is not that [20] sort of person, but the sort of person that right reason prescribes.

12 · Self-indulgence is more like a voluntary state than cowardice. For the former is actuated by pleasure, the latter by pain, of which the one is to be chosen and the other to be avoided; and pain upsets and destroys the nature of the person who feels it, while pleasure does nothing of the sort. Therefore self-indulgence is more voluntary. Hence also it is more a matter of reproach; for it is easier to become [25] accustomed to its objects, since there are many things of this sort in life, and the process of habituation to them is free from danger, while with terrible objects the reverse is the case. But cowardice would seem to be voluntary in a different degree from its particular manifestations; for it is itself painless, but in these we are upset by pain, so that we even throw down our arms and disgrace ourselves in other ways; [30] hence our acts are even thought to be done under compulsion. For the self-indulgent man, on the other hand, the particular acts are voluntary (for he does them with craving and desire), but the whole state is less so; for no one craves to be self-indulgent.

The name self-indulgence is applied also to childish faults; for they

bear a certain resemblance to what we have been considering. Which is called after which, [1119<sup>b</sup>1] makes no difference to our present purpose; plainly, however, the later is called after the earlier. The transference of the name seems not a bad one; for that which desires what is base and which develops quickly ought to be kept in a chastened condition,<sup>27</sup> and these characteristics belong above all to appetite and to the child, [5] since children in fact live at the beck and call of appetite, and it is in them that the desire for what is pleasant is strongest. If, then, it is not going to be obedient and subject to the ruling principle, it will go to great lengths; for in an irrational being the desire for pleasure is insatiable and tries every source of gratification, and the exercise of appetite increases its innate force, and if appetites are strong and violent they even expel the power of calculation. Hence they should be moderate and few, [10] and should in no way oppose reason—and this is what we call an obedient and chastened state—and as the child should live according to the direction of his tutor, so the appetitive element should live according to reason. Hence the appetitive element in a temperate man should harmonize with reason; for the noble is the mark [15] at which both aim, and the temperate man craves for the things he ought, as he ought, and when he ought; and this is what reason directs.

Here we conclude our account of temperance.

## BOOK IV

1 · Let us speak next of liberality. It seems to be the mean with regard to wealth; for the liberal man is praised not in respect of military matters, nor of those in respect of which the temperate man is praised, nor of judicial decisions, but with regard to the giving and taking of wealth, and especially in respect of giving. Now [25] by wealth we mean all the things whose value is measured by money. Further, prodigality and meanness are excesses and defects with regard to wealth; and meanness we always impute to those who care more than they ought for wealth, but [30] we sometimes apply the word 'prodigality' in a complex sense; for we call those men prodigals who are incontinent and spend money on self-indulgence. Hence also they are thought the poorest characters; for they combine more vices than one. Therefore the application of the word to them is not its proper use; for a 'prodigal' means a [1120<sup>a</sup>1] man who has a single evil quality, that of wasting his substance; since a prodigal is one who is being ruined by his own fault, and the wasting of substance is thought to be a sort of ruining of oneself, life being held to depend on possession of substance.

This, then, is the sense in which we take prodigality. Now the things that have [5] a use may be used either well or badly; and riches is a useful thing; and everything is used best by the man who has the excellence concerned with it; riches, therefore, will be used best by the man who has the excellence concerned with wealth; and this is the liberal man. Now spending and giving seem to be the using of wealth; taking [10] and keeping rather the possession of it. Hence it is more the mark of the liberal man to give to the right people than to take from the right sources and not to take from the wrong. For it is more characteristic of excellence to do good than to have good done to one, and more characteristic to do what is noble than not to do what is base; and it is not hard to see that giving implies doing good and doing what is noble, and [15] taking implies having good done to one or not acting basely. And gratitude is felt towards him who gives, not towards him who does not take, and praise also is bestowed more on him. It is easier, also, not to take than to give; for men are apter to give away their own too little than to take what is another's. Givers, too, are called [20] liberal; but those who do not take are not praised for liberality but rather for justice; while

those who take are hardly praised at all. And the liberal are almost the most loved of all excellent characters, since they are useful; and this depends on their giving.

Now excellent actions are noble and done for the sake of the noble. Therefore the liberal man will give for the sake of the noble, and rightly; for he will give to the [25] right people, the right amounts, and at the right time, with all the other qualifications that accompany right giving; and that too with pleasure or without pain; for that which is excellent is pleasant or free from pain—least of all will it be painful. But he who gives to the wrong people or not for the sake of the noble but for some other cause, will be called not liberal but by some other name. Nor is he liberal [30] who gives with pain; for he would prefer the wealth to the noble act, and this is not characteristic of a liberal man. But no more will the liberal man take from wrong sources; for such taking is not characteristic of the man who sets no store by wealth. Nor will he be a ready asker; for it is not characteristic of a man who confers benefits to accept them lightly. But he will take from the right sources, e.g. from his [1120<sup>b</sup>1] own possessions, not as something noble but as a necessity, that he may have something to give. Nor will he neglect his own property, since he wishes by means of this to help others. And he will refrain from giving to anybody and everybody, that he may have something to give to the right people, at the right time, and where it is [5] noble to do so. It is highly characteristic of a liberal man also to go to excess in giving, so that he leaves too little for himself; for it is the nature of a liberal man not to look to himself. The term 'liberality' is used relatively to a man's substance; for liberality resides not in the multitude of the gifts but in the state of the giver, and this is relative to the giver's substance.<sup>28</sup> There is therefore nothing to prevent the man who gives less from being the more liberal man, if he has less to give. Those are [10] thought to be more liberal who have not made their wealth but inherited it; for in the first place they have no experience of want, and secondly all men are fonder of their own productions, as are parents and poets. It is not easy for the liberal man to be rich, since he is not apt either at taking or at keeping, but at giving away, and [15] does not value wealth for its own sake but for the sake of giving. Hence comes the charge that is brought against fortune, that those who deserve riches most get it least. But it is not unreasonable that it should turn out so; for he cannot have wealth, any more than anything else, if he does not take pains to have it. Yet he will not give [20] to the wrong people nor at the wrong time, and so on; for he would no longer be acting in accordance with liberality, and if he spent on these objects he

would have nothing to spend on the right objects. For, as has been said, he is liberal who spends according to his substance and on the right objects; and he who exceeds is prodigal. Hence we do not call despots prodigal; for it is thought not easy for them to give and [25] spend beyond the amount of their possessions. Liberality, then, being a mean with regard to giving and taking of wealth, the liberal man will both give and spend the right amounts and on the right objects, alike in small things and in great, and that [30] with pleasure; he will also take the right amounts and from the right sources. For, the excellence being a mean with regard to both, he will do both as he ought; for right taking accompanies right giving, and wrong taking is contrary to it, and accordingly those that accompany each other are present together in the same man, while the contrary kinds evidently are not. But if he happens to spend in a manner [1121<sup>a</sup>1] contrary to what is right and noble, he will be pained, but moderately and as he ought; for it is the mark of excellence both to be pleased and to be pained at the right objects and in the right way. Further, the liberal man is easy to deal with in money matters; for he can be got the better of, since he sets no store by money, and is more [5] annoyed if he has not spent something that he ought than pained if he has spent something that he ought not, and does not agree with Simonides.

The prodigal errs in these respects also; for he is neither pleased nor pained at the right things or in the right way; this will be more evident as we go on. We have said that prodigality and meanness are excesses and deficiencies, and in two things, [10] in giving and in taking; for we include spending under giving. Now prodigality exceeds in giving and not taking, and falls short in taking, while meanness falls short in giving, and exceeds in taking, except in small things. [15]

The characteristics of prodigality are not often combined; for it is not easy to give to all if you take from none; private persons soon exhaust their substance with giving, and it is to these that the name of prodigals is applied—though a man of this sort would seem to be in no small degree better than a mean man. For he is easily [20] cured both by age and by poverty, and thus he may move towards the middle state. For he has the characteristics of the liberal man, since he both gives and refrains from taking, though he does neither of these in the right manner or well. Therefore if he were brought to do so by habituation or in some other way, he would be liberal; [25] for he will then give to the right people, and will not take from the wrong sources. This is why he is thought to have not a bad character; it is not the mark of a wicked or ignoble man to

go to excess in giving and not taking, but only of a foolish one. The man who is prodigal in this way is thought much better than the mean man both for the aforesaid reasons and because he benefits many while the other benefits no one, not even himself.

[30] But most prodigal people, as has been said, also take from the wrong sources, and are in this respect mean. They become apt to take because they wish to spend and cannot do this easily; for their possessions soon run short. Thus they are forced [1121<sup>b</sup>1] to provide means from some other source. At the same time, because they care nothing for honour, they take recklessly and from any source; for they have an appetite for giving, and they do not mind how or from what source. Hence also their giving is not liberal; for it is not noble, nor does it aim at nobility, nor is it done in the [5] right way; sometimes they make rich those who should be poor, and will give nothing to people of respectable character, and much to flatterers or those who provide them with some other pleasure. Hence also most of them are self-indulgent; for they spend lightly and waste money on their indulgences, and incline towards [10] pleasures because they do not live with a view to what is noble.

The prodigal man, then, turns into what we have described if he is left untutored, but if he is treated with care he will arrive at the intermediate and right state. But meanness is both incurable (for old age and every disability is thought to [15] make men mean) and more innate in men than prodigality; for most men are fonder of getting money than of giving. It also extends widely, and is multiform, since there seem to be many kinds of meanness.

For it consists in two things, deficiency in giving and excess in taking, and is [20] not found complete in all cases but is sometimes divided: some men go to excess in taking, others fall short in giving. Those who are called by such names as 'miserly', 'close', 'stingy', all fall short in giving, but do not covet the possessions of others nor wish to get them. In some this is due to a sort of honesty and avoidance of what is [25] disgraceful (for some seem, or at least profess, to hoard their money for this reason, that they may not some day be forced to do something disgraceful; to this class belong the cheeseparer and every one of the sort; he is so called from his excess of unwillingness to give anything); while others again keep their hands off the property of others from fear, on the ground that it is not easy, if one takes the property of [30] others oneself, to avoid having one's own taken by them; they are therefore content neither to take nor to give.

Others again exceed in respect of taking by taking anything and from any source, e.g. those who ply sordid trades, pimps and all such people, and those who [1122<sup>a</sup>1] lend small sums and at high rates. For all of these take more than they ought and from wrong sources. What is common to them is evidently sordid love of gain; they all put up with a bad name for the sake of gain, and little gain at that. For those who make great gains but from wrong sources, and not the right gains, e.g. despots when [5] they sack cities and spoil temples, we do not call mean but rather wicked, impious, and unjust. But the gamester and the footpad belong to the class of the mean, since they have a sordid love of gain. For it is for gain that both of them ply their craft and endure the disgrace of it, and the one faces the greatest dangers for the sake of the [10] booty, while the other makes gain from his friends, to whom he ought to be giving. Both, then, since they are willing to make gain from wrong sources, are sordid lovers of gain; therefore all such forms of taking are mean.

And it is natural that meanness is described as the contrary of liberality; for not only is it a greater evil than prodigality, but men err more often in this direction [15] than in the way of prodigality as we have described it.

So much, then, for liberality and the opposed vices.

2 · It would seem proper to discuss magnificence next. For this also seems to be an excellence concerned with wealth; but it does not like liberality extend to all [20] the actions that are concerned with wealth, but only to those that involve expenditure; and in these it surpasses liberality in scale. For, as the name itself suggests, it is a fitting expenditure involving largeness of scale. But the scale is relative; for the expense of equipping a trireme is not the same as that of heading a sacred embassy. It is what is fitting, then, in relation to the agent, and to the [25] circumstances and the object. The man who in small or middling things spends according to the merits of the case is not called magnificent (e.g. the man who can say ‘many a gift I gave the wanderer’),<sup>29</sup> but only the man who does so in great things. For the magnificent man is liberal, but the liberal man is not necessarily magnificent. The deficiency of this state is called niggardliness, the excess [30] vulgarity, lack of taste, and the like, which do not go to excess in the amount spent on right objects, but by showy expenditure in the wrong circumstances and the wrong manner; we shall speak of these vices later.



The magnificent man is like an artist; for he can see what is fitting and spend large sums tastefully. For, as we said at the beginning, a state is determined by its [1122<sup>b</sup>1] activities and by its objects. Now the expenses of the magnificent man are large and fitting. Such, therefore, are also his results; for thus there will be a great expenditure and one that is fitting to its result. Therefore the result should be worthy of the expense, and the expense should be worthy of the result, or should [5] even exceed it. And the magnificent man will spend such sums for the sake of the noble; for this is common to the excellences. And further he will do so gladly and lavishly; for nice calculation is a niggardly thing. And he will consider how the result can be made most beautiful and most becoming rather than for how much it can be produced and how it can be produced most cheaply. It is necessary, then, that [10] the magnificent man be also liberal. For the liberal man also will spend what he ought and as he ought; and it is in these matters that the greatness implied in the name of the magnificent man—his bigness, as it were—is manifested, since liberality is concerned with these matters; and at an equal expense he will produce a more magnificent result. For a possession and a result have not the same excellence. The most valuable possession is that which is worth most, e.g. gold, but the most [15] valuable result is that which is great and beautiful (for the contemplation of such a thing inspires admiration, and so does magnificence); and the excellence of a result<sup>30</sup> involves magnitude. Magnificence is an attribute of expenditures of the kind [20] which we call honourable, e.g. those connected with the gods—votive offerings, buildings, and sacrifices—and similarly with any form of religious worship, and all those that are proper objects of public-spirited ambition, as when people think they ought to equip a chorus or a trireme, or entertain the city, in a brilliant way. But in all cases, as has been said, we have regard to the agent as well and ask who he is and [25] what means he has; for the expenditure should be worthy of his means, and suit not only the result but also the producer. Hence a poor man cannot be magnificent, since he has not the means with which to spend large sums fittingly; and he who tries is a fool, since he spends beyond what can be expected of him and what is proper, but it is *right* expenditure that is excellent. But great expenditure is [30] becoming to those who have suitable means to start with, acquired by their own efforts or from ancestors or connexions, and to people of high birth or reputation, and so on; for all these things bring with them greatness and prestige. Primarily, then, the magnificent man is of this sort, and magnificence is shown in expenditures [35] of this sort, as has been said; for these are the greatest

and most honourable. Of *private* occasions of expenditure the most suitable are those that take place once for [1123<sup>a</sup>1] all, e.g. a wedding or anything of the kind, or anything that interests the whole city or the people of position in it, and also the receiving of foreign guests and the sending of them on their way, and gifts and counter-gifts; for the magnificent man [5] spends not on himself but on public objects, and gifts bear some resemblance to votive offerings. A magnificent man will also furnish his house suitably to his wealth (for even a house is a sort of public ornament), and will spend by preference on those works that are lasting (for these are the most beautiful), and on every class of things he will spend what is becoming; for the same things are not suitable for [10] gods and for men, nor in a temple and in a tomb. And since each expenditure may be great of its kind, and what is most magnificent absolutely is great expenditure on a great object, but what is magnificent *here* is what is great in *these* circumstances, and greatness in the work differs from greatness in the expense (for the most [15] beautiful ball or bottle is magnificent as a gift to a child, but the price of it is small and mean),—therefore it is characteristic of the magnificent man, whatever kind of result he is producing, to produce it magnificently (for such a result is not easily surpassed) and to make it worthy of the expenditure.

Such, then, is the magnificent man; the man who goes to excess and is vulgar [20] exceeds, as has been said, by spending beyond what is right. For on small objects of expenditure he spends much and displays a tasteless showiness; e.g. he gives a club dinner on the scale of a wedding banquet, and when he provides the chorus for a comedy he brings them on to the stage in purple, as they do at Megara. And all such [25] things he will do not for the sake of the noble but to show off his wealth, and because he thinks he is admired for these things, and where he ought to spend much he spends little and where little, much. The niggardly man on the other hand will fall short in everything, and after spending the greatest sums will spoil the beauty of the result for a trifle, and whatever he is doing he will hesitate and consider how he may spend least, and lament even that, and think he is doing everything on a bigger scale [30] than he ought.

These states, then, are vices; yet they do not bring *disgrace* because they are neither harmful to one's neighbour nor very unseemly.

3 · Pride seems even from its name to be concerned with great things; what sort of great things, is the first question we must try to

answer. It makes no difference whether we consider the state or the man characterized by it. Now the [1123<sup>b</sup>1] man is thought to be proud who thinks himself worthy of great things, being worthy of them; for he who does so beyond his deserts is a fool, but no excellent man is foolish or silly. The proud man, then, is the man we have described. For he who is worthy of little and thinks himself worthy of little is temperate, but not proud; for [5] pride implies greatness, as beauty implies a good-sized body, and little people may be neat and well-proportioned but cannot be beautiful. On the other hand, he who thinks himself worthy of great things, being unworthy of them, is vain; though not every one who thinks himself worthy of more than he really is worthy of is vain. The man who thinks himself worthy of less than he is really worthy of is unduly humble, [10] whether his deserts be great or moderate, or his deserts be small but his claims yet smaller. And the man whose deserts are great would seem *most* unduly humble; for what would he have done if they had been less? The proud man, then, is an extreme in respect of the greatness of his claims, but a mean in respect of the rightness of them; for he claims what is in accordance with his merits, while the others go to [15] excess or fall short.

If, then, he deserves and claims great things, and above all the greatest things, he will be concerned with one thing in particular. Desert is relative to external goods; and the greatest of these, we should say, is that which we render to the gods, and which people of position most aim at, and which is the prize appointed for the noblest deeds; and this is honour; that is surely the greatest of external goods. [20] Honours and dishonours, therefore, are the objects with respect to which the proud man is as he should be. And even apart from argument it is with honour that proud men appear to be concerned; for it is honour that they chiefly claim, but in accordance with their deserts. The unduly humble man falls short both in comparison with his own merits and in comparison with the proud man's claims. [25] The vain man goes to excess in comparison with his own merits, but does not exceed the proud man's claims.

Now the proud man, since he deserves most, must be good in the highest degree; for the better man always deserves more, and the best man most. Therefore the truly proud man must be good. And greatness in every excellence would seem to [30] be characteristic of a proud man. And it would be most unbecoming for a proud man to fly from danger, swinging his arms by his sides, or to wrong another; for to what end should he do disgraceful acts, he to whom nothing is great? If we consider him point by point we shall see the utter absurdity of a proud

man who is not good.

Nor, again, would he be worthy of honour if he were bad; for honour is the prize of [1124<sup>a</sup>1] excellence and it is to the good that it is rendered. Pride, then, seems to be a sort of crown of the excellences; for it makes them greater, and it is not found without them. Therefore it is hard to be truly proud; for it is impossible without nobility and [5] goodness of character. It is chiefly with honours and dishonours, then, that the proud man is concerned; and at honours that are great and conferred by good men he will be moderately pleased, thinking that he is coming by his own or even less than his own; for there can be no honour that is worthy of perfect excellence, yet he will at any rate accept it since they have nothing greater to bestow on him; but [10] honour from casual people and on trifling grounds he will utterly despise, since it is not this that he deserves, and dishonour too, since in his case it cannot be just. In the first place, then, as has been said, the proud man is concerned with honours; yet he will also bear himself with moderation towards wealth and power and all good or [15] evil fortune, whatever may befall him, and will be neither over-joyed by good fortune nor over-pained by evil. For not even about honour does he care much,<sup>31</sup> although it is the greatest thing (for power and wealth are desirable for the sake of honour—at least those who have them wish to get honour by means of them); and for him to whom even honour is a little thing the others must be so too. Hence proud [20] men are thought to be disdainful.

The goods of fortune also are thought to contribute towards pride. For men who are well-born are thought worthy of honour, and so are those who enjoy power or wealth; for they are in a superior position, and everything that has a superiority in something good is held in greater honour. Hence even such things make men prouder; for they are honoured by some for having them; but in truth the good man [25] alone is to be honoured; he, however, who has both advantages is thought the more worthy of honour. But those who without excellence have such goods are neither justified in making great claims nor entitled to the name of 'proud'; for these things imply perfect excellence. Disdainful and insolent, however, even those who have [1124<sup>b</sup>1] such goods become. For without excellence it is not easy to bear gracefully the goods of fortune; and, being unable to bear them, and thinking themselves superior to others, they despise others and themselves do what they please. They imitate the proud man without being like him, and this they do where they can; so they do not [5] act excellently, but they do despise others. For the proud man despises justly (since he thinks truly), but the

many do so at random.

He does not run into trifling dangers, nor is he fond of danger, because he honours few things; but he will face great dangers, and when he is in danger he is unsparing of his life, knowing that there are conditions on which life is not worth having. And he is the sort of man to confer benefits, but he is ashamed of receiving [10] them; for the one is the mark of a superior, the other of an inferior. And he is apt to confer greater benefits in return; for thus the original benefactor besides being paid will incur a debt to him, and will be the gainer by the transaction. They seem also to remember any service they have done, but not those they have received (for he who receives a service is inferior to him who has done it, but the proud man wishes to be superior), and to hear of the former with pleasure, of the latter with displeasure; [15] this, it seems, is why Thetis did not mention to Zeus the services she had done him, and why the Spartans did not recount their services to the Athenians, but those they had received. It is a mark of the proud man also to ask for nothing or scarcely anything, but to give help readily, and to be dignified towards people who enjoy high position and good fortune, but unassuming towards those of the middle class; for it is a difficult and lofty thing to be superior to the former, but easy to be so to [20] the latter, and a lofty bearing over the former is no mark of ill-breeding, but among humble people it is as vulgar as a display of strength against the weak. Again, it is characteristic of the proud man not to aim at the things commonly held in honour, or the things in which others excel; to be sluggish and to hold back except where great honour as a great result is at stake, and to be a man of few deeds, but of great [25] and notable ones. He must also be open in his hate and in his love (for to conceal one's feelings is a mark of timidity), and must care more for truth than for what people will think, and must speak and act openly; for he is free of speech because he is contemptuous, and he is given to telling the truth, except when he speaks in irony [30] to the vulgar. He must be unable to make his life revolve round another, unless it be a friend; for this is slavish, and for this reason all flatterers are servile and people [1125<sup>a</sup>1] lacking in self-respect are flatterers. Nor is he given to admiration; for nothing to him is great. Nor is he mindful of wrongs; for it is not the part of a proud man to have a long memory, especially for wrongs, but rather to overlook them. Nor is he a [5] gossip; for he will speak neither about himself nor about another, since he cares not to be praised nor for others to be blamed; nor again is he given to praise; and for the same reason he is not an evil-speaker, even about his enemies, except from haughtiness.

With regard to necessary or small matters he is least of all men given to lamentation or the asking of favours; for it is the part of one who takes such [10] matters seriously to behave so with respect to them. He is one who will possess beautiful and profitless things rather than profitable and useful ones; for this is more proper to a character that suffices to itself.

Further, a slow step is thought proper to the proud man, a deep voice, and a level utterance; for the man who takes few things seriously is not likely to be hurried, nor the man who thinks nothing great to be excited, while a shrill voice and [15] a rapid gait are the results of hurry and excitement.

Such, then, is the proud man; the man who falls short of him is unduly humble, and the man who goes beyond him is vain. Now these too are not thought to be bad (for they are not evil-doers), but only mistaken. For the unduly humble man, being worthy of good things, robs himself of what he deserves, and seems to have [20] something bad about him from the fact that he does not think himself worthy of good things, and seems also not to know himself; else he would have desired the things he was worthy of, since these were good. Yet such people are not thought to be fools, but rather unduly retiring. Such an estimate, however, seems actually to make them worse; for each class of people aims at what corresponds to its worth, [25] and these people stand back even from noble actions and undertakings, deeming themselves unworthy, and from external goods no less. Vain people, on the other hand, are fools and ignorant of themselves, and that manifestly; for, not being worthy of them, they attempt honourable undertakings, and then are found out; and [30] they adorn themselves with clothing and outward show and such things, and wish their strokes of good fortune to be made public, and speak about them as if they would be honoured for them. But undue humility is more opposed to pride than vanity is; for it is both commoner and worse.

Pride, then, is concerned with honour on the grand scale, as has been said.

[1125<sup>b</sup>1] 4 · There seems to be in the sphere of honour also, as was said in our first remarks on the subject, an excellence which would appear to be related to pride as liberality is to magnificence. For neither of these has anything to do with the grand [5] scale, but both dispose us as is right with regard to middling and unimportant objects; as in getting and giving of wealth there is a mean and an excess and defect, so too

honour may be desired more than is right, or less, or from the right sources and in the right way. We blame both the ambitious man as aiming at honour more [10] than is right and from wrong sources, and the unambitious man as not choosing to be honoured even for noble reasons. But sometimes we praise the ambitious man as being manly and a lover of what is noble, and the unambitious man as being moderate and temperate as we said in our first treatment of the subject. Evidently, since people are said to be fond of such and such in more than one way, we do not [15] assign the term ‘ambition’<sup>32</sup> always to the same thing, but when we praise the quality we think of the man who loves honour more than most people, and when we blame it we think of him who loves it more than is right. The mean being without a name, the extremes seem to dispute for its place as though that were vacant. But where there is excess and defect, there is also an intermediate; now men desire [20] honour both more than they should and less; therefore it is possible also to do so as one should; at all events this is the state that is praised, being an unnamed mean in respect of honour. Relatively to ambition it seems to be unambitiousness, and relatively to unambitiousness it seems to be ambition, while relatively to both it seems in a sense to be both. This appears to be true of the other excellences also. But [25] in this case the extremes seem to be opposed because the mean has not received a name.

5 · Good temper is a mean with respect to anger; the middle state being unnamed, and the extremes almost without a name as well, we place good temper in the middle position, though it inclines towards the deficiency, which is without a [30] name. The excess might be called a sort of irascibility. For the passion is anger, while its causes are many and diverse.

The man who is angry at the right things and with the right people, and, further, as he ought, when he ought, and as long as he ought, is praised. This will be the good-tempered man, then, since good temper is praised. For the good-tempered man tends to be unperturbed and not to be led by passion, but to be angry in the manner, at the things, and for the length of time, that reason dictates; but he is thought to err rather in the direction of deficiency; for the good-tempered man is [1126<sup>a</sup>1] not revengeful, but rather tends to forgive.

The deficiency, whether it is a sort of inirascibility or whatever it is, is blamed. For those who are not angry at the things they should be are thought to be fools, and so are those who are not angry in the right way,

at the right time, or with the right [5] persons; for such a man is thought not to feel things nor to be pained by them, and, since he does not get angry, he is thought unlikely to defend himself; and to endure being insulted and to put up with insults to one's friends is slavish.

The excess can be manifested in all the points (for one can be angry with the wrong persons, at the wrong things, more than is right, too quickly, or too long); yet [10] *all* are not found in the same person. Indeed they could not; for evil destroys even itself, and if it is complete becomes unbearable. Now *hot-tempered* people get angry quickly and with the wrong persons and at the wrong things and more than is right, but their anger ceases quickly—which is the best point about them. This [15] happens to them because they do not restrain their anger but retaliate openly owing to their quickness of temper, and then their anger ceases. By reason of excess *choleric* people are quick-tempered and ready to be angry with everything and on every occasion; whence their name. *Sulky* people are hard to appease, and retain their anger long; for they repress their passion. But it ceases when they retaliate; for [20] revenge relieves them of their anger, producing in them pleasure instead of pain. If this does not happen they retain their burden; for owing to its not being obvious no one even reasons with them, and to digest one's anger in oneself takes time.<sup>33</sup> Such people are most troublesome to themselves and to their dearest friends. We call [25] *bad-tempered* those who are angry at the wrong things, more than is right, and longer, and cannot be appeased until they inflict vengeance or punishment.

To good temper we oppose the excess rather than the defect; for not only is it commoner (since revenge is the more human), but bad-tempered people are worse [30] to live with.

What we have said before is plain also from what is said; for it is not easy to define how, with whom, at what, and how long one should be angry, and at what point right action ceases and wrong begins. For the man who strays a little from the [35] path, either towards the more or towards the less, is not blamed; since sometimes we praise those who exhibit the deficiency, and call them good-tempered, and [1126<sup>b</sup>1] sometimes we call angry people manly, as being capable of ruling. How far, therefore, and how a man must stray before he becomes blameworthy, it is not easy to determine by reason; for the decision depends on the particular facts and on perception. But so much at least is plain, that the middle state is praiseworthy—that [5] in virtue of which we are angry with the right people, at the right things, in the right way, and so on, while the excesses and defects are blameworthy—slightly so if



they are present in a low degree, more if in a higher degree, and very much if in a high degree. Evidently, then, we must cling to the middle state.—Enough of the states relative to anger. [10]

6 · In gatherings of men, in social life and the interchange of words and deeds, some men are thought to be obsequious, viz. those who to give pleasure praise everything and never oppose, but think they should give no pain to the people they [15] meet; while those who, on the contrary, oppose everything and care not a whit about giving pain are called churlish and contentious. That the states we have named are culpable is plain enough, and that the middle state is laudable—that in virtue of which a man will put up with, and will resent, the right things and in the right way; [20] but no name has been assigned to it, though it most resembles friendship. For the man who corresponds to this middle state is very much what, with affection added, we call a good friend. But the state in question differs from friendship in that it implies no passion or affection for one's associates; since it is not by reason of loving or hating that such a man takes everything in the right way, but by being a man of a [25] certain kind. For he will behave so alike towards those he knows and those he does not know, towards intimates and those who are not so, except that in each of these cases too he will behave as is befitting; for it is not proper to have the same care for intimates and for strangers, nor again to pain them in the same ways. Now we have said generally that he will associate with people in the right way; but it is by reference to what is noble and expedient that he will aim at either<sup>34</sup> giving pain or at [30] contributing pleasure. For he seems to be concerned with the pleasures and pains of social life; and wherever it is not noble, or is harmful, for him to contribute pleasure, he will refuse, and will choose rather to give pain; also if his acquiescence in another's action would bring disgrace, and that in a high degree, or injury, on the [35] agent, while his opposition brings a little pain, he will not acquiesce but will decline. He will associate differently with people in high station and with ordinary people, [1127<sup>a</sup>1] with closer and more distant acquaintances, and so too with regard to all other differences, rendering to each class what is befitting, and while for its own sake he chooses to contribute pleasure, and avoids the giving of pain, he will be guided by [5] the consequences, if these are greater, i.e. the noble and the expedient. For the sake of a great future pleasure, too, he will inflict small pains.

The man who attains the mean, then, is such as we have described,

but has not received a name; of those who contribute pleasure, the man who aims at being pleasant with no ulterior object is obsequious, but the man who does so in order that he may get some advantage in the direction of money or the things that money buys [10] is a flatterer; while the man who quarrels with everything is, as has been said, churlish and contentious. And the extremes seem to be opposed to each other because the mean is without a name.

7 · The mean for boastfulness<sup>35</sup> is found in almost the same sphere; and this also is without a name. It will be no bad plan to describe these states as well; for we [15] shall both know the facts about character better if we go through them in detail, and we shall be convinced that the excellences are means if we see this to be so in all cases. In the field of social life those who make the giving of pleasure or pain their object in associating with others have been described; let us now describe those who pursue truth or falsehood alike in words and deeds and in the claims they put [20] forward. The boastful man, then, is thought to be apt to claim the things that bring repute, when he has not got them, or to claim more of them than he has, and the mock-modest man on the other hand to disclaim what he has or belittle it, while the man who observes the mean is one who calls a thing by its own name, being truthful both in life and in word, owning to what he has, and neither more nor less. Now each [25] of these courses may be adopted either with or without an object. But each man speaks and acts and lives in accordance with his character, if he is *not* acting for some object. And falsehood is in itself mean and culpable, and truth noble and worthy of praise. Thus the truthful man is another case of a man who, being in the [30] mean, is worthy of praise, and both forms of untruthful man are culpable, and particularly the boastful man.

Let us discuss them both, but first of all the truthful man. We are not speaking of the man who keeps faith in his agreements, i.e. in the things that pertain to justice or injustice (for this would belong to another excellence), but the man who in the [1127<sup>b</sup>1] matters in which nothing of this sort is at stake is true both in word and in life because his character is such. But such a man would seem to be as a matter of fact equitable. For the man who loves truth, and is truthful where nothing is at stake, will still more be truthful where something is at stake; he will avoid falsehood as [5] something base, seeing that he avoided it even for its own sake; and such a man is worthy of praise. He inclines rather to

understate the truth; for this seems in better taste because exaggerations are wearisome.

He who claims more than he has with no ulterior object is a contemptible sort [10] of fellow (otherwise he would not delight in falsehood), but seems futile rather than bad; but if he does it for an object, he who does it for the sake of reputation or honour is (for a boaster<sup>36</sup>) not very much to be blamed, but he who does it for money, or the things that lead to money, is an uglier character (it is not the capacity that makes the boaster, but the choice; for it is in virtue of his state and by being a man of a certain kind that he is a boaster); as one man is a liar because he enjoys the [15] lie itself, and another because he desires reputation or gain. Now those who boast for the sake of reputation claim such qualities as win praise or congratulation, but those whose object is gain claim qualities which are of value to one's neighbours and one's lack of which is not easily detected, e.g. the powers of a seer, a sage, or a [20] physician. For this reason it is such things as these that most people claim and boast about; for in them the above-mentioned qualities are found.

Mock-modest people, who understate things, seem more attractive in character; for they are thought to speak not for gain but to avoid parade; and here too it is qualities which bring reputation that they disclaim, as Socrates used to do. Those [25] who disclaim trifling and obvious qualities are called humbugs and are more contemptible; and sometimes this seems to be boastfulness, like the Spartan dress; for both excess and great deficiency are boastful. But those who use understatement with moderation and understate about matters that do not very much force [30] themselves on our notice seem attractive. And it is the boaster that seems to be opposed to the truthful man; for he is the worse character.

8 · Since life includes rest as well, and in this is included leisure and amusement, there seems here also to be a kind of intercourse which is tasteful; there [1128<sup>a1</sup>] is such a thing as saying—and again listening to—what one should and as one should. The kind of people one is speaking or listening to will also make a difference. Evidently here also there is both an excess and a deficiency as compared with the [5] mean. Those who carry humour to excess are thought to be vulgar buffoons, striving after humour at all costs, and aiming rather at raising a laugh than at saying what is becoming and at avoiding pain to the object of their fun; while those who can neither make a joke themselves nor put up with those who do are thought to be [10] boorish and unpolished. But those

who joke in a tasteful way are called ready-witted, which implies a sort of readiness to turn this way and that; for such sallies are thought to be movements of the character, and as bodies are discriminated by their movements, so too are characters. The ridiculous side of things is not far to seek, however, and most people delight more than they should in amusement and in [15] jesting, and so even buffoons are called ready-witted because they are found attractive; but that they differ from the ready-witted man, and to no small extent, is clear from what has been said.

To the middle state belongs also tact; it is the mark of a tactful man to say and listen to such things as befit a good and well-bred man; for there are some things [20] that it befits such a man to say and to hear by way of jest, and the well-bred man's jesting differs from that of a vulgar man, and the joking of an educated man from that of an uneducated. One may see this even from the old and the new comedies; to the authors of the former indecency of language was amusing, to those of the latter innuendo is more so; and these differ in no small degree in respect of propriety. Now [25] should we define the man who jokes well by his saying what is not unbecoming to a well-bred man, or by his not giving pain, or even giving delight, to the hearer? Or is the latter, at any rate, itself indefinite, since different things are hateful or pleasant to different people? The kind of jokes he will listen to will be the same; for the kind he can put up with are also the kind he seems to make. There are, then, jokes he will [30] not make; for the jest is a sort of abuse, and there are things that lawgivers forbid us to abuse; and they should, perhaps, have forbidden us even to make a jest of such. The refined and well-bred man, therefore, will be as we have described, being as it were a law to himself.

Such, then, is the man who observes the mean, whether he be called tactful or ready-witted. The buffoon, on the other hand, is the slave of his sense of humour, and spares neither himself nor others if he can raise a laugh, and says things none of [1128<sup>b</sup>1] which a man of refinement would say, and to some of which he would not even listen. The boor, again, is useless for such social intercourse; for he contributes nothing and finds fault with everything. But relaxation and amusement are thought to be a necessary element in life.

The means in life that have been described, then, are three in number, and are all concerned with an interchange of words and deeds of some kind. They differ, [5] however, in that one is concerned with truth, and the other two with pleasantness. Of those concerned with pleasure, one is displayed in jests, the other in the general social intercourse of life.

9 · Shame should not be described as an excellence; for it is more like a [10] passion than a state. It is defined, at any rate, as a kind of fear of disrepute and produces an effect similar to that<sup>37</sup> produced by fear of danger; for people who feel disgraced blush, and those who fear death turn pale. Both, therefore, seem to be in a sense bodily conditions, which is thought to be characteristic of passion rather than [15] of a state.

The passion is not becoming to every age, but only to youth. For we think young people should be prone to shame because they live by passion and therefore commit many errors, but are restrained by shame; and we praise young people who are prone to this passion, but an older person no one would praise for being prone to [20] the sense of disgrace, since we think he should not do anything that need cause this sense. For the sense of disgrace is not even characteristic of a good man, since it is consequent on bad actions (for such actions should not be done; and if some actions are disgraceful in very truth and others only according to common opinion, this makes no difference; for neither class of actions should be done, so that no disgrace should be felt); and it is a mark of a bad man even to be such as to do any disgraceful [25] action. To be so constituted as to feel disgraced if one does such an action, and for this reason to think oneself good, is absurd; for it is for voluntary actions that shame is felt, and the good man will never voluntarily do bad actions. But shame may be said to be conditionally a good thing; *if* a good man did such actions, he would feel [30] disgraced; but the excellences are not subject to such a qualification. And if shamelessness—not to be ashamed of doing base actions—is bad, that does not make it good to be ashamed of doing such actions. Continnence too is not virtue, but a mixed sort of state; this will be shown later. Now, however, let us discuss justice. [35]

## BOOK V

1 · With regard to justice and injustice we must consider what kind of actions they are concerned with, what sort of mean justice is, and between what extremes the just act is intermediate. Our investigation shall follow the same course [5] as the preceding discussions.

We see that all men mean by justice that kind of state which makes people disposed to do what is just and makes them act justly and wish for what is just; and [10] similarly by injustice that state which makes them act unjustly and wish for what is unjust. Let us too, then, first lay this down as a rough sketch. For the same is not true of the sciences and the faculties as of states. For it seems that the same faculty or science deals with contraries; but a state of character which is one of two contraries does *not* produce the contrary results; e.g. as a result of health we do not [15] do what is the opposite of healthy, but only what is healthy; for we say a man walks healthily, when he walks as a healthy man would.

Now often one contrary state is recognized from its contrary, and often states are recognized from the subjects that exhibit them; for if good condition is known, [20] bad condition also becomes known, and good condition is known from the things that are in good condition, and they from it. If good condition is firmness of flesh, it is necessary both that bad condition should be flabbiness of flesh and that the wholesome should be that which causes firmness in flesh. And it follows for the most [25] part that if one contrary is ambiguous the other also will be ambiguous; e.g. if 'just' is so, that 'unjust' will be so too.

Now 'justice' and 'injustice' seem to be ambiguous, but because the homonymy is close, it escapes notice and is not obvious as it is, comparatively, when the meanings are far apart, e.g. (for here the difference in outward form is great) as the [30] homonymy in the use of *kleis* for the collar-bone of an animal and for that with which we lock a door. Let us then ascertain the different ways in which a man may be said to be unjust. Both the lawless man and the grasping and unequal man are thought to be unjust, so that evidently both the law-abiding and the equal man will [1129b1] be just. The just, then, is the lawful and the equal, the unjust the unlawful and the unequal.

Since the unjust man is grasping, he must be concerned with goods—not all goods, but those with which prosperity and adversity have to do,

which taken absolutely are always good, but for a particular person are not always good. (Men [5] pray for and pursue the same<sup>38</sup> things; but they should not, but should pray that the things that are good absolutely may also be good for them, and should choose the things that are good for them.) The unjust man does not always choose the greater, but also the less—in the case of things bad absolutely; but because the lesser evil is itself thought to be in a sense good, and graspingness is directed at the good, [10] therefore he is thought to be grasping. And he is unequal; for this contains and is common to both.

Since the lawless man was seen to be unjust and the law-abiding man just, evidently all lawful acts are in a sense just acts; for the acts laid down by the legislative art are lawful, and each of these, we say, is just. Now the laws in their [15] enactments on all subjects aim at the common advantage either of all or of the best or of those who hold power, or something of the sort; so that in one sense we call those acts just that tend to produce and preserve happiness and its components for the political society. And the law bids us do both the acts of a brave man (e.g. not to [20] desert our post or take to flight or throw away our arms), and those of a temperate man (e.g. not to commit adultery or outrage), and those of a good-tempered man (e.g. not to strike another or speak evil), and similarly with regard to the other excellences and forms of wickedness, commanding some acts and forbidding others and the rightly-framed law does this rightly, and the hastily conceived one less [25] well.

This form of justice, then is complete excellence—not absolutely, but in relation to others. And therefore justice is often thought to be the greatest of excellences and ‘neither evening nor morning star’ is so wonderful; and proverbially ‘in justice is every excellence comprehended’. And it is complete excellence in its [30] fullest sense, because it is the actual exercise of complete excellence. It is complete because he who possesses it can exercise his excellence towards others too and not merely by himself; for many men can exercise excellence in their own affairs, but not in their relations to excellence. This is why the saying of Bias is thought to be [1130a1] true, that ‘rule will show the man’; for a ruler is necessarily in relation to other men and a member of a society. For this same reason justice, alone of the excellences, is thought to be another’s good, because it is related to others; for it does what is advantageous to another, either a ruler or a partner. Now the worst man is he who [5] exercises his wickedness both towards himself and towards his friends, and the best man is not he who exercises his excellence towards himself but he<sup>39</sup> who exercises it towards another; for this is a difficult task.

Justice in this sense, then, is not part of excellence but excellence entire, nor is the contrary injustice a part of vice but vice [10] entire. What the difference is between excellence and justice in this sense is plain from what we have said; they are the same but being them is not the same; what, as a relation to others, is justice is, as a certain kind of state without qualification, excellence.

2 · But at all events what we are investigating is the justice which is a *part* of excellence; for there is a justice of this kind, as we maintain. Similarly it is with [15] injustice in the particular sense that we are concerned.

That there is such a thing is indicated by the fact that while the man who exhibits in action for the other forms of wickedness acts unjustly but not graspingly (e.g. the man who throws away his shield through cowardice or speaks harshly through bad temper or fails to help a friend with money through meanness), when a man acts graspingly he often exhibits none of these vices,—no, nor all together, but [20] certainly wickedness of some kind (for we blame him) and injustice. There is, then, another kind of injustice which is a part of injustice in the wide sense, and something unjust which answers to a part of what is unjust in the wide sense of contrary to the law. Again, if one man commits adultery for the sake of gain and makes money by it, while another does so at the bidding of appetite though he loses [25] money and is penalized for it, the latter would be held to be self-indulgent rather than grasping while the former is unjust, but not self-indulgent; evidently, therefore, he is unjust by reason of his making gain by his act. Again, all other unjust acts are ascribed invariably to some particular kind of wickedness, e.g. adultery to self-indulgence, the desertion of a comrade in battle to cowardice, [30] physical violence to anger; but if a man makes gain, his action is ascribed to no form of wickedness but injustice. Evidently, therefore, there is apart from injustice in the wide sense another, particular, injustice which shares the name and nature of the [1130<sup>b</sup>1] first, because its definition falls within the same genus; for the force of both lies in a relation to others but the one is concerned with honour or money or safety—or that which includes all these, if we had a single name for it—and its motive is the pleasure that arises from gain; while the other is concerned with all the objects with [5] which the good man is concerned.

It is clear, then, that there is more than one kind of justice, and that



there is one which is distinct from excellence entire; we must try to grasp what and what sort of thing it is.

The unjust has been divided into the unlawful and the unequal, and the just [10] into the lawful and the equal. To the unlawful answers the afore-mentioned sort of injustice. But since the unequal and the unlawful are not the same, but are different as a part is from its whole (for all that is unequal is unlawful, but not all that is unlawful is unequal), the unjust and injustice are not the same as but different from the former kind, as part from whole; for injustice in this sense is a part of injustice in [15] the wide sense, and similarly justice in the one sense of justice in the other. Therefore we must speak also about particular justice and particular injustice, and similarly about the just and the unjust. The justice, then, which answers to the whole of excellence and the corresponding injustice, one being the exercise of [20] excellence as a whole, and the other that of vice as a whole towards others, we may leave on one side. And how the just and the unjust which answer to these are to be distinguished is evident; for practically the majority of the acts commanded by the law are those which are prescribed from the point of view of excellence taken as a whole; for the law bids us practise every excellence and forbids us to practise any [25] vice. And the things that tend to produce excellence taken as a whole are those of the acts prescribed by the law which have been prescribed with a view to education for the common good. But with regard to the education of the individual as such, which makes him without qualification a good man, we must determine later whether this is the function of the political art or of another; for perhaps it is not the same in every case to be a good man and a good citizen.

[30] Of particular justice and that which is just in the corresponding sense, one kind is that which is manifested in distributions of honour or money or the other things that fall to be divided among those who have a share in the constitution (for in these it is possible for one man to have a share either unequal or equal to that of another), [1131<sup>a</sup>1] and another kind is that which plays a rectifying part in transactions. Of this there are two divisions; of transactions some are voluntary and others involuntary—voluntary such transactions as sale, purchase, usury, pledging, lending, depositing, [5] letting (they are called voluntary because the origin of these transactions is voluntary), while of the involuntary some are clandestine, such as theft, adultery, poisoning, procuring, enticement of slaves, assassination, false witness, and others are violent, such as assault, imprisonment, murder, robbery with violence, mutilation, abuse, insult.

3 · Since the unjust man is unequal and the unjust act unequal, it is clear [10] that there is also an intermediate for the unequal. And this is the equal; for in any kind of action in which there is a more and a less there is also what is equal. If, then, the unjust be unequal, the just is equal, as all men suppose it to be, even apart from argument. And since the equal is intermediate, the just will be an intermediate. Now equality implies at least two things. The just, then, must be both intermediate [15] and equal and relative (i.e. for certain persons). And *qua* intermediate it must be between certain things (which are respectively greater and less); *qua* equal, it involves *two* things; *qua* just, it is for certain people. The just, therefore, involves at least four terms; for the persons for whom it is in fact just are two, and the things in which it is manifested, the objects, are two. And the same equality will exist [20] between the persons and between the things concerned; for as the latter—the things concerned—are related, so are the former; if they are not equal, they will not have what is equal, but this is the origin of quarrels and complaints—when either equals have and are awarded unequal shares, or unequals equal shares. Further, this is plain from the fact that awards should be according to merit; for all men agree that what is just in distribution must be according to merit in some sense, though they do [25] not all specify the same sort of merit, but democrats identify it with the status of freeman, supporters of oligarchy with wealth (or with noble birth), and supporters of aristocracy with excellence.

The just, then, is a species of the proportionate (proportion being not a property only of the kind of number which consists of abstract units, but of number [30] in general). For proportion is equality of ratios, and involves four terms at least (that discrete proportion involves four terms is plain, but so does continuous proportion, for it uses one term as two and mentions it twice; e.g. as the line A is to [1131<sup>b</sup>1] the line B, so is the line B to the line C; the line B, then, has been mentioned twice, so that if the line B be assumed twice, the proportional terms will be four); and the just, too, involves at least four terms, and the ratio is the same—for there is a similar distinction between the persons and between the things. As the term A, then, is to B, [5] so will C be to D, and therefore, *alternando*, as A is to C, B will be to D. Therefore also the whole is in the same ratio to the whole; and this coupling the distribution effects, and, if the terms are so combined, effects justly. The conjunction, then, of the term A with C and of B with D is what is just in distribution, and this species of [10] the just is intermediate, and the unjust is what violates the proportion; for the proportional is intermediate, and the just is proportional.

(Mathematicians call this kind of proportion geometrical; for it is in geometrical proportion that it follows that the whole is to the whole as either part is to the corresponding part.) This proportion is not continuous; for we cannot get a single term standing for a person and a [15] thing.

This, then, is what the just is—the proportional; the unjust is what violates the proportion. Hence one term becomes too great, the other too small, as indeed happens in practice; for the man who acts unjustly has too much, and the man who [20] is unjustly treated too little, of what is good. In the case of evil the reverse is true; for the lesser evil is reckoned a good in comparison with the greater evil, since the lesser evil is rather to be chosen than the greater, and what is worthy of choice is good, and what is worthier of choice a greater good.

This, then, is one species of the just.

[25] **4** · The remaining one is the rectificatory, which arises in connexion with transactions both voluntary and involuntary. This form of the just has a different specific character from the former. For the justice which distributes common possessions is always in accordance with the kind of proportion mentioned above (for in the case also in which the distribution is made from common funds it will be [30] according to the same ratio which the funds put into the business bear to one another); and the injustice opposed to this kind of justice is that which violates the proportion. But the justice in transactions is a sort of equality indeed, and the [1132<sup>a</sup>1] injustice a sort of inequality; not according to that kind of proportion, however, but according to arithmetical proportion. For it makes no difference whether a good man has defrauded a bad man or a bad man a good one, nor whether it is a good or a bad man that has committed adultery; the law looks only to the distinctive [5] character of the injury, and treats the parties as equal, if one is in the wrong and the other is being wronged, and if one inflicted injury and the other has received it. Therefore, this kind of injustice being an inequality, the judge tries to equalize it; for in the case also in which one has received and the other has inflicted a wound, or one has slain and the other been slain, the suffering and the action have been unequally distributed; but the judge tries to equalize things by means of the penalty, [10] taking away from the gain of the assailant. For the term ‘gain’ is applied generally to such cases, even if it be not a term appropriate to certain cases, e.g. to the person who inflicts a wound—and ‘loss’ to the sufferer; at all events when

the suffering has been estimated, the one is called loss and the other gain. Therefore the equal is [15] intermediate between the greater and the less, but the gain and the loss are respectively greater and less in contrary ways; more of the good and less of the evil are gain, and the contrary is loss; intermediate between them is, as we saw, the equal, which we say is just; therefore corrective justice will be the intermediate between loss and gain. This is why, when people dispute, they take refuge in the [20] judge; and to go to the judge is to go to justice; for the nature of the judge is to be a sort of animate justice; and they seek the judge as an intermediate, and in some states they call judges mediators, on the assumption that if they get what is intermediate they will get what is just. The just, then, is an intermediate, since the [25] judge is so. Now the judge restores equality; it is as though there were a line divided into unequal parts, and he took away that by which the greater segment exceeds the half, and added it to the smaller segment. And when the whole has been equally divided, then they say they have their own—i.e. when they have got what is equal. It is for this reason also that it is called just ( $\delta\iota\kappa\alpha\iota\omicron\nu$ ), because it is a division into two [30] parts ( $\delta\iota\chi\alpha$ ), just as if one were to call it  $\delta\iota\chi\alpha\iota\omicron\nu$ ; and the judge ( $\delta\iota\kappa\alpha\sigma\tau\eta\varsigma$ ) is one who bisects ( $\delta\iota\chi\alpha\sigma\tau\eta\varsigma$ ). The equal is intermediate between the greater and the lesser according to arithmetical proportion.<sup>40</sup> For when something is subtracted from one of two equals and added to the other, the other is in excess by these two; since if what was taken from the one had not been added to the other, the latter would have been in excess by one only. It therefore exceeds the intermediate by one, and the [1132<sup>b</sup>1] intermediate exceeds by one that from which something was taken. By this, then, we shall recognize both what we must subtract from that which has more, and what we must add to that which has less; we must add to the latter that by which the intermediate exceeds it, and subtract from the greatest that by which it exceeds the [5] intermediate. Let the lines AA, BB, CC be equal to one another; from the line AA let the segment AE have been subtracted, and to the line CC let the segment CD have been added, so that the whole line DCC exceeds the line EA by the segment CD and the segment CF; therefore it exceeds the line BB [And this is true of the other arts also; for they would have been destroyed if what the patient suffered had [10] not been just what the agent did, and of the same amount and kind.]<sup>41</sup> by the segment CD. These names, both loss and gain, have come from voluntary exchange; for to have more than one's own is called gaining, and to have less than one's original share is called losing, e.g. in buying and selling and in all other matters in [15] which the law has left

people free to make their own terms; but when they get neither more nor less but just what belongs to themselves, they say that they have their own and that they neither lose nor gain.

Therefore the just is intermediate between a sort of gain and a sort of loss, viz. those which are involuntary; it consists in having an equal amount before and after [20] the transaction.

5 · Some think that *reciprocity* is without qualification just, as the Pythagoreans said; for they defined justice without qualification as reciprocity. Now reciprocity fits neither distributive nor rectificatory justice—yet people *want* even the justice of Rhadamanthus to mean this: [25]

Should a man suffer what he did, right justice would be done

—for in many cases they are not in accord; e.g. if an official has inflicted a wound, he should not be wounded in return, and if someone has wounded an official, he ought not to be wounded only but punished in addition. Further, there is a great [30] difference between a voluntary and an involuntary act. But in associations for exchange this sort of justice does hold men together—reciprocity in accordance with a proportion and not on the basis of equality. For it is by proportionate requital that the city holds together. Men seek to return either evil for evil—and if they [1133<sup>a1</sup>] cannot do so, think their position mere slavery—or good for good—and if they cannot do so there is no exchange, but it is by exchange that they hold together. This is why they give a prominent place to the temple of the Graces—to promote the requital of services; for this is characteristic of grace—we should serve in return one [5] who has shown grace to us, and should another time take the initiative in showing it.

Now proportionate return is secured by cross-conjunction. Let A be a builder, B a shoemaker, C a house, D a shoe. The builder, then, must get from the [10] shoemaker the latter's work, and must himself give him in return his own. If, then, first there is proportionate equality of goods, and then reciprocal action takes place, the result we mention will be effected. If not, the bargain is not equal, and does not hold; for there is nothing to prevent the work of the one being better than that of the other; they must therefore be equated. (And this is true of the other arts also; for [15] they would have been destroyed if what the patient suffered had not been just what the agent did, and of the same amount and kind.) For it is not two

doctors that associate for exchange, but a doctor and a farmer, or in general people who are different and unequal; but these must be equated. This is why all things that are exchanged must be somehow commensurable. It is for this end that money has been [20] introduced, and it becomes in a sense an intermediate; for it measures all things, and therefore the excess and the defect—how many shoes are equal to a house or to a given amount of food. The number of shoes exchanged for a house [or for a given amount of food]<sup>42</sup> must therefore correspond to the ratio of builder to shoemaker. For if this be not so, there will be no exchange and no intercourse. And this [25] proportion will not be effected unless the goods are somehow equal. All goods must therefore be measured by some one thing, as we said before. Now this unit is in truth demand, which holds all things together (for if men did not need one another's goods at all, or did not need them equally, there would be either no exchange or not the same exchange); but money has become by convention a sort of representative [30] of demand; and this is why it has the name 'money' (νόμισμα)—because it exists not by nature but by law (νόμος) and it is in our power to change it and make it useless. There will, then, be reciprocity when the terms have been equated so that as farmer is to shoemaker, the amount of the shoemaker's work is to that of the farmer's work. [1133<sup>b</sup>1] But we must not bring them into a figure of proportion when they have already exchanged (otherwise one extreme will have both excesses), but when they still have their own goods. Thus they are equals and associates just because this equality can [5] be effected in their case. Let A be a farmer, C food, B a shoemaker, D his product equated to C. If it had not been possible for reciprocity to be thus effected, there would have been no association of the parties. That demand holds things together as a single unit is shown by the fact that when men do not need one another, i.e. when neither needs the other or one does not need the other, they do not exchange, as we do when some one wants what one has oneself, e.g. when people permit the exportation of corn in exchange for wine. This equation therefore must be [10] established. And for the future exchange—that if we do not need a thing now we shall have it if ever we do need it—money is as it were our surety; for it must be possible for us to get what we want by bringing the money. Now the same thing happens to money itself as to goods—it is not always worth the same; yet it tends to be steadier. This is why all goods must have a price set on them; for then there will always be exchange, and if so, association. Money, then, acting as a measure, makes [15] goods commensurate and equates them; for neither would there have

been association if there were not exchange, nor exchange if there were not equality, nor equality if there were not commensurability. Now in truth it is impossible that things differing so much should become commensurate, but with reference to demand they may become so sufficiently. There must, then, be a unit, and that fixed [20] by agreement (for which reason it is called money); for it is this that makes all things commensurate, since all things are measured by money. Let A be a house, B ten minae, C a bed. A is half of B, if the house is worth five minae or equal to them; the bed, C, is a tenth of B; it is plain, then, how many beds are equal to a house, viz. [25] five. That exchange took place thus because there was money is plain; for it makes no difference whether it is five beds that exchange for a house, or the money value of five beds.

We have now defined the unjust and the just. These having been marked off from each other, it is plain that just action is intermediate between acting unjustly [30] and being justly treated; for the one is to have too much and the other to have too little. Justice is a kind of mean, but not in the same way as the other excellences, but because it relates to an intermediate amount, while injustice relates to the extremes. And justice is that in virtue of which the just man is said to be a doer, by choice, of [1134<sup>a</sup>1] that which is just, and one who will distribute either between himself and another or between two others not so as to give more of what is desirable to himself and less to his neighbour (and conversely with what is harmful), but so as to give what is equal [5] in accordance with proportion; and similarly in distributing between two other persons. Injustice on the other hand is similarly related to the unjust, which is excess and defect, contrary to proportion, of the useful or hurtful. For which reason injustice is excess and defect, viz. because it is productive of excess and defect—in one's own case excess of what is in its own nature useful and defect of what is [10] hurtful, while in the case of others it is as a whole like what it is in one's own case, but proportion may be violated in either direction. In the unjust act to have too little is to be unjustly treated; to have too much is to act unjustly.

Let this be taken as our account of the nature of justice and injustice, and [15] similarly of the just and the unjust in general.

6 · Since acting unjustly does not necessarily imply being unjust, we must ask what sort of unjust acts imply that the doer is unjust with respect to each type of injustice, e.g. a thief, an adulterer, or a brigand. Surely the answer does not turn on the difference between these types.

For a man might even lie with a woman knowing [20] who she was, but the origin of this act might be not choice but passion. He acts unjustly, then, but is not unjust; e.g. a man is not a thief, yet he stole, nor an adulterer, yet he committed adultery; and similarly in all other cases.

Now we have previously stated how the reciprocal is related to the just; but we [25] must not forget that what we are looking for is not only what is just without qualification but also political justice. This is found among men who share their life with a view to self-sufficiency, men who are free and either proportionately or arithmetically equal, so that between those who do not fulfil this condition there is no political justice but justice in a special sense and by analogy. For justice exists [30] only between men whose mutual relations are governed by law; and law exists for men between whom there is injustice; for legal justice is the discrimination of the just and the unjust. And between men between whom there is injustice there is also unjust action (though there is not injustice between all between whom there is unjust action), and this is assigning too much to oneself of things good in themselves and too little of things evil in themselves. This is why we do not allow a *man* to rule, [1134<sup>b</sup>1] but law,<sup>43</sup> because a man behaves thus in his own interests and becomes a tyrant. The magistrate on the other hand is the guardian of justice, and, if of justice, then of equality also. And since he is assumed to have no more than his share, if he is just (for he does not assign to himself more or what is good in itself, unless such a share is proportional to his merits—so that it is for others that he labours, and it is for this [5] reason that men, as we stated previously, say that justice is another's good), therefore a reward must be given him, and this is honour, and privilege; but those for whom such things are not enough become tyrants.

The justice of a master and that of a father are not the same as this, though they are like it; for there can be no injustice in the unqualified sense towards things [10] that are one's own, but a man's chattel, and his child until it reaches a certain age and sets up for itself, are as it were part of himself, and no one chooses to hurt himself (for which reason there can be no injustice towards oneself). Therefore the justice or injustice of citizens is not manifested in these relations; for it was as we saw according to law, and between people naturally subject to law, and these as we [15] saw are people who have an equal share in ruling and being ruled. Hence justice can more truly be manifested towards a wife than towards children and chattels, for the former is household justice; but even this is different from political justice.



7 · Of political justice part is natural, part legal,—natural, that which everywhere has the same force and does not exist by people's thinking this or that; legal, that which is originally indifferent, but when it has been laid down is not [20] indifferent, e.g. that a prisoner's ransom shall be a mina, or that a goat and not two sheep shall be sacrificed, and again all the laws that are passed for particular cases, e.g. that sacrifice shall be made in honour of Brasidas, and the provisions of decrees. Now some think that all justice is of this sort, because that which is by nature is unchangeable and has everywhere the same force (as fire burns both here and in [25] Persia), while they see change in the things recognized as just. This, however, is not true in this unqualified way, but is true in a sense; or rather, with the gods it is perhaps not true at all, while with us there is something that is just even by nature, yet all of it is changeable; but still some is by nature, some not by nature. It is [30] evident which sort of thing, among things capable of being otherwise, is by nature, and which is not but is legal and conventional, assuming that both are equally changeable. And in all other things the same distinction will apply; by nature the right hand is stronger, yet it is possible that all men should come to be ambidextrous. The things which are just by virtue of convention and expediency are [1135<sup>a</sup>1] like measures; for wine and corn measures are not everywhere equal, but larger in wholesale and smaller in retail markets. Similarly, the things which are just not by nature but by human enactment are not everywhere the same, since constitutions also are not the same, though there is but one which is everywhere by nature the [5] best.

Of things just and lawful each is related as the universal to its particulars; for the things that are done are many, but of *them* each is one, since it is universal.

There is a difference between the act of injustice and what is unjust, and between the act of justice and what is just; for a thing is unjust by nature or by enactment; and this very thing, when it has been done, is an act of injustice, but [10] before it is done is not yet this but is unjust. So, too, with an act of justice (though the general term is rather 'just action', and 'act of justice' is applied to the correction of the act of injustice).

Each of these must later be examined separately with regard to the nature and number of its species and the nature of the things with which it is concerned. [15]

8 · Acts just and unjust being as we have described them, a man acts

unjustly or justly whenever he does such acts voluntarily; when involuntarily, he acts neither unjustly nor justly except in an incidental way; for he does things which happen to be just or unjust. Whether an act is or is not one of injustice (or of justice) is determined by its voluntariness or involuntariness; for when it is voluntary it is [20] blamed, and at the same time is then an act of injustice; so that there will be things that are unjust but not yet acts of injustice, if voluntariness be not present as well. By the voluntary I mean, as has been said before, any of the things in a man's own power which he does with knowledge, i.e. not in ignorance either of the person acted on or of the instrument used or of the end that will be attained (e.g. whom he is [25] striking, with what, and to what end), each such act being done not incidentally nor under compulsion (e.g. if you take my hand and strike someone else with it, I do not act voluntarily; for the act was not in my power). The person struck may be the striker's father, and the striker may know that it is a man or one of the persons [30] present, but not know that it is his father; a similar distinction may be made in the case of the end, and with regard to the whole action. Therefore that which is done in ignorance, or though not done in ignorance is not in the agent's power, or is done under compulsion, is involuntary (for many natural processes, even, we knowingly [1135<sup>b</sup>1] both perform and experience, none of which is either voluntary or involuntary; e.g. growing old or dying). But in the case of unjust and just acts alike the injustice or justice may be only incidental; for a man might return a deposit unwillingly and [5] from fear, and then he must not be said either to do what is just or to act justly, except in an incidental way. Similarly the man who under compulsion and unwillingly fails to return the deposit must be said to act unjustly, and to do what is unjust, only incidentally. Of voluntary acts we do some by choice, others not by [10] choice; by choice those which we do after deliberation, not by choice those which we do without previous deliberation. Thus there are three kinds of injury in transactions; those done in ignorance are *mistakes* when the person acted on, the act, the instrument, or the end is other than the agent supposed; the agent thought either that he was not hitting any one or that he was not hitting with this missile or not hitting this person or to this end, but a result followed other than that which he [15] thought likely (e.g. he threw not with intent to wound but only to prick), or the person hit or the missile was other than he supposed. Now when the injury takes place contrary to reasonable expectation, it is a *misadventure*. When it is not contrary to reasonable expectation but does not imply vice, it is a *mistake* (for a man makes a mistake when the

ignorance<sup>44</sup> originates in him, but is the victim of accident when its origin lies outside him). When he acts with knowledge but not [20] after deliberation, it is an *act of injustice*—e.g. the acts due to anger or to other passions necessary or natural to man; for when men do such harmful and mistaken acts they act unjustly, and the acts are acts of injustice, but this does not imply that the doers are unjust or wicked; for the injury is not due to vice. But when a man acts [25] from choice, he is an *unjust man* and a vicious man.

Hence acts proceeding from anger are rightly judged not to be done of malice aforethought; for it is not the man who acts in anger but he who enraged him that starts the mischief. Again, the matter in dispute is not whether the thing happened or not, but its justice; for it is apparent injustice that occasions anger. For they do [30] not dispute about the occurrence of the act—as in commercial transactions where one of the two parties *must* be vicious—unless they do so owing to forgetfulness; but, agreeing about the fact, they dispute on which side justice lies (whereas a man who has deliberately injured another cannot help knowing that he has done so), so that the one thinks he is being treated unjustly and the other disagrees.

But if a man harms another by choice, he acts unjustly; and *these* are the acts [1136<sup>a</sup>1] of injustice which imply that the doer is an unjust man, provided that the act violates proportion or equality. Similarly, a man is *just* when he acts justly by choice; but he *acts justly* if he merely acts voluntarily.

Of involuntary acts some are forgivable, others not. For the mistakes which [5] men make not only in ignorance but also from ignorance are forgivable, while those which men do not from ignorance but (though they do them *in* ignorance) owing to a passion which is neither natural nor such as man is liable to, are not forgivable.

9 · Assuming that we have sufficiently defined the suffering and doing of [10] injustice, it may be asked whether there is any truth in Euripides' paradoxical words:

‘I slew my mother, that’s my tale in brief.’

‘Were you both willing, or unwilling both?’

Is it truly possible to be voluntarily treated unjustly, or is all suffering of injustice [15] involuntary, as all unjust action is voluntary? And is all suffering of injustice of the latter kind or else all of the former, or is it

sometimes voluntary, sometimes involuntary? So, too, with the case of being justly treated; all just action is voluntary, so that it is reasonable that there should be a similar opposition in either case—that both being unjustly and being justly treated should be either alike [20] voluntary or alike involuntary. But it would be thought paradoxical even in the case of being justly treated, if it were always voluntary; for some are non-voluntarily treated justly. One might raise this question also, whether every one who has suffered what is unjust is being unjustly treated, or on the other hand it is with suffering as with acting. In both it is possible to partake of justice incidentally, and [25] similarly (it is plain) of injustice; for to do what is unjust is not the same as to act unjustly, nor to suffer what is unjust as to be treated unjustly, and similarly in the case of acting justly and being justly treated; for it is impossible to be unjustly treated if the other does not act unjustly, or justly treated unless he acts justly. Now [30] if to act unjustly is simply to harm some one voluntarily, and ‘voluntarily’ means ‘knowing the person acted on, the instrument, and the manner of one’s acting’, and the incontinent man voluntarily harms himself, not only will he voluntarily be unjustly treated but it will be possible to treat oneself unjustly. (This also is one of [1136<sup>b</sup>1] the questions in doubt, whether a man can treat himself unjustly.) Again, a man may voluntarily, owing to incontinence, be harmed by another who acts voluntarily, so that it would be possible to be voluntarily treated unjustly. Or is our definition incorrect; must we to ‘harming another, with knowledge both of the person acted on, of the instrument, and of the manner’ add ‘contrary to the wish of the person acted on’? Then a man may be voluntarily harmed and voluntarily suffer what is unjust, [5] but no one is voluntarily treated unjustly; for no one wishes to be unjustly treated, not even the incontinent man. He acts contrary to his wish; for no one *wishes* for what he does not think to be good, but the incontinent man does *do* things that he does not think he ought to do. Again, one who gives what is his own, as Homer says [10] Glaucus gave Diomedes

Armour of gold for brazen, the price of a hundred beeves for nine,<sup>45</sup>

is not unjustly treated; for though to give is in his power, to be unjustly treated is not, but there must be some one to treat him unjustly. It is plain, then, that being unjustly treated is not voluntary.

[15] Of the questions we intended to discuss two still remain for discussion: whether it is the man who has assigned to another more than his deserts that acts unjustly, or he who has the excessive share, and whether it is possible to treat oneself unjustly. The questions are

connected; for if the former alternative is possible and the distributor acts unjustly and not the man who has the excessive share, then if a man assigns more to another than to himself, knowingly and voluntarily, he treats [20] himself unjustly; which is what modest people seem to do, since the virtuous man tends to take less than his share. Or does this statement too need qualification? For he perhaps gets more than his share of some other good, e.g. of honour or of intrinsic nobility. Again, the question is solved by applying the distinction we applied to unjust action; for he suffers nothing contrary to his own wish, so that he is not [25] unjustly treated as far as this goes, but at most only suffers harm.

It is plain too that the distributor acts unjustly, but not always the man who has the excessive share; for it is not he to whom what is unjust appertains that acts unjustly, but he to whom it appertains to do the unjust act voluntarily, i.e. the person in whom lies the origin of the action, and this lies in the distributor not in the receiver. Again, since things are said to do things in different senses, and there is a [30] sense in which lifeless things, or a hand, or a servant who obeys an order, may be said to slay, he who gets an excessive share does not act unjustly; though he does what is unjust.

Again, if the distributor gave his judgment in ignorance, he does not act unjustly in respect of legal justice, and his judgment is not unjust in this sense, but in a sense it is unjust (for legal justice and primary justice are different); but if with [1137<sup>a</sup>1] knowledge he judged unjustly, he is himself aiming at an excessive share either of gratitude or of revenge. As much, then, as if he were to share in the unjust act, the man who has judged unjustly for these reasons has got too much; for, assigning the land on that condition, he received not land but money.

[5] Men think that acting unjustly is in their power, and therefore that being just is easy. But it is not; to lie with one's neighbour's wife, to wound another, to deliver a bribe, is easy and in our power, but to do these things as a result of a certain state of character is neither easy nor in our power. Similarly to know what is just and what [10] is unjust requires, men think, no great wisdom, because it is not hard to understand the matters dealt with by the laws (though these are not the things that are just, except incidentally); but how actions must be done and distributions effected in order to be just, to know *this* is a greater achievement than knowing what is good for the health; though even there, while it is easy to know that honey, wine, hellebore, cautery, and the use of the knife are so, to know how, to whom, and when there [15] should be applied with a view to producing health, is no less an

achievement than that of being a physician. Again, for this very reason men think that acting unjustly is characteristic of the just man no less than of the unjust, because he would be not less but even more capable of doing each of these acts; for he could lie with a woman or wound a neighbour; and the brave man could throw away his shield and turn to [20] flight in this direction or in that. But to play the coward or to act unjustly consists not in doing these things, except incidentally, but in doing them as the result of a certain state of character, just as to practise medicine and to heal consists not in applying or not applying the knife, in using or not using medicines, but in doing so in [25] a certain way.

Just acts occur between people who participate in things good in themselves and can have too much or too little of them; for some beings (e.g. presumably the gods) cannot have too much of them, and to others, those who are incurably bad, not even the smallest share in them is beneficial but all such goods are harmful, while to others they are beneficial up to a point; therefore justice is essentially something [30] human.

10 · Our next subject is equity and the equitable, and their respective relations to justice and the just. For on examination they appear to be neither absolutely the same nor generically different; and while we sometimes praise what is equitable and the equitable man (so that we apply the name by way of praise even to instances of the other virtues, instead of ‘good’, meaning by ‘more equitable’<sup>46</sup> [1137<sup>b</sup>1] that a thing is better), at other times, when we reason it out, it seems strange if the equitable, being something different from the just, is yet praiseworthy; for either the just or the equitable is not good,<sup>47</sup> if they are different; or, if both are good, they [5] are the same.

These, then, are pretty much the considerations that give rise to the problem about the equitable; they are all in a sense correct and not opposed to one another; for the equitable, though it is better than one kind of justice, yet is just, and it is not as being a different class of thing that it is better than the just. The same thing, then, is just and equitable, and while both are good the equitable is superior. What [10] creates the problem is that the equitable is just, but not the legally just but a correction of legal justice. The reason is that all law is universal but about some things it is not possible to make a universal statement which will be correct. In those cases, then, in which it is necessary to speak universally, but not possible to do so [15] correctly, the law takes the usual case,

though it is not ignorant of the possibility of error. And it is none the less correct; for the error is not in the law nor in the legislator but in the nature of the thing, since the matter of practical affairs is of this [20] kind from the start. When the law speaks universally, then, and a case arises on it which is not covered by the universal statement, then it is right, when the legislator fails us and has erred by over-simplicity, to correct the omission—to say what the legislator himself would have said had he been present, and would have put into his law if he had known. Hence the equitable is just, and better than one kind of [25] justice—not better than absolute justice but better than the error that arises from the absoluteness of the statement. And this is the nature of the equitable, a correction of law where it is defective owing to its universality. In fact this is the reason why all things are not determined by law, viz. that about some things it is impossible to lay down a law, so that a decree is needed. For when the thing is [30] indefinite the rule also is indefinite, like the lead rule used in making the Lesbian moulding; the rule adapts itself to the shape of the stone and is not rigid, and so too the decree is adapted to the facts.

It is plain, then, what the equitable is, and that it is just and is better than one kind of justice. It is evident also from this who the equitable man is; the man who chooses and does such acts, and is no stickler for justice in a bad sense but tends to [1138<sup>a</sup>1] take less than his share though he has the law on his side, is equitable, and this state is equity, which is a sort of justice, and not a different state.

**11** · Whether a man can treat himself unjustly or not, is evident from what [5] has been said. For one class of just acts are those acts in accordance with any excellence which are prescribed by the law; e.g. the law does not command a man to kill himself, and what it does not command it forbids. Again, when a man in violation of the law harms another (otherwise than in retaliation) voluntarily, he acts unjustly, and a voluntary agent is one who knows both the person he is affecting and the instrument; and he who through anger voluntarily stabs himself does this [10] contrary to right reason, and this the law does not allow; therefore he is acting unjustly. But towards whom? Surely towards the state, not towards himself. For he suffers voluntarily, but no one is voluntarily treated unjustly. This is also the reason why the state punishes; a certain loss of civil rights attaches to the man who destroys himself, on the ground that he is treating the state unjustly.

Further, in the sense in which the man who acts unjustly is unjust only and not [15] bad all round, it is not possible to treat oneself unjustly (this is different from the former sense; the unjust man in one sense of the term is wicked in a particularized way just as the coward is, not in the sense of being wicked all round, so that his unjust act does not manifest wickedness in general). For that would imply the possibility of the same thing's having been subtracted from and added to the same [20] thing at the same time; but this is impossible—the just and the unjust always involve more than one person. Further, unjust action is voluntary and done by choice, and is prior (for the man who because he has suffered does the same in return is not thought to act unjustly); but if a man harms himself he suffers and does the same things *at the same time*. Further, a man could be voluntarily treated unjustly. Besides, no one acts unjustly without committing particular acts of injustice; but no one can commit adultery with his own wife or housebreaking on his [25] own house or theft on his own property.

In general, the question 'can a man treat himself unjustly?' is solved also by the distinction we applied to the question 'can a man be voluntarily treated unjustly?'

(It is evident too that both are bad, being unjustly treated and acting unjustly; for the one means having less and the other having more than the intermediate [30] amount, which plays the part here that the healthy does in the medical art, and that good condition does in the art of bodily training. But still acting unjustly is the worse, for it involves vice and is blameworthy—involves vice which is either of the complete and unqualified kind or almost so (for not all voluntary unjust action implies injustice), while being unjustly treated does not involve vice and injustice. In itself, then, being unjustly treated is less bad, but there is nothing to prevent its being incidentally a greater evil. But theory cares nothing for this; it calls pleurisy a [1138<sup>b1</sup>] more serious mischief than a stumble; yet the latter may become incidentally the more serious, if the fall due to it leads to your being taken prisoner or put to death by [5] the enemy.)

Metaphorically and in virtue of a certain resemblance there is a justice, not indeed between a man and himself, but between certain parts of him; yet not every kind of justice but that of master and servant or that of husband and wife. For these are the ratios in which the part of the soul that has reason stands to the irrational part; and it is with a view to these parts that people also think a man can be unjust to [10] himself, viz. because these parts are liable to suffer something contrary to their



desires; there is therefore thought to be a mutual justice between them as between ruler and ruled.

Let this be taken as our account of justice and the other, i.e. the moral, excellences.

## BOOK VI

1 · Since we have previously said that one ought to choose that which is intermediate, not the excess nor the defect, and that the intermediate is determined by the dictates of reason, let us discuss this. In all the states we have mentioned, as [20] in all other matters, there is a mark to which the man who possesses reason looks, and heightens or relaxes his activity accordingly, and there is a standard which determines the mean states which we say are intermediate between excess and defect, being in accordance with right reason. But such a statement, though true, is [25] by no means illuminating; for in all other pursuits which are objects of knowledge it is indeed true to say that we must not exert ourselves nor relax our efforts too much nor too little, but to an intermediate extent and as right reason dictates; but if a man [30] had only this knowledge he would be none the wiser—e.g. we should not know what sort of medicines to apply to our body if some one were to say ‘all those which the medical art prescribes, and which agree with the practice of one who possesses the art’. Hence it is necessary with regard to the states of the soul also not only that this true statement should be made, but also that it should be determined what right reason is and what is the standard that fixes it.

We divided the excellences of the soul and said that some are excellences of [1139<sup>a</sup>1] character and others of intellect. Now we have discussed the moral excellences; with regard to the others let us express our view as follows, beginning with some remarks about the soul. We said before that there are two parts of the soul—that which possesses reason and that which is irrational; let us now draw a similar [5] distinction within the part which possesses reason. And let it be assumed that there are two parts which possess reason—one by which we contemplate the kind of things whose principles cannot be otherwise, and one by which we contemplate variable things; for where objects differ in kind the part of the soul answering to [10] each of the two is different in kind, since it is in virtue of a certain likeness and kinship with their objects that they have the knowledge they have. Let one of these parts be called the scientific and the other the calculative; for to deliberate and to calculate are the same thing, but no one deliberates about what cannot be [15] otherwise. Therefore the calculative is one part of the faculty which

possesses reason. We must, then, learn what is the best state of each of these two parts; for this is the excellence of each.

2 · The excellence of a thing is relative to its proper function. Now there are three things in the soul which control action and truth—sensation, thought, desire.

Of these sensation originates no action; this is plain from the fact that beasts [20] have sensation but no share in action.

What affirmation and negation are in thinking, pursuit and avoidance are in desire; so that since moral excellence is a state concerned with choice, and choice is deliberate desire, therefore both the reasoning must be true and the desire right, if [25] the choice is to be good, and the latter must pursue just what the former asserts. Now this kind of intellect and of truth is practical; of the intellect which is contemplative, not practical nor productive, the good and the bad state are truth and falsity (for this is the function of everything intellectual); while of the part [30] which is practical and intellectual the good state is truth in agreement with right desire.

The origin of action—its efficient, not its final cause—is choice, and that of choice is desire and reasoning with a view to an end. This is why choice cannot exist either without thought and intellect or without a moral state; for good action and its [35] opposite cannot exist without a combination of intellect and character. Intellect itself, however, moves nothing, but only the intellect which aims at an end and is [1139<sup>b</sup>1] practical; for this rules the productive intellect as well, since every one who makes makes for an end, and that which is made is not an end in the unqualified sense (but only relative to something, i.e. of something)—only that which is *done* is that; for good action is an end, and desire aims at this. Hence choice is either desiderative thought or intellectual desire, and such an origin of action is a man. (Nothing that is [5] past is an object of choice, e.g. no one chooses to have sacked Troy; for no one *deliberates* about the past, but about what is future and contingent, while what is past is not capable of not having taken place; hence Agathon is right in saying

For this alone is lacking even to God, [10]

To make undone things that have once been done.)

The function of both the intellectual parts, then, is truth. Therefore the states that are most strictly those in respect of which each of these parts will reach truth are the excellences of the two parts.

3 · Let us begin, then, from the beginning, and discuss these states once more. Let it be assumed that the states by virtue of which the soul possesses truth by [15] way of affirmation or denial are five in number, i.e. art, knowledge, practical wisdom, philosophic wisdom, comprehension; for belief and opinion may be mistaken.

Now what *knowledge* is, if we are to speak exactly and not follow mere similarities, is plain from what follows. We all suppose that what we know is not [20] capable of being otherwise; of things capable of being otherwise we do not know, when they have passed outside our observation, whether they exist or not. Therefore the object of knowledge is of necessity. Therefore it is eternal; for things that are of necessity in the unqualified sense are all eternal; and things that are eternal are ungenerated and imperishable. Again, every science is thought to be capable of [25] being taught, and its object of being learned. And all teaching starts from what is already known, as we maintain in the *Analytics*<sup>50</sup> also; for it proceeds sometimes through induction and sometimes by deduction. Now induction is of first principles<sup>51</sup> and of the universal and deduction proceeds *from* universals. There are therefore principles from which deduction proceeds, which are not reached by [30] deduction; it is therefore by induction that they are acquired. Knowledge, then, is a state of capacity to demonstrate, and has the other limiting characteristics which we specify in the *Analytics*; for it is when a man believes in a certain way and the principles are known to him that he has knowledge, since if they are not better known to him than the conclusion, he will have his knowledge only incidentally. [35]

Let this, then, be taken as our account of knowledge.

4 · Among things that can be otherwise are included both things made and [1140a1] things done; making and acting are different (for their nature we treat even the discussions outside our school as reliable); so that the reasoned state of capacity to act is different from the reasoned state of capacity to make. Nor<sup>52</sup> are they included [5] one in the other; for neither is acting making nor is making acting. Now since building is an art and is essentially a reasoned state of capacity to make, and there is neither any art that is not such a state nor any such state that is not an art, *art* is [10] identical with a state of capacity to make, involving a true course of reasoning. All art is concerned with coming into being, i.e. with contriving and considering how something may come into being which is capable of either being or not being, and whose origin is in the maker and

not in the thing made; for art is concerned neither with things that are, or come into being, by necessity, nor with things that do so in [15] accordance with nature (since these have their origin in themselves). Making and acting being different, art must be a matter of making, not of acting. And in a sense chance and art are concerned with the same objects; as Agathon says, 'art loves [20] chance and chance loves art'. Art, then, as has been said, is a state concerned with making, involving a true course of reasoning, and lack of art on the contrary is a state concerned with making, involving a false course of reasoning; both are concerned with what can be otherwise.

5 · Regarding *practical wisdom* we shall get at the truth by considering who [25] are the persons we credit with it. Now it is thought to be a mark of a man of practical wisdom to be able to deliberate well about what is good and expedient for himself, not in some particular respect, e.g. about what sorts of thing conduce to health or to strength, but about what sorts of thing conduce to the good life in general. This is shown by the fact that we credit men with practical wisdom in some particular respect when they have calculated well with a view to some good end [30] which is one of those that are not the object of any art. Thus in general the man who is capable of deliberating has practical wisdom. Now no one deliberates about things that cannot be otherwise nor about things that it is impossible for him to do. Therefore, since knowledge involves demonstration, but there is no demonstration of things whose first principles can be otherwise (for all such things might actually [1140<sup>b</sup>1] be otherwise), and since it is impossible to deliberate about things that are of necessity, practical wisdom cannot be knowledge nor art; not knowledge because that which can be done is capable of being otherwise, not art because action and making are different kinds of thing. It remains, then, that it is a true and reasoned [5] state of capacity to act with regard to the things that are good or bad for man. For while making has an end other than itself, action cannot; for good action itself is its end. It is for this reason that we think Pericles and men like him have practical wisdom, viz. because they can see what is good for themselves and what is good for [10] men in general; we consider that those can do this who are good at managing households or states. (This is why we call temperance by this name; we imply that it preserves one's practical wisdom.<sup>53</sup> Now what it preserves is a belief of the kind we have described. For it is not any and every belief that pleasant and painful objects destroy and pervert, e.g. the belief that the triangle has or has not

its angles equal to [15] two right angles, but only beliefs about what is to be done. For the principles of the things that are done consist in that for the sake of which they are to be done; but the man who has been ruined by pleasure or pain forthwith fails to see any such principle—to see that for the sake of this or because of this he ought to choose and do whatever he chooses and does; for vice is destructive of the principle.)

Practical wisdom, then, must be a reasoned and true state of capacity to act [20] with regard to human goods. But further, while there is such a thing as excellence in art, there is no such thing as excellence in practical wisdom; and in art he who errs willingly is preferable, but in practical wisdom, as in the excellences he is the reverse. Plainly, then, practical wisdom is an excellence and not an art. There being [25] two parts of the soul that possess reason, it must be the excellence of one of the two, i.e. of that part which forms opinions; for opinion is about what can be otherwise, and so is practical wisdom. But yet it is not only a reasoned state; this is shown by the fact that a state of that sort may be forgotten but practical wisdom cannot. [30]

6 · Knowledge is belief about things that are universal and necessary, and there are principles of everything that is demonstrated and of all knowledge (for knowledge involves reasoning). This being so, the first principle of what is known cannot be an object of knowledge, of art, or of practical wisdom; for that which can be known can be demonstrated, and art and practical wisdom deal with things that [1141<sup>a</sup>1] can be otherwise. Nor are these first principles the objects of wisdom, for it is a mark of the wise man to have *demonstration* about some things. If, then, the states by which we have truth and are never deceived about things that cannot—or can—be otherwise are knowledge, practical wisdom, philosophic wisdom, and [5] comprehension, and it cannot be any of the three (i.e. practical wisdom, scientific knowledge, or philosophic wisdom), the remaining alternative is that it is comprehension that grasps the first principles.

7 · *Wisdom* in the arts we ascribe to their most finished exponents, e.g. to Phidias as a sculptor and to Polyclitus as a maker of statues, and here we mean [10] nothing by wisdom except excellence in art; but we think that some people are wise in general, not in some particular field or in any other limited respect, as Homer says in the *Margites*,

Him did the gods make neither a digger nor yet a ploughman [15]

Nor wise in anything else.

Therefore wisdom must plainly be the most finished of the forms of knowledge. It follows that the wise man must not only know what follows from the first principles, but must also possess truth about the first principles. Therefore wisdom must be comprehension combined with knowledge—knowledge of the highest objects which has received as it were its proper completion.

For it would be strange to think that the art of politics, or practical wisdom, is [20] the best knowledge, since man is not the best thing in the world. Now if what is healthy or good is different for men and for fishes, but what is white or straight is always the same, any one would say that what is wise is the same but what is practically wise is different; for it is to that which observes well the various matters [25] concerning itself that one ascribes practical wisdom, and it is to this that one will entrust such matters. This is why we say that some even of the lower animals have practical wisdom, viz. those which are found to have a power of foresight with regard to their own life. It is evident also that wisdom and the art of politics cannot [30] be the same; for if the state of mind concerned with a man's own interests is to be called wisdom, there will be many wisdoms; there will not be one concerned with the good of all animals (any more than there is one art of medicine for all existing things), but a different wisdom about the good of each species.

But if the argument be that man is the best of the animals, this makes no difference; for there are other things much more divine in their nature even than [1141<sup>b</sup>1] man, e.g., most conspicuously, the bodies of which the heavens are framed. From what has been said it is plain, then, that wisdom is knowledge, combined with comprehension, of the things that are highest by nature. This is why we say Anaxagoras, Thales, and men like them have wisdom but not practical wisdom, [5] when we see them ignorant of what is to their own advantage, and why we say that they know things that are remarkable, admirable, difficult, and divine, but useless; viz. because it is not human goods that they seek.

Practical wisdom on the other hand is concerned with things human and things about which it is possible to deliberate; for we say this is above all the work of the [10] man of practical wisdom, to deliberate well, but no one deliberates about things that cannot be otherwise, nor about things which have not an end, and that a good that can be brought about by action. The man who is without qualification good at deliberating is the man who is capable of aiming in accordance with



calculation at the best for man of things attainable by action. Nor is practical wisdom concerned [15] with universals only—it must also recognize the particulars; for it is practical, and practice is concerned with particulars. This is why some who do not know, and especially those who have experience, are more practical than others who know; for if a man knew that light meats are digestible and wholesome, but did not know which sorts of meat are light, he would not produce health, but the man who knows [20] that chicken is wholesome is more likely to produce health.

Now practical wisdom is concerned with action; therefore one should have both forms of it, or the latter in preference to the former. Here, too, there must be a controlling kind.

8 · Political wisdom and practical wisdom are the same state of mind, but to be them is not the same. Of the wisdom concerned with the city, the practical [25] wisdom which plays a controlling part is legislative wisdom, while that which is related to this as particulars to their universal is known by the general name ‘political wisdom’; this has to do with action and deliberation, for a decree is a thing to be carried out in the form of an individual act. This is why the exponents of this art are alone said to take part in politics; for these alone do things as manual labourers do things.

[30] Practical wisdom also is identified especially with that form of it which is concerned with a man himself—with the individual; and this is known by the general name ‘practical wisdom’; of the other kinds one is called household management, another legislation, the third politics, and of the last one part is called deliberative and the other judicial. Now knowing what is good for oneself will be one kind of knowledge, but is very different from the other kinds; and the man who knows and concerns himself with his own interests is thought to have practical [1142<sup>a</sup>1] wisdom, while politicians are thought to be busybodies; hence the words of Euripides,

But how could I be wise, who might at ease,  
Numbered among the army’s multitude,  
Have had an equal share? . . . [5]  
For those who aim too high and do too much. . . .

Those who think thus seek their own good, and consider that one ought to do so. From this opinion, then, has come the view that such men have

practical wisdom; yet perhaps one's own good cannot exist without household management, nor without a form of government. Further, how one should order one's own affairs is [10] not clear and needs inquiry.

What has been said is confirmed by the fact that while young men become geometricians and mathematicians and wise in matters like these, it is thought that a young man of practical wisdom cannot be found. The cause is that such wisdom is concerned not only with universals but with particulars, which become familiar from experience, but a young man has no experience, for it is length of time that [15] gives experience; indeed one might ask this question too, why a boy may become a mathematician, but not a wise man or a natural scientist. Is it because the objects of mathematics exist by abstraction, while the first principles of these other subjects come from experience, and because young men have no conviction about the latter but merely use the proper language, while the essence of mathematical objects is [20] plain enough to them?

Further, error in deliberation may be either about the universal or about the particular; we may fail to know either that all water that weighs heavy is bad, or that this particular water weighs heavy.

That practical wisdom is not knowledge is evident; for it is, as has been said, concerned with the ultimate particular fact, since the thing to be done is of this nature. It is opposed, then, to comprehension; for comprehension is of the [25] definitions, for which no reason can be given, while practical wisdom is concerned with the ultimate particular, which is the object not of knowledge but of perception—not the perception of qualities peculiar to one sense but a perception akin to that by which we perceive that the particular figure before us is a triangle; for in that direction too there will be a limit. But this is rather perception than practical wisdom, though it is another kind of perception. [30]

9 · There is a difference between inquiry and deliberation; for deliberation is a particular kind of inquiry. We must grasp the nature of excellence in deliberation as well—whether it is a form of knowledge, or opinion, or skill in conjecture, or some other kind of thing. It is not *knowledge*; for men do not inquire about the [1142<sup>b</sup>1] things they know about, but good deliberation is a kind of deliberation, and he who deliberates inquires and calculates. Nor is it *skill in conjecture*; for this both involves no reasoning and is something that is quick in its operation, while men deliberate a long time, and they say that one should carry out quickly the [5] conclusions of one's deliberation, but should deliberate

slowly. Again, *readiness of mind* is different from excellence in deliberation; it is a sort of skill in conjecture. Nor again is excellence in deliberation *opinion* of any sort. But since the man who deliberates badly makes a mistake, while he who deliberates well does so correctly, excellence in deliberation is clearly a kind of correctness, but neither of knowledge [10] nor of opinion; for there is no such thing as correctness of knowledge (since there is no such thing as error of knowledge), and correctness of opinion is truth; and at the same time everything that is an object of opinion is already determined. But again excellence in deliberation involves reasoning. The remaining alternative, then, is that it is *correctness of thinking*; for this is not yet assertion, since, while opinion is not inquiry but already assertion, the man who is deliberating, whether he does so [15] well or ill, is searching for something and calculating.

But excellence in deliberation is a certain correctness of deliberation; hence we must first inquire what deliberation is and what it is about. And, there being more than one kind of correctness, plainly excellence in deliberation is not any and every kind; for the incontinent man and the bad man will reach as a result of his calculation what he sets himself to do,<sup>54</sup> so that he will have deliberated correctly, [20] but he will have got for himself a great evil. Now to have deliberated well is thought to be a good thing; for it is this kind of correctness of deliberation that is excellence in deliberation, viz. that which tends to attain what is good. But it is possible to attain even good by a false deduction and to attain what one ought to do but not by the right means, the middle term being false; so that this too is not yet excellence in [25] deliberation—this state in virtue of which one attains what one ought but not by the right means. Again it is possible to attain it by long deliberation while another man attains it quickly. Therefore in the former case we have not yet got excellence in deliberation, which is rightness with regard to the expedient—rightness in respect both of the conclusion, the manner, and the time. Further it is possible to have deliberated well either in the unqualified sense or with reference to a particular end. [30] Excellence in deliberation in the unqualified sense, then, is that which succeeds with reference to what is the end in the unqualified sense, and excellence in deliberation in a particular sense is that which succeeds relatively to a particular end. If, then, it is characteristic of men of practical wisdom to have deliberated well, excellence in deliberation will be correctness with regard to what conduces to the end of which practical wisdom is the true apprehension.

10 · Understanding, also, and goodness of understanding, in virtue of which [1143<sup>a</sup>1] men are said to be men of understanding or of good understanding, are neither entirely the same as opinion or knowledge (for at that rate all men would have been men of understanding), nor are they one of the particular sciences, such as medicine, the science of things connected with health, or geometry, the science of spatial magnitudes. For understanding is neither about things that are always and are unchangeable, nor about any and every one of the things that come into being, [5] but about things which may become subjects of questioning and deliberation. Hence it is about the same objects as practical wisdom; but understanding and practical wisdom are not the same. For practical wisdom issues commands, since its end is what ought to be done or not to be done; but understanding only judges. (Understanding is identical with goodness of understanding, men of understanding [10] with men of good understanding.) Now understanding is neither the having nor the acquiring of practical wisdom; but as learning is called understanding when it means the exercise of the faculty of knowledge, so ‘understanding’ is applicable to the exercise of the faculty of opinion for the purpose of judging of what some one else says about matters with which practical wisdom is concerned—and of judging [15] soundly; for ‘well’ and ‘soundly’ are the same thing. And from this has come the use of the name ‘understanding’ in virtue of which men are said to be of good understanding, viz. from the application of the word to learning; for we often call learning understanding.

11 · What is called judgement, in virtue of which men are said to be forgiving<sup>55</sup> and to have judgement, is the right discrimination of the equitable. This [20] is shown by the fact that we say the equitable man is above all others a man of forgiveness and identify equity with forgiveness about certain facts. And forgiveness is judgement which discriminates what is equitable and does so correctly; and correct judgement is that which judges what is true.

Now all the states we have considered converge, as might be expected, on the [25] same point; for when we speak of judgement and understanding and practical wisdom and comprehension we credit the same people with possessing judgement and comprehension and with having practical wisdom and understanding. For all these faculties deal with ultimates, i.e. with particulars; and being a man of understanding and of good judgement or of forgiveness consists in being able to [30]

judge about the things with which practical wisdom is concerned; for the equities are common to all good men in relation to other men. Now all things which have to be done are included among particulars or ultimates; for not only must the man of practical wisdom know particular facts, but understanding and judgement are also concerned with things to be done, and these are ultimates. And comprehension is [35] concerned with the ultimates in both directions; for both the primary definitions and the ultimates are objects of comprehension and not of argument, and in [1143<sup>b</sup>1] demonstrations comprehension grasps the unchangeable and primary definitions, while in practical reasonings it grasps the last and contingent fact, i.e. the second proposition. For these are the starting-points of that for the sake of which, since the [5] universals are reached from the particulars; of these therefore we must have perception, and this is comprehension.

This is why these states are thought to be natural endowments—why, while no one is thought to be wise by nature, people are thought to have by nature judgement, understanding, and comprehension. This is shown by the fact that we think our powers correspond to our time of life, and that a particular age brings with it comprehension and judgement; this implies that nature is the cause. [Hence [10] comprehension is both beginning and end; for demonstrations are from these and about these.]<sup>56</sup> Therefore we ought to attend to the undemonstrated sayings and opinions of experienced and older people or of people of practical wisdom not less than to demonstrations; for because experience has given them an eye they see aright.

[15] We have stated, then, what practical wisdom and wisdom are, and with what each of them is concerned, and we have said that each is the excellence of a different part of the soul.

12 · Difficulties might be raised as to the utility of these qualities of mind. For wisdom will contemplate none of the things that will make a man happy (for it [20] is not concerned with any coming into being), and though practical wisdom has *this* merit, for what purpose do we need it? Practical wisdom is the quality of mind concerned with things just and noble and good for man, but these are the things which it is the mark of a *good* man to do, and we are none the more able to act for [25] *knowing* them if the excellences are states, just as we are none the better able to act for knowing the things that are healthy and sound, in the sense not of producing but of issuing from the state of health; for we are none the

more able to act for having the art of medicine or of gymnastics. But if we are to say that it is useful<sup>57</sup> not for the sake of this but for the sake of becoming good, practical wisdom will be of no use to [30] those who *are* good; but again it is of no use to those who are not;<sup>58</sup> for it will make no difference whether they have practical wisdom themselves or obey others who have it, and it would be enough for us to do what we do in the case of health; though we wish to become healthy, yet we do not learn the art of medicine. Besides this, it would be thought strange if practical wisdom, being inferior to wisdom, is to be put in authority over it, as seems to be implied by the fact that the art which produces [35] anything rules and issues commands about that thing.

These, then, are the questions we must discuss; so far we have only stated the difficulties.

[1144<sup>a</sup>1] Now first let us say that in themselves these states must be worthy of choice because they are the excellences of the two parts of the soul respectively, even if neither of them produces anything.

Secondly, they do produce something, not as the art of medicine produces health, however, but as health produces health; so does wisdom produce happiness; for, being a part of excellence entire, by being possessed and by actualizing itself it [5] makes a man happy.

Again, the function of man is achieved only in accordance with practical wisdom as well as with moral excellence; for excellence makes the aim right, and practical wisdom the things leading to it. (Of the fourth part of the soul—the nutritive—there is no such excellence; for there is nothing which it is in its power to [10] do or not to do.)

With regard to our being none the more able to do because of our practical wisdom what is noble and just, let us begin a little further back, starting with the following principle. As we say that some people who do just acts are not necessarily just, i.e. those who do the acts ordained by the laws either unwillingly or owing to [15] ignorance or for some other reason and not for the sake of the acts themselves (though, to be sure, they do what they should and all the things that the good man ought), so is it, it seems, that in order to be good one must be in a certain state when one does the several acts, i.e. one must do them as a result of choice and for the sake of the acts themselves. Now excellence makes the choice right, but the question of [20] the things which should naturally be done to carry out our choice belongs not to excellence but to another faculty. We must devote our attention to these matters and give a clearer statement about them. There is a faculty which is called cleverness; and this is such as to be able to do the things that tend towards the mark [25]

we have set before ourselves, and to hit it. Now if the mark be noble, the cleverness is laudable, but if the mark be bad, the cleverness is mere villainy; hence we call clever both men of practical wisdom and villains.<sup>59</sup> Practical wisdom is not the faculty, but it does not exist without this faculty. And this eye of the soul acquires its formed state not without the aid of excellence as has been said and is plain; for [30] inferences which deal with acts to be done are things which involve a starting-point, viz. 'since the end, i.e. what is best, is of such and such a nature', whatever it may be (let it for the sake of argument be what we please); and this is not evident except to the good man; for wickedness perverts us and causes us to be deceived about the [35] starting-points of action. Therefore it is evident that it is impossible to be practically wise without being good.

13 · We must therefore consider excellence also once more; for virtue too is [1144<sup>b</sup>1] similarly related; as practical wisdom is to cleverness—not the same, but like it—so is natural excellence to excellence in the strict sense. For all men think that each type of character belongs to its possessors in some sense by nature; for from the very moment of birth we are just or fitted for self-control or brave or have the other [5] moral qualities; but yet we seek something else as that which is good in the strict sense—we seek for the presence of such qualities in another way. For both children and brutes have the natural dispositions to these qualities, but without thought these are evidently hurtful. Only we seem to see this much, that, while one may be [10] led astray by them, as a strong body which moves without sight may stumble badly because of its lack of sight, still, if a man once acquires thought that makes a difference in action; and his state, while still like what it was, will then be excellence in the strict sense. Therefore, as in the part of us which forms opinions there are two [15] types, cleverness and practical wisdom, so too in the moral part there are two types, natural excellence and excellence in the strict sense, and of these the latter involves practical wisdom. This is why some say that all the excellences are forms of practical wisdom, and why Socrates in one respect was on the right track while in another he went astray; in thinking that all the excellences were forms of practical [20] wisdom he was wrong, but in saying they implied practical wisdom he was right. This is confirmed by the fact that even now all men, when they define excellence, after naming the state and its objects add 'that (state) which is in accordance with the right reason'; now the right reason is that which is in accordance with practical wisdom. All men, then, seem somehow to divine that this kind

of state is excellence, [25] viz. that which is in accordance with practical wisdom. But we must go a little further. For it is not merely the state in accordance with right reason, but the state that implies the *presence* of right reason, that is excellence; and practical wisdom is right reason about such matters. Socrates, then, thought the excellences were forms of reason (for he thought they were, all of them, forms of knowledge), while we think they *involve* reason.

[30] It is clear, then, from what has been said, that it is not possible to be good in the strict sense without practical wisdom, nor practically wise without moral excellence. But in this way we may also refute the dialectical argument whereby it might be contended that the excellences exist in separation from each other; the same man, it might be said, is not best equipped by nature for all the excellences, so that [35] he will have already acquired one when he has not yet acquired another. This is possible in respect of the natural excellences, but not in respect of those in respect of [1145<sup>a</sup>1] which a man is called without qualification good; for with the presence of the one quality, practical wisdom, will be given all the excellences. And it is plain that, even if it were of no practical value, we should have needed it because it is the excellence of the part of us in question; plain too that the choice will not be right without [5] practical wisdom any more than without excellence; for the one determines the end and the other makes us do the things that lead to the end.

But again it is not *supreme* over wisdom, i.e. over the superior part of us, any more than the art of medicine is over health; for it does not use it but provides for its coming into being; it issues orders, then, for its sake, but not to it. Further, to [10] maintain its supremacy would be like saying that the art of politics rules the gods because it issues orders about all the affairs of the state.



## BOOK VII

[15] 1 · Let us now make a fresh beginning and point out that of moral states to be avoided there are three kinds—vice, incontinence, brutishness. The contraries of two of these are evident—one we call excellence, the other continence; to brutishness it would be most fitting to oppose superhuman excellence, something heroic and divine, as Homer has represented Priam saying of Hector that he was very [20] good.

For he seemed not, he,

The child of a mortal man, but as one that of God's seed came.<sup>60</sup>

Therefore if, as they say, men become gods by excess of excellence, of this kind must evidently be the state opposed to the brutish state; for as a brute has no vice or [25] excellence, so neither has a god; his state is higher than excellence, and that of a brute is a different kind of state from vice.

Now, since it is rarely that a godlike man is found—to use the epithet of the Spartans, who when they admire any one highly call him a 'godlike man'—so too the brutish type is rarely found among men, it is found chiefly among foreigners, [30] but some brutish qualities are also produced by disease or deformity; and we also call by this evil name those who surpass ordinary men in vice. Of this kind of disposition, however, we must later make some mention, while we have discussed vice before; we must now discuss incontinence and softness (or effeminacy), and [35] continence and endurance; for we must treat each of the two neither as identical with excellence or wickedness, nor as a different genus. We must, as in all other [1145<sup>b</sup>1] cases, set the phenomena before us and, after first discussing the difficulties, go on to prove, if possible, the truth of all the reputable opinions about these affections or, [5] failing this, of the greater number and the most authoritative; for if we both resolve the difficulties and leave the reputable opinions undisturbed, we shall have proved the case sufficiently.

Now both continence and endurance are thought to be included among things good and praiseworthy, and both incontinence and softness among things bad and blameworthy; and the same man is thought to be continent and ready to abide by [10] the result of his calculations, or

incontinent and ready to abandon them. And the incontinent man, knowing that what he does is bad, does it as a result of passion, while the continent man, knowing that his appetites are bad, does not follow them because of his reason. The temperate man all men call continent and disposed to endurance, while the continent man some maintain to be always temperate but [15] others do not; and some call the self-indulgent man incontinent and the incontinent man self-indulgent indiscriminately, while others distinguish them. The man of practical wisdom, they sometimes say, cannot be incontinent, while sometimes they say that some who are practically wise and clever *are* incontinent. Again men are said to be incontinent with respect to anger, honour, and gain.—These, then, are the [20] things that are said.

2 · Now we may ask what kind of right belief is possessed by the man who behaves incontinently. That he should behave so when he has knowledge, some say is impossible; for it would be strange—so Socrates thought—if when knowledge was in a man something else could master it and drag it about like a slave. For [25] *Socrates* was entirely opposed to the view in question, holding that there is no such thing as incontinence; no one, he said, acts against what he believes best—people act so only by reason of ignorance. Now this view contradicts the plain phenomena, and we must inquire about what happens to such a man; if he acts by reason of ignorance, what is the manner of his ignorance? For that the man who behaves [30] incontinently does not, before he gets into this state, *think* he ought to act so, is evident. But there are *some* who concede certain of Socrates' contentions but not others; that nothing is stronger than knowledge they admit, but not that no one acts contrary to what has seemed to him the better course, and therefore they say that [35] the incontinent man has not knowledge when he is mastered by his pleasures, but opinion. But *if* it is opinion and not knowledge, if it is not a strong belief that resists [1146<sup>a</sup>1] but a weak one, as in men who hesitate, we forgive their failure to stand by such convictions against strong appetites; but we do not forgive wickedness, nor any of the other blameworthy states. It is then *practical wisdom* whose resistance is [5] mastered? That is the strongest of all states. But this is absurd; the same man will be at once practically wise and incontinent, but *no one* would say that it is the part of a practically wise man to do willingly the basest acts. Besides, it has been shown before that the man of practical wisdom is one who will *act* (for he is a man concerned with the individual facts) and who has the other excellences.

[10] Further, if continence involves having strong and bad appetites, the temperate man will not be continent nor the continent man temperate; for a temperate man will have neither excessive nor bad appetites. But the continent man *must*; for if the appetites are good, the state that restrains us from following them is bad, so that not [15] all continence will be good; while if they are weak and not bad, there is nothing admirable in resisting them, and if they are weak and bad, there is nothing great in resisting these either.

Further, if continence makes a man ready to stand by any and every opinion, it is bad, i.e. if it makes him stand even by a false opinion; and if incontinence makes a man apt to abandon any and every opinion, there will be a good incontinence, of which Sophocles' Neoptolemus in the *Philoctetes* will be an instance; for he is to be [20] praised for not standing by what Odysseus persuaded him to do, because he is pained at telling a lie.

Further, the sophistic argument presents a difficulty; for, because they want to produce paradoxical results to show how clever they are, when they succeed the resulting inference presents a difficulty (for thought is bound fast when it will not [25] rest because the conclusion does not satisfy it, and cannot advance because it cannot refute the argument). There is an argument from which it follows that folly coupled with incontinence is excellence; for a man does the opposite of what he believes owing to incontinence, but believes what is good to be evil and something that he [30] should not do, and in consequence he will do what is good and not what is evil.

Further, he who on conviction does and pursues and chooses what is pleasant would be thought to be better than one who does so as a result not of calculation but of incontinence; for he is easier to cure since he may be persuaded to change his mind. But to the incontinent man may be applied the proverb 'when water chokes, what is one to wash it down with?' If he had been persuaded of the rightness of what he does, he would have desisted when he was persuaded to change his mind; but now [1146<sup>b</sup>1] he acts in spite of his being persuaded of something quite different.

Further, if incontinence and continence are concerned with any and every kind of object, who is it that is incontinent in the unqualified sense? No one has all the forms of incontinence, but we say some people are incontinent without qualification. [5]

3 · Of some such kind are the difficulties that arise; some of these points must be refuted and the others left in possession of the field; for the solution of the difficulty is the discovery of the truth. We must consider first, then, whether incontinent people act knowingly or not, and in what sense knowingly; then with what sorts of object the incontinent and the continent man may be said to be concerned (i.e. whether with any and every pleasure and pain or with certain [10] determinate kinds), and whether the continent man and the man of endurance are the same or different; and similarly with regard to the other matters germane to this inquiry. The starting-point of our investigation is the question whether the continent man and the incontinent are differentiated by their objects or by their [15] attitude, i.e. whether the continent man is incontinent simply by being concerned with such and such objects, or, instead, by his attitude, or, instead of that, by both these things; the second question is whether incontinence and continence are concerned with any and every object or not. The man who is incontinent in the unqualified sense is neither concerned with any and every object, but with precisely those with which the self-indulgent man is concerned, nor is he characterized by [20] being simply related to these (for then his state would be the same as self-indulgence), but by being related to them in a certain way. For the one is led on in accordance with his own choice, thinking that he ought always to pursue the present pleasure; while the other does not think so, but yet pursues it.

As for the suggestion that it is true opinion and not knowledge against which we act incontinently, that makes no difference to the argument; for some people [25] when in a state of opinion do not hesitate, but think they know exactly. If, then, it is owing to their weak conviction those who have opinion are more likely to act against their belief than those who know, there will be no difference between knowledge and opinion; for some men are no less convinced of what they think than others of what [30] they know; as is shown by the case of Heraclitus. But since we use the word 'know' in two senses (for both the man who has knowledge but is not using it and he who is using it are said to know), it *will* make a difference whether, when a man does what he should not, he has the knowledge but is not exercising it, or *is* exercising it; for the latter seems strange, but not the former.

Further, since there are two kinds of propositions, there is nothing to prevent a [1147<sup>a</sup>1] man's having both and acting against his knowledge, provided that he is using only the universal and not the particular; for it

is particular acts that have to be done. And there are also two kinds of universal; one is predicable of the agent, the other of the object; e.g. 'dry food is good for every man', and 'I am a man', or 'such and such [5] food is dry'; but whether this food is such and such, of this the incontinent man either has not or is not exercising the knowledge. There will, then, be, firstly, an enormous difference between these manners of knowing, so that to know in one way would not seem anything strange, while to know in the other way would be extraordinary.

[10] And further the possession of knowledge in another sense than those just named is something that happens to men; for within the case of having knowledge but not using it we see a difference of state, admitting of the possibility of having knowledge in a sense and yet not having it, as in the instance of a man asleep, mad, or drunk. But now this is just the condition of men under the influence of passions; [15] for outbursts of anger and sexual appetites and some other such passions, it is evident, actually alter our bodily condition, and in some men even produce fits of madness. It is plain, then, that incontinent people must be said to be in a similar condition to these. The fact that men use the language that flows from knowledge proves nothing; for even men under the influence of these passions utter scientific [20] proofs and verses of Empedocles, and those who have just begun to learn can string together words, but do not yet know; for it has to become part of themselves, and that takes time; so that we must suppose that the use of language by men in an incontinent state means no more than its utterance by actors on the stage.

Again, we may also view the cause as follows with reference to the facts of [25] nature. The one opinion is universal, the other is concerned with the particular facts, and here we come to something within the sphere of perception; when a single opinion results from the two, the soul must in one type of case affirm the conclusion, while in the case of opinions concerned with production it must immediately act (e.g. if everything sweet ought to be tasted, and this is sweet, in the sense of being [30] one of the particular sweet things, the man who can act and is not restrained must at the same time actually act accordingly). When, then, the universal opinion is present in us restraining us from tasting, and there is also the opinion that everything sweet is pleasant, and that this is sweet (now this is the opinion that is active), and when appetite happens to be present in us, the one opinion bids us avoid the object, but appetite leads us towards it (for it can move each of our bodily parts); [1147<sup>b</sup>1] so that it turns out that a man behaves incontinently under the influence (in a sense) of reason and opinion, and of opinion not contrary

in itself, but only incidentally—for the appetite is contrary not the opinion—to right reason. It also follows that this is the reason why the lower animals are not incontinent, viz. because they have no [5] universal beliefs but only imagination and memory of particulars.

The explanation of how the ignorance is dissolved and the incontinent man regains his knowledge, is the same as in the case of the man drunk or asleep and is not peculiar to this condition; we must go to the students of natural science for it. Now, the last proposition both being an opinion about a perceptible object, and [10] being what determines our actions, this a man either has not when he is in the state of passion, or has it in the sense in which having knowledge did not mean knowing but only talking, as a drunken man may utter the verses of Empedocles. And because the last term is not universal nor equally an object of knowledge with the universal term, the position that Socrates sought to establish actually seems to result; for it is not what is thought to be knowledge proper that the passion [15] overcomes<sup>61</sup> (nor is it this that is dragged about as a result of the passion), but perceptual knowledge.

This must suffice as our answer to the question of whether men can act incontinently when they know or not, and in what sense they know.

4 · We must next discuss whether there is any one who is incontinent without [20] qualification, or all men who are incontinent are so in a particular sense, and if so, with what sort of objects. That both continent persons and persons of endurance, and incontinent and soft persons, are concerned with pleasures and pains, is evident.

Now of the things that produce pleasure some are necessary, while others are worthy of choice in themselves but admit of excess, the bodily causes of pleasure [25] being necessary (by such I mean both those concerned with food and those concerned with sexual intercourse, i.e. the bodily matters with which we defined self-indulgence and temperance as being concerned), while the others are not necessary but worthy of choice in themselves (e.g. victory, honour, wealth, and good [30] and pleasant things of this sort). This being so, those who go to excess with reference to the latter, contrary to the right reason which is in themselves, are not called incontinent simply, but incontinent with the qualification 'in respect of money, gain, honour, or anger',—not simply incontinent, on the ground that they are different from incontinent people and are called incontinent by reason of a resemblance. (Compare the case of Man, who won a contest at the Olympic games; in his case the general formula of

man differed little from the one peculiar to *him*, but yet it *was* [1148<sup>a</sup>1] different.) This is shown by the fact that incontinence either without qualification or in some particular respect is blamed not only as a fault but as a kind of vice, while none of the others is so blamed.

But of the people who are incontinent with respect to bodily enjoyments, with [5] which we say the temperate and the self-indulgent man are concerned, he who pursues the excesses of things pleasant—and shuns those of things painful, of hunger and thirst and heat and cold and all the objects of touch and taste—not by choice but contrary to his choice and his judgement, is called incontinent, not with [10] the qualification ‘in respect of this or that’, e.g. of anger, but without qualification. This is confirmed by the fact that men are called soft with regard to these pleasures, but not with regard to any of the others. And for this reason we group together the incontinent and the self-indulgent, the continent and the temperate man—but not any of these other types—because they are concerned somehow with the same [15] pleasures and pains; but although these are concerned with the same objects, they are not similarly related to them, but some of them choose them while the others do not choose them.

This is why we should describe as self-indulgent rather the man who without appetite or with but a slight appetite pursues the excesses and avoids moderate [20] pains, than the man who does so because of his strong appetites; for what would the former do, if he had in addition a vigorous appetite, and a violent pain at the lack of the necessary objects?

Now of appetites and pleasures some belong to the class of things generically noble and good—for some pleasant things are by nature worthy of choice—while [25] others are contrary to these, and others are intermediate, to adopt our previous distinction, e.g. wealth, gain, victory, honour. And with reference to all objects whether of this or of the intermediate kind men are not blamed for being affected by them, for desiring and loving them, but for doing so in a certain way, i.e. for going to excess. (This is why all those who contrary to reason either are mastered by or pursue one of the objects which are naturally noble and good, e.g. those who busy [30] themselves more than they ought about honour or about children and parents—for these too are goods, and those who busy themselves about them are praised; but yet there is an excess even in them—if like Niobe one were to fight even against the [1148<sup>b</sup>1] gods, or were to be as much devoted to one’s father as Satyrus nicknamed ‘the filial’, who was thought to be very silly on this point.) There is no wickedness, then, with regard to these objects, for the reason named, viz.

because each of them is by nature a thing worthy of choice for its own sake; yet excesses in respect of them are bad and to be avoided. Similarly there is no incontinence with regard to them; for [5] incontinence is not only to be avoided but is also a thing worthy of blame; but owing to a similarity in the passion people apply the name incontinence, adding in each case what it is in respect of, as we may describe as a bad doctor or a bad actor one whom we should not call bad, simply. As, then, is the case we do not apply the term [10] without qualification because each of these conditions is not badness but only analogous to it, so it is clear that in the other case also that alone must be taken to be incontinence and continence which is concerned with the same objects as temperance and self-indulgence, but we apply the term to anger by virtue of a resemblance; and this is why we say with a qualification ‘incontinent in respect of anger’ as we say ‘incontinent in respect of honour, or of gain’.

[15] **5** · Some things are pleasant by nature, and of these some are so without qualification, and others are so with reference to particular classes either of animals or of men; while others are not pleasant by nature, but some of them become so by reason of deformities, and others by reason of habits, and others by reason of bad natures. This being so it is possible with regard to each of the latter kinds to discover [20] similar states; I mean the brutish states, as in the case of the female who, they say, rips open pregnant women and devours the infants, or of the things in which some of the tribes about the Black Sea that have gone savage are said to delight—in raw meat or in human flesh, or in lending their children to one another to feast upon—or of the story of Phalaris.

[25] These states are brutish, but others arise as a result of disease (or, in some cases, of madness, as with the man who sacrificed and ate his mother, or with the slave who ate the liver of his fellow), and others are morbid states resulting from custom,<sup>62</sup> e.g. the habit of plucking out the hair or of gnawing the nails, or even coals or earth, and in addition to these paederasty; for these arise in some by nature and in others, as in those who have been the victims of lust from childhood, from habit. [30]

Now those in whom nature is the cause of such a state no one would call incontinent, any more than one would apply the epithet to women because of the passive part they play in copulation; nor would one apply it to those who are in a morbid condition as a result of habit. To have these various types of habit is beyond the limits of vice, as brutishness is too; for a man who has them to master or be [1149<sup>a</sup>1] mastered by them



is not simple incontinence but that which is so by analogy, as the man who is in this condition in respect of fits of anger is to be called incontinent in respect of that feeling, but not incontinent.

For every excessive state whether of folly, of cowardice, of self-indulgence, or [5] of bad temper, is either brutish or morbid; the man who is by nature apt to fear everything, even the squeak of a mouse, is cowardly with a brutish cowardice, while the man who feared a weasel did so in consequence of disease; and of foolish people those who by nature are thoughtless and live by their senses alone are brutish, like [10] some races of the distant foreigners, while those who are so as a result of disease (e.g. of epilepsy) or of madness are morbid. Of these characteristics it is possible to have some only at times, and not to be mastered by them, e.g. Phalaris may have restrained a desire to eat the flesh of a child or an appetite for unnatural sexual pleasure; but it is also possible to be mastered, not merely to have the feelings. Thus, [15] as the wickedness which is on the human level is called wickedness simply, while that which is not is called wickedness not simply but with the qualification 'brutish' or 'morbid', in the same way it is plain that some incontinence is brutish and some morbid, while only that which corresponds to *human* self-indulgence is incontinence [20] simply.

That incontinence and continence, then, are concerned only with the same objects as self-indulgence and temperance and that what is concerned with other objects is a type distinct from incontinence, and called incontinence by a metaphor and not simply, is plain.

6 · That incontinence in respect of anger is less disgraceful than that in respect of the appetites is what we will now proceed to see. Anger seems to listen to [25] reason to some extent, but to mishear it, as do hasty servants who run out before they have heard the whole of what one says, and then muddle the order, or as dogs bark if there is but a knock at the door, before looking to see if it is a friend; so anger by reason of the warmth and hastiness of its nature, though it hears, does not hear [30] an order, and springs to take revenge. For reason or imagination informs us that we have been insulted or slighted, and anger, reasoning as it were that anything like this must be fought against, boils up straightway; while appetite, if reason or perception merely says that an object is pleasant, springs to the enjoyment of it. Therefore anger obeys reason in a sense, but appetite does not. It is therefore more [1149<sup>b</sup>1] disgraceful; for the man who is incontinent in respect of anger is in a sense conquered by

reason, while the other is conquered by appetite and not by reason.

Further, we forgive people more easily for following natural desires, since we [5] forgive them more easily for following such appetites as are common to all men, and in so far as they are common; now anger and bad temper are more natural than the appetites for excess, i.e. for unnecessary objects. Take for instance the man who defended himself on the charge of striking his father by saying ‘yes, but *he* struck [10] *his* father, and *he* struck *his*, and’ (pointing to his child) ‘this boy will strike *me* when he is a man; it runs in the family’; of the man who when he was being dragged along by his son bade him stop at the doorway, since he himself had dragged his father only as far as that.

Further, those who are more given to plotting against others are more unjust. Now a passionate man is not given to plotting, nor is anger itself—it is open; but the [15] nature of appetite is illustrated by what the poets call Aphrodite, ‘guile-weaving daughter of Cyprus’, and by Homer’s words about her ‘embroidered girdle’:

And the whisper of wooing is there,  
Whose subtlety stealeth the wits of the wise, how prudent soe’er.<sup>63</sup>

Therefore if this form of incontinence is more unjust and disgraceful than that in respect of anger, it is both incontinence without qualification and in a sense vice.

[20] Further, no one commits wanton outrage with a feeling of pain, but every one who acts in anger acts with pain, while the man who commits outrage acts with pleasure. If, then, those acts at which it is most just to be angry are more unjust, the incontinence which is due to appetite is the more unjust; for there is no wanton outrage involved in anger.

Plainly, then, the incontinence concerned with appetite is more disgraceful [25] than that concerned with anger, and continence and incontinence are concerned with bodily appetites and pleasures; but we must grasp the differences among the latter themselves. For, as has been said at the beginning, some are human and natural both in kind and in magnitude, others are brutish, and others are due to [30] deformities and diseases. Only with the first of these are temperance and self-indulgence concerned; this is why we call the lower animals neither temperate nor self-indulgent except by a metaphor, and only if some one kind<sup>64</sup> of animals exceeds another as a whole in wantonness, destructiveness, and omnivorous greed; these have no power of choice or calculation, but they

are departures from what is natural[1150<sup>a</sup>1] as, among men, madmen are. Now brutishness is less evil than vice, though more alarming; for it is not that the better part has been perverted, as in man,—they *have* no better part. Thus it is like comparing a lifeless thing with a living in respect of [5] badness; for the badness of that which has no source of movement is always less hurtful, and thought is a source. Thus it is like comparing injustice with an unjust man. Each is in some sense worse; for a bad man will do ten thousand times as much evil as a brute.

7 · With regard to the pleasures and pains and appetites and aversions arising through touch and taste, to which both self-indulgence and temperance were [10] formerly narrowed down, it is possible to be in such a state as to be defeated even by those of them which most people master, or to master even those by which most people are defeated; among these possibilities, those relating to pleasures are incontinence and continence, those relating to pains softness and endurance. The state of most people is intermediate, even if they lean more towards the worse [15] states.

Now, since some pleasures are necessary while others are not, and are necessary up to a point while the excesses of them are not, nor the deficiencies, and this is equally true of appetites and pains, the man who pursues the excesses of things pleasant, or pursues to excess necessary objects, and<sup>65</sup> does so by choice, for their own sake and not at all for the sake of any result distinct from them, is [20] self-indulgent; for such a man is of necessity without regrets, and therefore incurable, since a man without regrets cannot be cured. The man who is deficient is the opposite; the man who is intermediate is temperate. Similarly, there is the man who avoids bodily pains not because he is defeated by them but by choice. (Of those who do not *choose* such acts, one kind of man is led to them as a result of the [25] pleasure involved, another because he avoids the pain arising from the appetite, so that these types differ from one another. Now any one would think worse of a man if with no appetite or with weak appetite he were to do something disgraceful, than if he did it under the influence of powerful appetite, and worse of him if he struck a blow not in anger than if he did it in anger; for what would he have done if he *had* [30] been strongly affected? This is why the self-indulgent man is worse than the incontinent.) Of the states named, then, the latter is rather a kind of softness; the former is self-indulgence. While to the incontinent man is opposed the continent, to the soft is opposed the man

of endurance; for endurance consists in resisting, while continence consists in conquering, and resisting and conquering are different, as not [35] being beaten is different from winning; this is why continence is also more worthy of choice than endurance. Now the man who is defective in respect of resistance to the [1150<sup>b</sup>1] things which most men both resist and resist successfully is soft and effeminate; for effeminacy too is a kind of softness; such a man trails his cloak to avoid the pain of lifting it, and plays the invalid without thinking himself wretched, though the man [5] he imitates is a wretched man.

The case is similar with regard to continence and incontinence. For if a man is defeated by violent and excessive pleasures or pains, there is nothing wonderful in that; indeed we are ready to forgive him if he has resisted, as Theodectes' Philoctetes does when bitten by the snake, or Carcinus' Cercyon in the *Alope*, and [10] as people who try to restrain their laughter burst out in a guffaw, as happened to Xenophantus. But it is surprising if a man is defeated by and cannot resist pleasures or pains which most men can hold out against, when this is not due to heredity or disease, like the softness that is hereditary with the kings of the Scythians, or that [15] which distinguishes the female sex from the male.

The lover of amusement, too, is thought to be self-indulgent, but is really soft. For amusement is a relaxation, since it is a rest; and the lover of amusement is one of the people who go to excess in this.

Of incontinence one kind is impetuosity, another weakness. For some men [20] after deliberating fail, owing to their passion, to stand by the conclusions of their deliberation, others because they have not deliberated are led by their passion; since some men (just as people who first tickle others are not tickled themselves), if they have first perceived and seen what is coming and have first roused themselves and their calculative faculty, are not defeated by their passion, whether it be pleasant or [25] painful. It is keen and excitable people that suffer especially from the impetuous form of incontinence; for the former because of their quickness and the latter because of the violence of their passions do not wait on reason, because they are apt to follow their imagination.

8 · The self-indulgent man, as was said, has no regrets; for he stands by his [30] choice; but any incontinent man is subject to regrets. This is why the position is not as it was expressed in the formulation of the problem, but the self-indulgent man is incurable and the incontinent man

curable; for wickedness is like a disease such as dropsy or consumption, while incontinence is like epilepsy; the former is a [35] permanent, the latter an intermittent badness. And generally incontinence and vice are different in kind; vice is unconscious of itself, incontinence is not (of incontinent [1151<sup>a</sup>1] men themselves, those who become beside themselves are better than those who possess reason but do not abide by it, since the latter are defeated by a weaker passion, and do not act without previous deliberation like the others); for the incontinent man is like the people who get drunk quickly and on little wine, i.e. on [5] less than most people.

Evidently, then, incontinence is not vice (though perhaps it is so in a qualified sense); for incontinence is contrary to choice while vice is in accordance with choice; not but what they are similar in respect of the actions they lead to; as in the saying of Demodocus about the Milesians, 'the Milesians are not without sense, but they do [10] the things that senseless people do', so too incontinent people are not unjust but they will do unjust acts.

Now, since the incontinent man is apt to pursue, not on conviction, bodily pleasures that are excessive and contrary to right reason, while the self-indulgent man is convinced because he is the sort of man to pursue them, it is on the contrary the former that is easily persuaded to change his mind, while the latter is not. For [15] excellence and vice respectively preserve and destroy the first principle, and in actions that for the sake of which is the first principle, as the hypotheses are in mathematics; neither in that case is it reason that teaches the first principles, nor is it so here—excellence either natural or produced by habituation is what teaches right opinion about the first principle. Such a man as this, then, is temperate; his contrary is the self-indulgent.

[20] But there is a sort of man who is carried away as a result of passion and contrary to right reason—a man whom passion masters so that he does not act according to right reason, but does not master to the extent of making him ready to believe that he ought to pursue such pleasures without reserve; this is the incontinent man, who is better than the self-indulgent man, and not bad without qualification; for the best thing in him, the first principle, is preserved. And [25] contrary to him is another kind of man, he who abides by his convictions and is not carried away, at least as a result of passion. It is evident from these considerations that the latter is a good state and the former a bad one.

9 · Is the man continent who abides by any and every reasoning and any and every choice, or the man who abides by the right choice, and is he incontinent who [30] abandons any and every choice and any and every reasoning, or he who abandons the reasoning that is not false and the choice that is right? this is how we put it before our statement of the problem. Or is it incidentally any and every choice but *per se* the true reasoning and the right choice by which the one abides and the other does not? If any one chooses or pursues this for the sake of that, *per se* he pursues and [1151<sup>b</sup>1] chooses the latter, but incidentally the former. But when we speak without qualification we mean what is *per se*. Therefore in a sense the one abides by, and the other abandons, any and every opinion; but without qualification, the true opinion.

There are some who are apt to abide by their opinion, who are called [5] strong-headed, viz. those who are hard to persuade and are not easily persuaded to change; these have in them something like the continent man, as the prodigal is in a way like the liberal man and the rash man like the confident man; but they are different in many respects. For it is to passion and appetite that the one will not yield, since on occasion the continent man *will* be easy to persuade; but it is to [10] reason that the others refuse to yield, for they do form appetites and many of them are led by their pleasures. Now the people who are strong-headed are the opinionated, the ignorant, and the boorish—the opinionated being influenced by pleasure and pain; for they delight in the victory they gain if they are not persuaded to change, and are pained if their decisions become null and void as decrees [15] sometimes do; so that they are more like the incontinent than the continent man.

But there are some who fail to abide by their resolutions, not as a result of incontinence, e.g. Neoptolemus in Sophocles' *Philoctetes*; yet it was for the sake of pleasure that he did not stand fast—but a noble pleasure; for telling the truth was noble to him, but he had been persuaded by Odysseus to tell the lie. For not every [20] one who does anything for the sake of pleasure is either self-indulgent or bad or incontinent, but he who does it for a disgraceful pleasure.

Since there is also a sort of man who takes less delight than he should in bodily things, and does not abide by reason, he who is intermediate between him and the incontinent man is the continent man; for the incontinent man fails to abide by [25] reason because he delights too much in them, and this man because he delights in them too little; while the continent man abides by it and does not change on either account.

Now if continence is good, both the contrary states must be bad, as they [30] actually appear to be; but because the other extreme is seen in few people and seldom, as temperance is thought to be contrary only to self-indulgence, so is continence to incontinence.

Since many names are applied analogically, it is by analogy that we have come to speak of the continence of the temperate man; for both the continent man and the temperate man are such as to do nothing contrary to reason for the sake of the [1152<sup>a</sup>1] bodily pleasures, but the former has and the latter has not bad appetites, and the latter is such as not to feel pleasure contrary to reason, while the former is such as to feel pleasure but not to be led by it. And the incontinent and the self-indulgent man [5] are also like one another; they are different, but both pursue bodily pleasures—the latter, however, also thinking that he ought to do so, while the former does not think this.

10 · Nor can the same man have practical wisdom and be incontinent; for it has been shown that a man is at the same time practically wise, and good in respect of character. Further, a man has practical wisdom not by knowing only but by acting; but the incontinent man is unable to act—there is, however, nothing to [10] prevent a clever man from being incontinent; this is why it is sometimes actually thought that some people have practical wisdom but are incontinent, viz. because cleverness and practical wisdom differ in the way we have described in our first discussions, and are near together in respect of their reasoning, but differ in respect of their choice—nor yet is the incontinent man like the man who knows and is [15] contemplating a truth, but like the man who is asleep or drunk. And he acts voluntarily (for he acts in a sense with knowledge both of what he does and of that for the sake of which he does it), but is not wicked since his choice is good; so that he is half-wicked. And he is not unjust; for he does not act of malice aforethought; of the two types of incontinent man the one does not abide by the conclusions of his deliberation, while the excitable man does not deliberate at all. And thus the [20] incontinent man is like a city which passes all the right decrees and has good laws, but makes no use of them, as in Anaxandrides' jesting remark,

‘The city willed it, that cares nought for laws’;

but the wicked man is like a city that uses its laws, but has wicked laws to use.

[25] Now incontinence and continence are concerned with that

which is in excess of the state characteristic of most men; for the continent man abides by his resolutions more and the incontinent man less than most men can.

Of the forms of incontinence, that of excitable people is more curable than that of those who deliberate but do not abide by their decisions, and those who are incontinent through habituation are more curable than those in whom incontinence [30] is innate; for it is easier to change a habit than to change one's nature; even habit is hard to change just because it is like nature, as Evenus says:

I say that habit's but long practice, friend,  
And this becomes men's nature in the end.

We have now stated what continence, incontinence, endurance, and softness are, and how these states are related to each other.

**11** · The study of pleasure and pain belongs to the province of the political [1152<sup>b</sup>1] philosopher; for he is the architect of the end, with a view to which we call one thing bad and another good without qualification. Further, it is one of our necessary tasks to consider them; for not only did we lay it down that moral excellence and vice are [5] concerned with pains and pleasures, but most people say that happiness involves pleasure; this is why the blessed man is called by a name derived from a word meaning enjoyment.<sup>66</sup>

Now some people think that no pleasure is a good, either in itself or incidentally, since the good and pleasure are not the same; others think that some [10] pleasures are good but that most are bad. Again there is a third view, that even if all pleasures are goods, yet the best thing cannot be pleasure. The reasons given for the view that pleasure is not a good at all are (a) that every pleasure is a perceptible process to a natural state, and that no process is of the same kind as its end, e.g. no process of building of the same kind as a house, (b) A temperate man avoids [15] pleasures, (c) A man of practical wisdom pursues what is free from pain, not what is pleasant, (d) The pleasures are a hindrance to thought, and the more so the more one delights in them, e.g. in sexual pleasure; for no one could think of anything while absorbed in this, (e) There is no art of pleasure; but every good is the product of some art. (f) Children and the brutes pursue pleasures. The reasons for the view [20] that not all pleasures are good are that (a) there are pleasures that are actually base and objects of reproach, and (b) there are harmful pleasures; for some



pleasant things are unhealthy. The reason for the view that the best thing is not pleasure is that pleasure is not an end but a process.

12 · These are pretty much the things that are said. That it does not follow from these grounds that pleasure is not a good, or even the chief good, is plain from [25] the following considerations. First, since that which is good may be so in either of two senses (one thing good simply and another good for a particular person), natural constitutions and states, and therefore also movements and processes, will be correspondingly divisible. Of those which are thought to be bad some will be bad without qualification but not bad for a particular person, but worthy of his choice, and some will not be worthy of choice even for a particular person, but only at a [30] particular time and for a short period, though not without qualification; while others are not even pleasures, but seem to be so, viz. all those which involve pain and whose end is curative, e.g. the processes that go on in sick persons.

Further, one kind of good being activity and another being state, the processes that restore us to our natural state are only incidentally pleasant; for that matter the activity at work in the appetites for them is the activity of so much of our state and [35] nature as has remained unimpaired; for there are actually pleasures that involve *no* [1153<sup>a</sup>1] pain or appetite (e.g. those of contemplation), the nature in such a case not being defective at all. That the others are incidental is indicated by the fact that men do not enjoy the same things<sup>67</sup> when their nature is in its settled state as they do when it is being replenished, but in the former case they enjoy the things that are pleasant without qualification, in the latter the contraries of these as well; for then they enjoy [5] even sharp and bitter things, none of which is pleasant either by nature or without qualification. Nor, then, are the pleasures; for as pleasant things differ, so do the pleasures arising from them.

Again, it is not necessary that there should be something else better than pleasure, as some say the end is better than the process; for pleasures are not [10] processes nor do they all involve process—they are activities and ends; nor do they arise when we are becoming something, but when we are exercising some faculty; and not all pleasures have an end different from themselves, but only the pleasures of persons who are being led to the completing of their nature. This is why it is not right to say that pleasure is a perceptible process, but it should rather be called [15] activity of the natural state, and instead of ‘perceptible’ ‘unimpeded’.

It is thought to be a<sup>68</sup> process just because they think it is in the strict sense *good*; for they think that activity is a process which it is not.

The view that pleasures are bad because some pleasant things are unhealthy is like saying that healthy things are bad because some healthy things are bad for the pocket; both are bad in the respect mentioned, but they are not *bad* for *that* [20] reason—indeed, contemplation itself is sometimes injurious to health.

Neither practical wisdom or any state is impeded by the pleasure arising from it; it is foreign pleasures that impede, for the pleasures arising from contemplation and learning will make us contemplate and learn all the more.

The fact that no pleasure is the product of any art arises naturally enough; [25] there is no art of any other activity either, but only of the capacity; though for that matter the arts of the perfumer and the cook *are* thought to be arts of pleasure.

The arguments that the temperate man avoids pleasure and that the man of practical wisdom pursues the painless life, and that children and the brutes pursue pleasure, are all refuted by the same consideration. We have pointed out in what [30] sense pleasures are good without qualification and in what sense some are not good; now both the brutes and children pursue pleasures of the latter kind (and the man of practical wisdom pursues tranquil freedom from that kind), viz. those which imply appetite and pain, i.e. the bodily pleasures (for it is these that are of this nature) and the excesses of them, in respect of which the self-indulgent man is self-indulgent. [35] This is why the temperate man avoids these pleasures; for even he has pleasures of his own.

[1153<sup>b</sup>1] **13** · But further it is agreed that pain is bad and to be avoided; for some pain is without qualification bad, and other pain is bad because it is in some respect an impediment to us. Now the contrary of that which is to be avoided, *qua* something to be avoided and bad, is good. Pleasure, then, is necessarily a good. For the answer of Speusippus, that it is just as the greater is contrary both to the less and to the [5] equal, is not successful; since he would not say that pleasure is essentially a species of evil.

And if certain pleasures are bad, that does not prevent the best thing from being some pleasure—just as knowledge might be, though certain kinds of knowledge are bad. Perhaps it is even necessary, if each state has unimpeded activities, that whether the activity (if unimpeded) of all our

states or that of some [10] one of them is happiness, this should be the thing most worthy of our choice; and this activity is a pleasure. Thus the chief good would be some pleasure, though most pleasures might perhaps be bad without qualification. And for this reason all men think that the happy life is pleasant and weave pleasure into happiness—and [15] reasonably too; for no activity is complete when it is impeded, and happiness is a complete thing; this is why the happy man needs the goods of the body and external goods, i.e. those of fortune, viz. in order that he may not be impeded in these ways. Those who say that the victim on the rack or the man who falls into great misfortunes is happy if he is good, are, whether they mean to or not, talking [20] nonsense. Now because we need fortune as well as other things, some people think good fortune the same thing as happiness; but it is not that, for even good fortune itself when in excess is an impediment, and perhaps should then be no longer called good fortune; for its limit is fixed by reference to happiness.

And indeed the fact that all things, both brutes and men, pursue pleasure in an [25] indication of its being somehow the chief good:

No voice is wholly lost that many peoples. . . .<sup>69</sup>

But since no one nature or state either is or is thought the best for all, neither do all pursue the same pleasure; yet all pursue pleasure. And perhaps they actually pursue [30] not the pleasure they think they pursue nor that which they would say they pursue, but the same pleasure; for all things have by nature something divine in them. But the bodily pleasures have appropriated the name both because we oftenest steer our course for them and because all men share in them; thus because they alone are [35] familiar, men think there are no others.

It is evident also that if pleasure and activity is not a good, it will not be the [1154\*1] case that the happy man lives a pleasant life; for to what end should he need pleasure, if it is not a good but the happy man may even live a painful life? For pain is neither an evil nor a good, if pleasure is not; why then should he avoid it? [5]

Therefore, too, the life of the good man will not be pleasanter than that of any one else, if his activities are not more pleasant.

14 · With regard to the bodily pleasures, those who say that *some* pleasures are very much to be chosen, viz. the noble pleasures, but not the bodily pleasures, i.e. those with which the self-indulgent man is concerned, must consider why,<sup>70</sup> [10] then, the contrary pains are bad.

For the contrary of bad is good. Are the necessary pleasures good in the sense in which even that which is not bad is good? Or are they good up to a point? Is it that where you have states and processes of which there cannot be too much, there cannot be too much of the corresponding pleasure, and that where there can be too much of the one there can be too much of the other also? [15] Now there can be too much of bodily goods, and the bad man is bad by virtue of pursuing the excess, not by virtue of pursuing the necessary pleasures (for *all* men enjoy in some way or other both dainty foods and wines and sexual intercourse, but not all men do so as they ought). The contrary is the case with pain; for he does not [20] avoid the excess of it, he avoids it altogether; for the alternative to excess of pleasure is not pain, except to the man who pursues this excess.

Since we should state not only the truth, but also the cause of error—for this contributes towards producing conviction, since when a reasonable explanation is [25] given of why the false view appears true, this tends to produce belief in the true view—therefore we must state why the bodily pleasures appear the more worthy of choice. Firstly, then, it is because they expel pain; owing to the excesses of pain men pursue excessive and in general bodily pleasure as being a cure for the pain. Now [30] curative agencies produce intense feeling—which is the reason why they are pursued—because they show up against the contrary pain. (Indeed pleasure is thought not to be good for these two reasons, as has been said, viz. that some of them are activities belonging to a bad nature—either congenital, as in the case of a brute, or due to habit, i.e. those of bad men; while others are meant to cure a defective nature, and it is better to be in a healthy state than to be getting into it, but these [1154<sup>b</sup>1] arise during the process of being made complete and are therefore only incidentally good.) Further, they are pursued because of their violence by those who cannot enjoy other pleasures. At all events some people<sup>71</sup> manufacture thirsts for themselves. When these are harmless, the practice is irreproachable; when they are [5] hurtful, it is bad. For they have nothing else to enjoy, and, besides, a neutral state is painful to many people because of their nature. For animals are always toiling, as the students of natural science also testify, saying that sight and hearing are painful; but we have become used to this, as they maintain. Similarly, while, in [10] youth, people are, owing to the growth that is going on, in a situation like that of drunken men, and youth is pleasant, on the other hand people of excitable nature always need relief; for even their body is ever in torment owing to its special composition,

and they are always under the influence of violent desire; but pain is driven out both by the contrary pleasure, and by any chance pleasure if it be strong; [15] and for these reasons they become self-indulgent and bad. But the pleasures that do not involve pains do not admit of excess; and these are among the things pleasant by nature and not incidentally. By things pleasant incidentally I mean those that act as cures (for because as a result people are cured, through some action of the part that remains healthy, for this reason the process is thought pleasant); things naturally [20] pleasant are those that stimulate the action of the healthy nature.

There is no one thing that is always pleasant, because our nature is not simple but there is another element in us as well, inasmuch as we are perishable creatures, so that if the one element does something, this is unnatural to the other nature, and when the two elements are evenly balanced, what is done seems neither painful nor pleasant; for if the nature of anything were simple, the same action would always be [25] most pleasant to it. This is why God always enjoys a single and simple pleasure; for there is not only an activity of movement but an activity of immobility, and pleasure is found more in rest than in movement. But ‘change in all things is sweet’, as the poet says,<sup>72</sup> because of some vice; for as it is the vicious man that is changeable, so [30] the nature that needs change is vicious; for it is not simple nor good.

We have now discussed continence and incontinence, and pleasure and pain, both what each is and in what sense some of them are good and others bad; it remains to speak of friendship.

## BOOK VIII

1 · After what we have said, a discussion of friendship would naturally follow, since it is an excellence or implies excellence, and is besides most necessary with a view to living. For without friends no one would choose to live, though he had [5] all other goods; even rich men and those in possession of office and of dominating power are thought to need friends most of all; for what is the use of such prosperity without the opportunity of beneficence, which is exercised chiefly and in its most laudable form towards friends? Or how can prosperity be guarded and preserved without friends? The greater it is, the more exposed is it to risk. And in poverty and [10] in other misfortunes men think friends are the only refuge. It helps the young, too, to keep from error; it aids older people by ministering to their needs and supplementing the activities that are failing from weakness; those in the prime of life it stimulates to noble actions—‘two going together’—for with friends men are [15] more able both to think and to act. Again, parent seems by nature to feel it for offspring and offspring for parent, not only among men but among birds and among most animals; it is felt mutually by members of the same race, and especially by men, whence we praise lovers of their fellow men. We may see even in our travels [20] how near and dear every man is to every other. Friendship seems too to hold states together, and lawgivers to care more for it than for justice; for unanimity seems to be something like friendship, and this they aim at most of all, and expel faction as [25] their worst enemy; and when men are friends they have no need of justice, while when they are just they need friendship as well, and the truest form of justice is thought to be a friendly quality.

But it is not only necessary but also noble; for we praise those who love their [30] friends, and it is thought to be a fine thing to have many friends; and again we think it is the same people that are good men and are friends.

Not a few things about friendship are matters of debate. Some define it as a kind of likeness and say like people are friends, whence come the sayings ‘like to like’, ‘birds of a feather flock together’, and so on; others on the contrary say ‘two of [1155<sup>b</sup>1] a trade never agree’. On this very question they inquire more deeply and in a more scientific fashion, Euripides saying that ‘parched earth loves the rain, and stately heaven when filled with rain loves to fall to earth’, and Heraclitus that ‘it is what [5] opposes that helps’ and ‘from different tones comes the fairest tune’

and 'all things are produced through strife'; while Empedocles, as well as others, expresses the opposite view that like aims at like. The scientific problems we may leave alone (for they do not belong to the present inquiry); let us examine those which are human [10] and involve character and feeling, e.g. whether friendship can arise between any two people or people cannot be friends if they are wicked, and whether there is one species of friendship or more than one. Those who think there is only one because it admits of degrees have relied on an inadequate indication; for even things different [15] in species admit of degree. We have discussed this matter previously.

2 · The kinds of friendship may perhaps be cleared up if we first come to know the object of love. For not everything seems to be loved but only the lovable, and this is good, pleasant, or useful; but it would seem to be that by which some [20] good or pleasure is produced that is useful, so that it is the good and the pleasant that are lovable as ends. Do men love, then, *the* good, or what is good for *them*? These sometimes clash. So too with regard to the pleasant. Now it is thought that each loves what is good for himself, and that the good is without qualification [25] lovable, and what is good for each man is lovable for him; but each man loves not what is good for him but what seems good. This however will make no difference; we shall just have to say that this is that which seems lovable. Now there are three grounds on which people love; of the love of lifeless objects we do not use the word 'friendship'; for it is not mutual love, nor is there a wishing of good to the other (for [30] it would surely be ridiculous to wish wine well; if one wishes anything for it, it is that it may keep, so that one may have it oneself); but to a friend we say we ought to wish what is good for his sake. But to those who thus wish good we ascribe only goodwill, if the wish is not reciprocated; goodwill when it is reciprocal being friendship. Or must we add 'when it is recognized'? For many people have goodwill to those whom [1156<sup>a</sup>1] they have not seen but judge to be good or useful; and one of these might return this feeling. These people seem to bear goodwill to each other; but how could one call them friends when they do not know their mutual feelings? To be friends, then, they must be mutually recognized as bearing goodwill and wishing well to each other for [5] one of the aforesaid reasons.

3 · Now these reasons differ from each other in kind; so therefore, do

the corresponding forms of love and friendship. There are therefore three kinds of friendship, equal in number to the things that are lovable; for with respect to each there is a mutual and recognized love, and those who love each other wish well to each other in that respect in which they love one another. Now those who love each [10] other for their utility do not love each other for themselves but in virtue of some good which they get from each other. So too with those who love for the sake of pleasure; it is not for their character that men love ready-witted people, but because they find them pleasant. Therefore those who love for the sake of utility love for the sake of what is good for *themselves*, and those who love for the sake of pleasure do [15] so for the sake of what is pleasant to *themselves*, and not in so far as the other is the person loved but in so far as he is useful or pleasant. And thus these friendships are only incidental; for it is not as being the man he is that the loved person is loved, but as providing some good or pleasure. Such friendships, then, are easily dissolved, if the parties do not remain like themselves; for if the one party is no longer pleasant or [20] useful the other ceases to love him.

Now the useful is not permanent but is always changing. Thus when the motive of the friendship is done away, the friendship is dissolved, inasmuch as it existed only for the ends in question. This kind of friendship seems to exist chiefly between old people (for at that age people pursue not the pleasant but the useful) [25] and, of those who are in their prime or young, between those who pursue utility. And such people do not live much with each other either; for sometimes they do not even find each other pleasant; therefore they do not need such companionship unless they are useful to each other; for they are pleasant to each other only in so far as they rouse in each other hopes of something good to come. Among such friendships [30] people also class the friendship of host and guest. On the other hand the friendship of young people seems to aim at pleasure; for they live under the guidance of emotion, and pursue above all what is pleasant to themselves and what is immediately before them; but with increasing age their pleasures become different. This is why they quickly become friends and quickly cease to be so; their friendship changes with the object that is found pleasant, and such pleasure alters quickly. [1156<sup>b</sup>1] Young people are amorous too; for the greater part of the friendship of love depends on emotion and aims at pleasure; this is why they fall in love and quickly fall out of love, changing often within a single day. But these people do wish to spend their days and lives together; for it is thus that they attain the purpose of their [5] friendship.



Perfect friendship is the friendship of men who are good, and alike in excellence; for these wish well alike to each other *qua* good, and they are good in themselves. Now those who wish well to their friends for their sake are most truly [10] friends; for they do this by reason of their own nature and not incidentally; therefore their friendship lasts as long as they are good—and excellence is an enduring thing. And each is good without qualification and to his friend, for the good are both good without qualification and useful to each other. So too they are pleasant; for the good are pleasant both without qualification and to each other, since to each his own [15] activities and others like them are pleasurable, and the actions of the good *are* the same or like. And such a friendship is as might be expected lasting since there meet in it all the qualities that friends should have. For all friendship is for the sake of [20] good or of pleasure—good or pleasure either in the abstract or such as will be enjoyed by him who has the friendly feeling—and is based on a certain resemblance; and to a friendship of good men all the qualities we have named belong in virtue of the nature of the friends themselves; for in the case of this kind of friendship the other qualities also are alike in both friends, and that which is good without qualification is also without qualification pleasant, and these are the most lovable qualities. Love and friendship therefore are found most and in their best form between such men.

[25] But it is natural that such friendships should be infrequent; for such men are rare. Further, such friendship requires time and familiarity; as the proverb says, men cannot know each other till they have ‘eaten salt together’; nor can they admit each other to friendship or be friends till each has been found lovable and been [30] trusted by each. Those who quickly show the marks of friendship to each other wish to be friends, but are not friends unless they both are lovable and know the fact; for a wish for friendship may arise quickly, but friendship does not.

4 · This kind of friendship, then is complete both in respect of duration and in all other respects, and in it each gets from each in all respects the same as, or something like what, he gives; which is what ought to happen between friends. [1157<sup>a</sup>1] Friendship for the sake of pleasure bears a resemblance to this kind; for good people too are pleasant to each other. So too does friendship for the sake of utility; for the good are also useful to each other. Among men of these sorts too, friendships are most permanent when the friends get the same thing from each other (e.g. [5] pleasure), and not only that but also from the same

source, as happens between ready-witted people, not as happens between lover and beloved. For these do not take pleasure in the same things, but the one in seeing the beloved and the other in receiving attentions from his lover; and when the bloom of youth is passing the friendship sometimes passes too (for the one finds no pleasure in the sight of the [10] other, and the other gets no attentions from the first); but many lovers on the other hand are constant, if familiarity has led them to love each other's characters, these being alike. But those who exchange not pleasure but utility in their love are both less truly friends and less constant. Those who are friends for the sake of utility part [15] when the advantage is at an end; for they were lovers not of each other but of profit.

For the sake of pleasure or utility, then, even bad men may be friends of each other, or good men of bad, or one who is neither good nor bad may be a friend to any sort of person, but for their own sake clearly only good men can be friends; for bad men do not delight in each other unless some advantage come of the relation.

[20] The friendship of the good too alone is proof against slander; for it is not easy to trust any one's talk about a man who has long been tested by oneself; and it is among good men that trust and the feeling that he would never wrong me and all the other things that are demanded in true friendship are found. In the other kinds of [25] friendship, however, there is nothing to prevent these evils arising.

For men apply the name of friends even to those whose motive is utility, in which sense states are said to be friendly (for the alliances of states seem to aim at advantage), and to those who love each other for the sake of pleasure, in which sense children are called friends. Therefore we too ought perhaps to call such people friends, and say that there are several kinds of friendship—firstly and in the proper [30] sense that of good men *qua* good, and by similarity the other kinds; for it is in virtue of something good and something similar that they are friends, since even the pleasant is good for the lovers of pleasure. But these two kinds of friendship are not often united, nor do the same people become friends for the sake of utility and of pleasure; for things that are only incidentally connected are not often coupled [35] together.

Friendship being divided into these kinds; bad men will be friends for the sake [1157<sup>b</sup>1] of pleasure or of utility, being in this respect like each other, but good men will be friends for their own sake, i.e. in virtue of their goodness. These, then, are friends without qualification; the others are friends incidentally and through a resemblance to these.

5 · As in regard to the excellences some men are called good in respect of a [5] state, others in respect of an activity, so too in the case of friendship; for those who live together delight in each other and confer benefits on each other, but those who are asleep or locally separated are not performing, but are disposed to perform, the activities of friendship; distance does not break off the friendship absolutely, but [10] only the activity of it. But if the absence is lasting, it seems actually to make men forget their friendship; hence the saying 'out of sight, out of mind'. Neither old people nor sour people seem to make friends easily; for there is little that is pleasant in them, and no one can spend his days with one whose company is painful, or not [15] pleasant, since nature seems above all to avoid the painful and to aim at the pleasant. Those, however, who approve of each other but do not live together seem to be well-disposed rather than actual friends. For there is nothing so characteristic of friends as living together (since while it is people who are in need that desire [20] benefits, even those who are blessed desire to spend their days together; for solitude suits such people least of all); but people cannot live together if they are not pleasant and do not enjoy the same things, as friends who are companions seem to do.

The truest friendship, then, is that of the good, as we have frequently said; for [25] that which is without qualification good or pleasant seems to be lovable and desirable, and for each person that which is good or pleasant to him; and the good man is lovable and desirable to the good man for both these reasons. Now it looks as if love were a passion, friendship a state; for love may be felt just as much towards lifeless things, but mutual love involves choice and choice springs from a state; and [30] men wish well to those whom they love, for their sake, not as a result of passion but as a result of a state. And in loving a friend men love what is good for themselves; for the good man in becoming a friend becomes a good to his friend. Each, then, both loves what is good for himself, and makes an equal return in goodwill and in pleasantness; for friendship is said to be equality, and both of these are found most [1158<sup>a</sup>1] in the friendship of the good.

6 · Between sour and elderly people friendship arises less readily, inasmuch as they are less good-tempered and enjoy companionship less; for these are thought to be the greatest marks of friendship and most productive of it. This is why, while [5] young men become friends quickly, old men do not; it is because men do not become friends with

those in whom they do not delight; and similarly sour people do not quickly make friends either. But such men may bear goodwill to each other; for they wish one another well and aid one another in need; but they are hardly *friends* because they do not spend their days together nor delight in each other, and these [10] are thought the greatest marks of friendship.

One cannot be a friend to many people in the sense of having friendship of the complete type with them, just as one cannot be in love with many people at once (for love is a sort of excess, and it is the nature of such only to be felt towards one person); and it is not easy for many people at the same time to please the same person very greatly, or perhaps even to be good for him. One must, too, acquire [15] some experience of the other person and become familiar with him, and that is very hard. But with a view to utility or pleasure it is possible that many people should please one; for many people are useful or pleasant, and these services take little time.

Of these two kinds that which is for the sake of pleasure is the more like friendship, when both parties get the same things from each other and delight in [20] each other or in the same things, as in the friendships of the young; for generosity is more found in such friendships. Friendship based on utility is for the commercially minded. People who are blessed, too, have no need of useful friends, but do need pleasant friends; for they wish to live with others, and, though they can endure for a short time what is painful, no one could put up with it continuously, nor even with [25] the Good itself if it were painful to him; this is why they look out for friends who are pleasant. Perhaps they should look out for friends who, being pleasant, are also good, and good for them too; for so they will have all the characteristics that friends should have.

People in positions of authority seem to have friends who fall into distinct classes; some people are useful to them and others are pleasant, but the same people [30] are rarely both; for they seek neither those whose pleasantness is accompanied by excellence nor those whose utility is with a view to noble objects, but in their desire for pleasure they seek for ready-witted people, and their other friends they choose as being clever at doing what they are told, and these characteristics are rarely combined. Now we have said that the good man is at the same time pleasant and useful; but such a man does not become the friend of one who surpasses him, unless [35] he is surpassed also in excellence; if this is not so, he does not establish equality by being proportionally exceeded. But such men are not so easy to find.

[1158<sup>b</sup>1] However that may be, the aforesaid friendships involve equality; for the friends get the same things from one another and wish the same things for one another, or exchange one thing for another, e.g. pleasure for utility; we have said, however, that they are both less truly friendships and less permanent. But it is from their likeness and their unlikeness to the same thing that they are thought both to be [5] and not to be friendships. It is by their likeness to the friendship of excellence that they seem to be friendships (for one of them involves pleasure and the other utility, and these characteristics belong to the friendship of excellence as well); while it is because the friendship of excellence is proof against slander and lasting, while these quickly change (besides differing from the former in many other respects), that [10] they appear *not* to be friendships; i.e. it is because of their unlikeness to the friendship of excellence.

7 · But there is another kind of friendship, viz. that which involves an inequality, e.g. that of father to son and in general of elder to younger, that of man to wife and in general that of ruler to subject. And these friendships differ also from each other; for it is not the same that exists between parents and children and [15] between rulers and subjects, nor is even that of father to son the same as that of son to father, nor that of husband to wife the same as that of wife to husband. For the excellence and the function of each of these is different, and so are the reasons for which they love; the love and the friendship are therefore different also. Each party, then, neither gets the same from the other, nor ought to seek it; but when children [20] render to parents what they ought to render to those who brought them into the world, and parents render what they should to their children, the friendship of such persons will be lasting and excellent. In all friendships implying inequality the love also should be proportional, i.e. the better should be more loved than he loves, and so [25] should the more useful, and similarly in each of the other cases; for when the love is in proportion to the merit of the parties, then in a sense arises equality, which is held to be characteristic of friendship.

But equality does not seem to take the same form in acts of justice and in friendship; for in acts of justice what is equal in the primary sense is that which is in [30] proportion to merit, while quantitative equality is secondary, but in friendship quantitative equality is primary and proportion to merit secondary. This becomes clear if there is a great interval in respect of excellence or vice or wealth or anything else

between the parties; for then they are no longer friends, and do not even expect to be so. And this is most manifest in the case of the gods; for they surpass us most decisively in all good things. But it is clear also in the case of kings; for with them, [1159<sup>a</sup>1] too, men who are much their inferiors do not expect to be friends; nor do men of no account expect to be friends with the best or wisest men. In such cases it is not possible to define exactly up to what point friends can remain friends; for much can be taken away and friendship remain, but when one party is removed to a great distance, as God is, the possibility of friendship ceases. This is in fact the origin of [5] the question whether friends really wish for their friends the greatest goods, e.g. that of being gods; since in that case their friends will no longer be friends to them, and therefore will not be good things for them (for friends *are* good things). Now if we were right in saying that friend wishes good to friend for his sake, his friend must remain the sort of being he is, whatever that may be; therefore it is for him only so [10] long as he remains a man that he will wish the greatest goods. But perhaps not *all* the greatest goods; for it is for himself most of all that each man wishes what is good.

8 · Most people seem, owing to ambition, to wish to be loved rather than to love; which is why most men love flattery; for the flatterer is a friend in an inferior [15] position, or pretends to be such and to love more than he is loved; and being loved seems to be akin to being honoured, and this is what most people aim at. But it seems to be not for its own sake that people choose honour, but incidentally. For most people enjoy being honoured by those in positions of authority because of their [20] hopes (for they think that if they want anything they will get it from them; and therefore they delight in honour as a token of favour to come); while those who desire honour from good men, and men who know, are aiming at confirming their own opinion of themselves; they delight in honour, therefore, because they believe in their own goodness on the strength of the judgement of those who speak about them. [25] In being loved, on the other hand, people delight for its own sake; whence it would seem to be better than being honoured, and friendship to be desirable in itself. But it seems to lie in loving rather than in being loved, as is indicated by the delight mothers take in loving; for some mothers hand over their children to be brought up, and so long as they know their fate they love them and do not seek to be loved in [30] return (if they cannot have both), but seem to be satisfied if they see them prospering; and they themselves love their children even if these owing to their

ignorance give them nothing of a mother's due. Now since friendship depends more on loving, and it is those who love their friends that are praised, loving seems to be the characteristic excellence of friends, so that it is only those in whom this is found [1159<sup>b</sup>1] in due measure that are lasting friends, and only their friendship that endures.

It is in this way more than any other that even unequals can be friends; they can be equalized. Now equality and likeness are friendship, and especially the likeness of those who are like in excellence; for being steadfast in themselves they [5] hold fast to each other, and neither ask nor give base services, but (one may say) even prevent them; for it is characteristic of good men neither to go wrong themselves nor to let their friends do so. But wicked men have no steadfastness (for they do not even stay similar to themselves), but become friends for a short time [10] because they delight in each other's wickedness. Friends who are useful or pleasant last longer; i.e. as long as they provide each other with enjoyments or advantages. Friendship for utility's sake seems to be that which most easily exists between contraries, e.g. between poor and rich, between ignorant and learned; for what a man actually lacks he aims at, and he gives something else in return. Under this [15] head, too, one might bring lover and beloved, beautiful and ugly. This is why lovers sometimes seem ridiculous, when they demand to be loved as they love; if they are equally lovable their claim can perhaps be justified, but when they have nothing lovable about them it is ridiculous. Perhaps, however, contrary does not even aim at [20] contrary in its own nature, but only incidentally, the desire being for what is intermediate; for that is what is good, e.g. it is good for the dry not to become wet but to come to the intermediate state, and similarly with the hot and in all other cases. These subjects we may dismiss; for they are indeed somewhat foreign to our inquiry.

9 · Friendship and justice seem, as we have said at the outset of our [25] discussion, to be concerned with the same objects and exhibited between the same persons. For in every community there is thought to be some form of justice, and friendship too; at least men address as friends their fellow-voyagers and fellow-soldiers, and so too those associated with them in any other kind of community. And the extent of their association is the extent of their friendship, as it is the extent to [30] which justice exists between them. And the proverb 'what friends have is common property' expresses the truth; for friendship depends on community. Now

brothers and comrades have all things in common, but the others have definite things in common—some more things, others fewer; for of friendships, too, some are more and others less truly friendships. And the claims of justice differ too; the duties of parents to children and those of brothers to each other are not the same, nor those of [1160<sup>a</sup>1] comrades and those of fellow-citizens, and so, too, with the other kinds of friendship. There is a difference, therefore, also between the acts that are unjust towards each of these classes of associates, and the injustice increases by being exhibited towards those who are friends in a fuller sense; e.g. it is a more terrible thing to defraud a comrade than a fellow citizen, more terrible not to help a brother [5] than a stranger, and more terrible to wound a father than any one else. And the demands of justice also naturally increase with the friendship, which implies that friendship and justice exist between the same persons and have an equal extension.

Now all forms of community are like parts of the political community; for men journey together with a view to some particular advantage, and to provide [10] something that they need for the purposes of life; and it is for the sake of advantage that the political community too seems both to have come together originally and to endure, for this is what legislators aim at, and they call just that which is to the common advantage. Now the other communities aim at some particular advantage, e.g. sailors at what is advantageous on a voyage with a view to making money or [15] something of the kind, fellow-soldiers at what is advantageous in war, whether it is wealth or victory or the taking of a city that they seek, and members of tribes and demes act similarly. [Some communities seem to arise for the sake of pleasure, viz. religious guilds and social clubs; for these exist respectively for the sake of offering [20] sacrifice and of companionship. But all these seem to fall under the political community; for it aims not at present advantage but at what is advantageous for life as a whole],<sup>73</sup> offering sacrifices and arranging gatherings for the purpose, and assigning honours to the gods, and providing pleasant relaxations for themselves. [25] For the ancient sacrifices and gatherings seem to take place after the harvest as a sort of first fruits, because it was at these seasons that people had most leisure. All the communities, then, seem to be parts of the political community; and the particular kinds of friendship will correspond to the particular kinds of community. [30]



deviation-forms—perversions, as it were, of them. The constitutions are monarchy, aristocracy, and thirdly that which is based on a property qualification, which it [35] seems appropriate to call timocratic, though most people usually call it polity. The best of these is monarchy, the worst timocracy. The deviation from monarchy is [1160<sup>b</sup>1] tyranny; for both are forms of one-man rule, but there is the greatest difference between them; the tyrant looks to his own advantage, the king to that of his subjects. For a man is not a king unless he is sufficient to himself and excels his subjects in all [5] good things; and such a man needs nothing further; therefore he will not look to his own interests but to those of his subjects; for a king who is not like that would be a mere titular king. Now tyranny is the very contrary of this; the tyrant pursues his own good. And it is clearer in the case of tyranny that it is the worst deviation-form; [10] but it is the contrary of the best that is worst. Monarchy passes over into tyranny; for tyranny is the evil form of one-man rule and the bad king becomes a tyrant. Aristocracy passes over into oligarchy by the badness of the rulers, who distribute contrary to merit what belongs to the city—all or most of the good things to [15] themselves, and office always to the same people, paying most regard to wealth; thus the rulers are few and are bad men instead of the most worthy. Timocracy passes over into democracy; for these are coterminous, since timocracy too tends to involve a mass of people, and all who have the property qualification count as equal. Democracy is the least bad of the deviations; for in its case the form of constitution is but a slight deviation. These then are the changes to which constitutions are most subject; for these are the smallest and easiest transitions.

One may find resemblances to the constitutions and, as it were, patterns of them even in households. For the association of a father with his sons bears the form [25] of monarchy, since the father cares for his children; and this is why Homer calls Zeus ‘father’; it is the ideal of monarchy to be paternal rule. But among the Persians the rule of the father is tyrannical; they use their sons as slaves. Tyrannical too is the [30] rule of a master over slaves; for it is the advantage of the master that is brought about in it. Now this seems to be a correct form of government, but the Persian type is perverted; for the modes of rule appropriate to different relations are diverse. The association of man and wife seems to be aristocratic; for the man rules in accordance with merit, and in those matters in which a man should rule, but the [35] matters that befit a woman he hands over to her. If the man rules in everything the relation passes over into oligarchy; for he does this contrary to merit

and not *qua* [1161<sup>a</sup>1] better. Sometimes, however, women rule, because they are heiresses; so their rule is not in virtue of excellence but due to wealth and power, as in oligarchies. The association of brothers is like timocracy; for they are equal, except in so far as they [5] differ in age; hence if they differ *much* in age, the friendship is no longer of the fraternal type. Democracy is found chiefly in masterless dwellings (for here every one is on an equality), and in those in which the ruler is weak and every one has licence to do as he pleases.

[10] **11** · Each of the constitutions may be seen to involve friendship just in so far as it involves justice. The friendship between a king and his subjects depends on an excess of benefits conferred; for he confers benefits on his subjects if being a good man he cares for them with a view to their well-being, as a shepherd does for his sheep (whence Homer called Agamemnon ‘shepherd of the peoples’). Such too is [15] the friendship of a father, though this exceeds the other in the greatness of the benefits conferred; for he is responsible for the existence of his children, which is thought the greatest good, and for their nurture and upbringing. These things are ascribed to ancestors as well. Further, by nature a father tends to rule over his sons, ancestors over descendants, a king over his subjects. These friendships imply superiority of one party over the other, which is why parents are honoured. The [20] justice therefore that exists between persons so related is not the same but proportioned to merit; for that is true of the friendship as well. The friendship of man and wife, again, is the same that is found in an aristocracy; for it is in accordance with excellence—the better gets more of what is good, and each gets what befits him; and so, too, with the justice in these relations. The friendship of [25] brothers is like that of comrades; for they are equal and of like age, and such persons are for the most part like in their feelings and their character. Like this, too, is the friendship appropriate to timocratic government; for the citizens tend to be equal and fair; therefore rule is taken in turn, and on equal terms; and the friendship appropriate here will correspond.

But in the deviation-forms, as justice hardly exists, so too does friendship. It [30] exists least in the worst form; in tyranny there is little or no friendship. For where there is nothing common to ruler and ruled, there is not friendship either, since there is not justice; e.g. between craftsman and tool, soul and body, master and slave; the latter in each case is benefited by that which uses it, but there is no [1161<sup>b</sup>1] friendship

nor justice towards lifeless things. But neither is there friendship towards a horse or an ox, nor to a slave *qua* slave. For there is nothing common to the two parties; the slave is a living tool and the tool a lifeless slave. *Qua* slave then, one cannot be friends with him. But *qua* man one can; for there seems to be some justice [5] between any man and any other who can share in a system of law or be a party to an agreement; therefore there can also be friendship with him in so far as he is a man. Therefore while in tyrannies friendship and justice hardly exist, in democracies they exist more fully; for where the citizens are equal they have much in common. [10]

12 · Every form of friendship, then, involves association, as has been said. One might, however, mark off from the rest both the friendship of kindred and that of comrades. Those of fellow-citizens, fellow-tribesmen, fellow-voyagers, and the like are more like mere friendships of association; for they seem to rest on a sort of [15] compact. With them we might class the friendship of host and guest.

The friendship of kinsmen itself, while it seems to be of many kinds, appears to depend in every case on paternal friendship; for parents love their children as being a part of themselves, and children their parents as being something originating from them. Now parents know their offspring better than their children know that they [20] are their children, and the originator is more attached to his offspring than the offspring to their begetter; for the product belongs to the producer (e.g. a tooth or hair or anything else to him whose it is), but the producer does not belong to the product, or belongs in a less degree. And the length of time produces the same [25] result; parents love their children as soon as these are born, but children love their parents only after time has elapsed and they have acquired understanding or perception. From these considerations it is also plain why mothers love more than fathers do. Parents, then, love their children as themselves (for their issue are by virtue of their separate existence a sort of other selves), while children love their [30] parents as being born of them, and brothers love each other as being born of the same parents; for their identity with them makes them identical with each other (which is the reason why people talk of ‘the same blood’, ‘the same stock’, and so on). They are, therefore, in a sense the same thing, though in separate individuals. Two things that contribute greatly to friendship are a common upbringing and similarity of age; for ‘two of an age take to each other’, and familiarity makes for comradeship; whence

the friendship of brothers is akin to that of comrades. And [1162<sup>a</sup>1] cousins and other kinsmen are attached by derivation from brothers, viz. by being derived from the same parents. They come to be closer together or farther apart by virtue of the nearness or distance of the original ancestor.

The friendship of children to parents, and of men to gods, is a relation to them [5] as to something good and superior; for they have conferred the greatest benefits, since they are the causes of their being and of their nourishment, and of their education from their birth; and this kind of friendship possesses pleasantness and utility also, more than that of strangers, inasmuch as their life is lived more in [10] common. The friendship of brothers has the characteristics found in that of comrades (and especially when these are good), and in general between people who are like each other, inasmuch as they belong more to each other and start with a love for each other from their very birth, and inasmuch as those born of the same parents and brought up together and similarly educated are more akin in character; and the test of time has been applied most fully and convincingly in their case.

[15] Between other kinsmen friendly relations are found in due proportion. Between man and wife friendship seems to exist by nature; for man is naturally inclined to form couples—even more than to form cities, inasmuch as the household is earlier and more necessary than the city, and reproduction is more common to [20] man than with the animals. With the other animals the union extends only to this point, but human beings live together not only for the sake of reproduction but also for the various purposes of life; for from the start the functions are divided, and those of man and woman are different; so they help each other by throwing their peculiar gifts into the common stock. It is for these reasons that both utility and [25] pleasure seem to be found in this kind of friendship. But this friendship may be based also on excellence, if the parties are good; for each has its own excellence and they will delight in the fact. And children seem to be a bond of union (which is the reason why childless people part more easily); for children are a good common to both and what is common holds them together.

[30] How man and wife and in general friend and friend ought mutually to behave seems to be the same question as how it is just for them to behave; for a man does not seem to have the same duties to a friend, a stranger, a comrade, and a schoolfellow.

13 · There are three kinds of friendship, as we said at the outset of our inquiry, and in respect of each some are friends on an equality and others by virtue [35] of a superiority (for not only can equally good men become friends but a better man can make friends with a worse, and similarly in friendships of pleasure or utility the [1162<sup>b</sup>1] friends may be equal or unequal in the benefits they confer). This being so, equals must effect the required equalization on a basis of equality in love and in all other respects, while unequals must render what is in proportion to their superiority or inferiority.

Complaints and reproaches arise either only or chiefly in the friendship of [5] utility, and this is only to be expected. For those who are friends on the ground of excellence are anxious to do well by each other (since that is a mark of excellence and of friendship), and between men who are emulating each other in this there cannot be complaints or quarrels; no one is offended by a man who loves him and does well by him—if he is a person of nice feeling he takes his revenge by doing well [10] by the other. And the man who excels will not complain of his friend, since he gets what he aims at; for each man desires what is good. Nor do complaints arise much even in friendships of pleasure; for both get at the same time what they desire, if they enjoy spending their time together; and even a man who complained of another for *not* affording him pleasure would seem ridiculous, since it is in his power not to [15] spend his days with him.

But the friendship of utility is full of complaints; for as they use each other for their own interests they always want to get the better of the bargain, and think they have got less than they should, and blame their partners because they do not get all they want and deserve; and those who do well by others cannot help them as much [20] as those whom they benefit want.

Now it seems that, as justice is of two kinds, one unwritten and the other legal, one kind of friendship of utility is moral and the other legal. And so complaints arise most of all when men do not dissolve the relation in the spirit of the same type of friendship in which they contracted it. The *legal* type is that which is on fixed terms; [25] its purely commercial variety is on the basis of immediate payment, while the more liberal variety allows time but stipulates for a definite *quid pro quo*. In this variety the debt is clear and not ambiguous, but in the postponement it contains an element of friendliness; and so some states do not allow suits arising out of such agreements, but think men who have bargained on a

basis of credit ought to be content. The [30] *moral* type is not on fixed terms; it makes a gift, or does whatever it does, as to a friend; but one expects to receive as much or more, as having not given but lent; and if a man is worse off when the relation is dissolved than he was when it was contracted he will complain. This happens because all or most men, while they wish [35] for what is noble, choose what is advantageous; now it is noble to do well by another without a view to repayment, but it is the receiving of benefits that is [1163a1] advantageous.

Therefore if we can we should return the equivalent of what we have received (for we must not make a man our friend against his will; we must recognize that we were mistaken at the first and took a benefit from a person we should not have taken it from—since it was not from a friend, nor from one who did it just for the sake of [5] acting so—and we must settle up just as if we had been benefited on fixed terms). Indeed, one would agree to repay if one could (if one could not, even the giver would not have expected one to do so); therefore if it is possible we must repay. But at the outset we must consider the man by whom we are being benefited and on what terms he is acting, in order that we may accept the benefit on these terms, or else decline it.

[10] It is disputable whether we ought to measure a service by its utility to the receiver and make the return with a view to that, or by the beneficence of the giver. For those who have received say they have received from their benefactors what meant little to the latter and what they might have got from others—minimizing the service; while the givers, on the contrary, say it was the biggest thing they had, [15] and what could not have been got from others, and that it was given in times of danger or similar need. Now if the friendship is one that aims at *utility*, surely the advantage to the receiver is the measure. For it is he that asks for the service, and the other man helps him on the assumption that he will receive the equivalent; so the assistance has been precisely as great as the advantage to the receiver, and therefore [20] he must return as much as he has received, or even more (for that would be nobler). In friendships based on *excellence* on the other hand, complaints do not arise, but the choice of the doer is a sort of measure; for in choice lies the essential element of excellence and character.

14 · Differences arise also in friendship based on superiority for each [25] expects to get more out of them, but when this happens the friendship is dissolved. Not only does the better man think he ought to

get more, since more should be assigned to a good man, but the more useful similarly expects this; they say a useless man should not get as much as they should, since it becomes an act of public service [30] and not a friendship if the proceeds of the friendship do not answer to the worth of the benefits conferred. For they think that, as in a commercial partnership those who put more in get more out, so it should be in friendship. But the man who is in a state of need and inferiority makes the opposite claim; they think it is the part of a good friend to help those who are in need; what, they say, is the use of being the friend of a good man or a powerful man, if one is to get nothing out of it?

[1163<sup>b</sup>1] At all events it seems that each party is justified in his claim, and that each should get more out of the friendship than the other—not more of the same thing, however, but the superior more honour and the inferior more gain; for honour is the prize of excellence and of beneficence, while gain is the assistance required by inferiority.

[5] It seems to be so in constitutional arrangements also; the man who contributes nothing good to the common stock is not honoured; for what belongs to the public is given to the man who benefits the public, and honour does belong to the public. It is not possible to get wealth from the common stock and at the same time honour. For no one puts up with the smaller share in *all* things; therefore to the man who loses in [10] wealth they assign honour and to the man who is willing to be paid, wealth, since the proportion to merit equalizes the parties and preserves the friendship, as we have said.

This then is also the way in which we should associate with unequals; the man who is benefited in respect of wealth or excellence must give honour in return, repaying what he can. For friendship asks a man to do what he can, not what is [15] proportional to the merits of the case; since that cannot always be done, e.g. in honours paid to the gods or to parents; for no one could ever return to them the equivalent of what he gets, but the man who serves them to the utmost of his power is thought to be a good man.

This is why it would not seem open to a man to disown his father (though a father may disown his son); being in debt, he should repay, but there is nothing by [20] doing which a son will have done the equivalent of what he has received, so that he is always in debt. But creditors can remit a debt; and a father can therefore do so too. At the same time it is thought that presumably no one would repudiate a son who was not far gone in wickedness; for apart from the natural friendship it is human nature not to reject assistance. But the son, if he is wicked, will naturally

avoid [25] aiding his father, or not be zealous about it; for most people wish to get benefits, but avoid doing them, as a thing unprofitable.—So much for these questions.



## BOOK IX

1 · In all friendships between dissimilars it is, as we have said, proportion that equalizes the parties and preserves the friendship; e.g. in the political form of friendship the shoemaker gets a return for his shoes in proportion to his worth, and the weaver and the rest do the same. Now here a common measure has been [1164a1] provided in the form of money, and therefore everything is referred to this and measured by this; but in the friendship of lovers sometimes the lover complains that his excess of love is not met by love in return (though perhaps there is nothing lovable about him), while often the beloved complains that the lover who formerly [5] promised everything now performs nothing. Such incidents happen when the lover loves the beloved for the sake of pleasure while the beloved loves the lover for the sake of utility, and they do not both possess the qualities expected of them. If these be the objects of the friendship it is dissolved when they do not get the things that formed the motives of their love; for each did not love the other person himself but [10] the qualities he had, and these were not enduring; that is why the friendships also are transient. But the love of characters, as has been said, endures because it is self-dependent. Differences arise when what they get is something different and not what they desire; for it is like getting nothing at all when we do not get what we aim at; compare the story of the person who made promises to a lyre-player, promising [15] him the more, the better he sang, but in the morning, when the other demanded the fulfilment of his promises, said that he had given pleasure for pleasure. Now if this had been what each wanted, all would have been well; but if the one wanted enjoyment but the other gain, and the one has what he wants while the other has not, the terms of the association will not have been properly fulfilled; for what each [20] in fact wants is what he attends to, and it is for the sake of that that he will give what he has.

But who is to fix the worth of the service; he who makes the offer or he who has got the advantage? At any rate the one who offers seems to leave it to him. This is what they say Protagoras used to do; whenever he taught anything whatsoever, he [25] bade the learner assess the value of the knowledge, and accepted the amount so fixed. But in such matters some men approve of the saying ‘let a man have his fixed reward’.<sup>74</sup>

Those who get the money first and then do none of the things they said they would, owing to the extravagance of their promises, naturally find themselves the [30] objects of complaint; for they do not fulfil what they agreed to. The sophists are perhaps compelled to do this because no one would give money for the things they *do* know. These people then, if they do not do what they have been paid for, are naturally made the objects of complaint.

But where there is *no* contract of service, those who offer something for the sake of the other party cannot (as we have said) be complained of (for that is the [1164<sup>b</sup>1] nature of the friendship of excellence), and the return to them must be made on the basis of their choice (for it is choice that is the characteristic thing in a friend and in excellence). And so too, it seems, should one make a return to those with whom one has studied philosophy; for their worth cannot be measured against money, and they can get no honour which will balance their services, but still it is perhaps enough, as [5] it is with the gods and with one's parents, to give them what one can.

If the gift was not of this sort, but was made on conditions, it is no doubt preferable that the return made should be one that seems fair to both parties, but if this cannot be achieved, it would seem not only necessary that the person who gets [10] the first service should fix the reward, but also just; for if the other gets in return the equivalent of the advantage the beneficiary has received, or the price he would have paid for the pleasure, he will have got what is fair as from the other.

We see this happening too with things put up for sale, and in some places there are laws providing that no actions shall arise out of voluntary contracts, on the assumption that one should settle with a person whom one has trusted, in the spirit [15] in which one bargained with him. The law holds that it is more just that the person to whom credit was given should fix the terms than that the person who gave credit should do so. For most things are not assessed at the same value by those who have them and those who want them; each class values highly what is its own and what it is offering; yet the return is made on the terms fixed by the receiver. But [20] no doubt the receiver should assess a thing not at what it seems worth when he has it, but at what he assessed it at before he had it.

2 · A further problem is set by such questions as, whether one should in all things give the preference to one's father and obey him, or whether

when one is ill one should trust a doctor, and when one has to elect a general should elect a man of military skill; and similarly whether one should render a service by preference to a [25] friend or to a good man, and should show gratitude to a benefactor or oblige a friend, if one cannot do both.

Surely all questions are hard to decide with precision. For they admit of many variations of all sorts in respect both of the magnitude of the service and of its nobility and necessity. But that we should not give the preference in all things to the [30] same person is plain enough; and we must for the most part return benefits rather than oblige friends, as we must pay back a loan to a creditor rather than make one to a friend. But perhaps even this is not always true; e.g. should a man who has been ransomed out of the hands of brigands ransom his ransomer in return, whoever he may be (or pay him if he has not been captured but requests payment), or should he [1165<sup>a</sup>1] ransom his father? It would seem that he should ransom his father in preference even to himself. As we have said, then, generally the debt should be paid, but if the gift is exceedingly noble or exceedingly necessary, one should defer to these considerations. For sometimes it is not even fair to return the equivalent of what one [5] has received, when the one man has done a service to one whom he knows to be good, while the other makes a return to one whom he believes to be bad. For that matter, one should sometimes not lend in return to one who has lent to oneself; for the one person lent to a good man, expecting to recover his loan, while the other has no hope of recovering from one who is believed to be bad. Therefore if the facts really are so, [10] the demand is not fair; and if they are not, but people think they are, they would be held to be doing nothing strange in refusing. As we have often pointed out, then, discussions about feelings and actions have just as much definiteness as their subject-matter.

That we should not make the same return to every one, nor give a father the preference in everything, as one does not sacrifice everything to Zeus, is plain [15] enough; but since we ought to render different things to parents, brothers, comrades, and benefactors, we ought to render to each class what is appropriate and becoming. And this is what people seem in fact to do; to marriages they invite their kinsfolk; for these have a part in the family and therefore in the doings that affect the family; and at funerals also they think that kinsfolk, before all others, should [20] meet, for the same reason. And it would be thought that in the matter of food we should help our parents before all others, since we owe our own nourishment to them, and it is more noble to help in this

respect the authors of our being even before ourselves; and honour too one should give to one's parents as one does to the gods, but not any and every honour; for one should not give the same honour to one's [25] father and one's mother, nor again should one give them the honour due to a wise man or to a general, but the honour due to a father, or again to a mother. To all older persons, too, one should give honour appropriate to their age, by rising to receive them and finding seats for them and so on; while to comrades and brothers one should allow freedom of speech and common use of all things. To kinsmen, too, [30] and fellow-tribesmen and fellow-citizens and to every other class one should always try to assign what is appropriate, and to compare the claims of each class with respect to nearness of relation and to excellence or usefulness. The comparison is easier when the persons belong to the same class, and more laborious when they are [35] different. Yet we must not on *that* account shrink from the task, but decide the question as best we can.

3 · Another question that arises is whether friendships should or should not [1165<sup>b</sup>1] be broken off when the other party does not remain the same. Perhaps we may say that there is nothing strange in breaking off a friendship based on utility or pleasure, when our friends no longer have these attributes. For it was of these attributes that we were the friends; and when these have failed it is reasonable to love no longer. But one might complain of another if, when he loved us for our [5] usefulness or pleasantness, he pretended to love us for our character. For, as we said at the outset, most differences arise between friends when they are not friends in the spirit in which they think they are. So when a man has made a mistake and has thought he was being loved for his character, when the other person was doing [10] nothing of the kind, he must blame himself; but when he has been deceived by the pretences of the other person, it is just that he should complain against his deceiver—and with more justice than one does against people who counterfeit the currency, inasmuch as the wrongdoing is concerned with something more valuable.

But if one accepts another man as good, and he becomes bad and is seen to do so, must one still love him? Surely it is impossible, since not everything can be loved, [15] but only what is good. What is evil neither can nor should be loved; for one should not be a lover of evil, nor become like what is bad; and we have said that like is dear to like. Must the friendship, then, be forthwith broken off? Or is this not so in all cases, but only when one's friends are incurable in their wickedness? If they are

capable of being reformed one should rather come to the assistance of their [20] character or their property, inasmuch as this is better and more characteristic of friendship. But a man who breaks off such a friendship would seem to be doing nothing strange; for it was not to a man of this sort that he was a friend; when his friend has changed, therefore, and he is unable to save him, he gives him up.

But if one friend remained the same while the other became better and far outstripped him in excellence, should the latter treat the former as a friend? Surely [25] he cannot. When the interval is great this becomes most plain, e.g. in the case of childish friendships; if one friend remained a child in intellect while the other became a fully developed man, how could they be friends when they neither approved of the same things nor delighted in and were pained by the same things? For not even with regard to each other will their tastes agree, and without this (as [30] we saw) they cannot be friends; for they cannot live together. But we have discussed these matters.

Should he, then, behave no otherwise towards him than he would if he had never been his friend? Surely he should keep a remembrance of their former intimacy, and as we think we ought to oblige friends rather than strangers, so to [35] those who have been our friends we ought to make some allowance for our former friendship, when the breach has not been due to excess of wickedness.

4 · Friendly relations with one's neighbours, and the marks by which [1166<sup>a</sup>1] friendships are defined, seem to have proceeded from a man's relations to himself. For men think a friend is one who wishes and does what is good, or seems so, for the sake of his friend, or one who wishes his friend to exist and live, for his sake; which [5] mothers do to their children, and friends do who have come into conflict. And others think a friend is one who lives with and has the same tastes as another, or one who grieves and rejoices with his friend; and this too is found in mothers most of all. It is by some one of these characteristics that friendship too is defined.

Now each of these is true of the good man's relation to himself (and of all other [10] men in so far as they think themselves good; excellence and the good man seem, as has been said, to be the measure of every class of things). For his opinions are harmonious, and he desires the same things with all his soul; and therefore he wishes for himself what is good and what seems so, and does it (for it is characteristic of the [15] good

man to exert himself for the good), and does so for his own sake (for he does it for the sake of the intellectual element in him, which is thought to be the man himself); and he wishes himself to live and be preserved, and especially the element by virtue of which he thinks. For existence is good to the good man, and each man wishes himself what is good, while no one chooses to possess the whole world if he [20] has first to become some one else (for that matter, even now God possesses the good); he wishes for this only on condition of being whatever he is; and the element that thinks would seem to be the individual man, or to be so more than any other element in him. And such a man wishes to live with himself; for he does so with pleasure, since the memories of his past acts are delightful and his hopes for the [25] future are good, and therefore pleasant. His mind is well stored too with subjects of contemplation. And he grieves and rejoices, more than any other, with himself; for the same thing is always painful, and the same thing always pleasant, and not one thing at one time and another at another; he has, so to speak, nothing to regret.

Therefore, since each of these characteristics belongs to the good man in [30] relation to himself, and he is related to his friend as to himself (for his friend is another self), friendship too is thought to be one of these attributes, and those who have these attributes to be friends. Whether there is or is not friendship between a man and himself is a question we may dismiss for the present; there would seem to be friendship in so far as he is two or more, to judge from what has been said, and from the fact that the extreme of friendship is likened to one's love for oneself. [1166<sup>b</sup>1]

But the attributes named seem to belong even to the majority of men, poor creatures though they may be. Are we to say then that in so far as they are satisfied with themselves and think they are good, they share in these attributes? Certainly no one who is thoroughly bad and impious has these attributes, or even seems to do [5] so. They hardly belong even to inferior people; for they are at variance with themselves, and have appetites for some things and wishes for others. This is true, for instance, of incontinent people; for they choose, instead of the things they themselves think good, things that are pleasant but hurtful; while others again, through cowardice and laziness, shrink from doing what they think best for [10] themselves. And those who have done many terrible deeds and are hated for their wickedness even shrink from life and destroy themselves. And wicked men seek for people with whom to spend their days, and shun themselves; for they remember [15] many a grievous

deed, and anticipate others like them, when they are by themselves, but when they are with others they forget. And having nothing lovable in them they have no feeling of love to themselves. Therefore also such men do not rejoice or grieve with themselves; for their soul is rent by faction, and one element in it by [20] reason of its wickedness grieves when it abstains from certain acts, while the other part is pleased, and one draws them this way and the other that, as if they were pulling them in pieces. If a man cannot at the same time be pained and pleased, at all events after a short time he is pained *because* he was pleased, and he could have wished that these things had not been pleasant to him; for bad men are laden with regrets.

[25] Therefore the bad man does not seem to be amicably disposed even to himself, because there is nothing in him to love; so that if to be thus is the height of wretchedness, we should strain every nerve to avoid wickedness and should endeavour to be good; for so one may be both friendly to oneself and a friend to another.

[30] **5** · Goodwill is a friendly sort of relation, but is not *identical* with friendship; for one may have goodwill both towards people whom one does not know, and without their knowing it, but not friendship. This has indeed been said already. But goodwill is not even friendly feeling. For it does not involve intensity or desire, whereas these accompany friendly feeling; and friendly feeling implies intimacy while goodwill may arise of a sudden, as it does towards competitors in a contest; we [1167<sup>a</sup>1] come to feel goodwill for them and to share in their wishes, but we would not *do* anything with them; for, as we said, we feel goodwill suddenly and love them only superficially.

Goodwill seems, then, to be a beginning of friendship, as the pleasure of the eye is the beginning of love. For no one loves if he has not first been delighted by the [5] form of the beloved, but he who delights in the form of another does not, for all that, love him, but only does so when he also longs for him when absent and craves for his presence; so too it is not possible for people to be friends if they have not come to feel goodwill for each other, but those who feel goodwill are not for all that friends; for they only *wish* well to those for whom they feel goodwill, and would not do anything [10] with them nor take trouble for them. And so one might by an extension of the term say that goodwill is inactive friendship, though when it is prolonged and reaches the point of intimacy it becomes friendship—not the friendship based on utility nor that based

on pleasure; for goodwill too does not arise on those terms. The man who has received a benefit bestows goodwill in return for what has been done to him, and in [15] doing so is doing what is just; while he who wishes some one to prosper because he hopes for enrichment through him seems to have goodwill not to him but rather to himself, just as a man is not a friend to another if he cherishes him for the sake of some use to be made of him. In general, goodwill arises on account of some excellence and worth, when one man seems to another beautiful or brave or [20] something of the sort, as we pointed out in the case of competitors in a contest.

6 · Unanimity also seems to be a friendly relation. For this reason it is not identity of opinion; for that might occur even with people who do not know each other; nor do we say that people who have the same views on any and every subject are unanimous, e.g. those who agree about the heavenly bodies (for unanimity [25] about these is not a friendly relation), but we do say that a city is unanimous when men have the same opinion about what is to their interest, and choose the same actions, and do what they have resolved in common. It is about things to be done, therefore, that people are said to be unanimous, and, among these, about matters of consequence and in which it is possible for both or all parties to get what they want; [30] e.g. a city is unanimous when all its citizens think that the offices in it should be elective, or that they should form an alliance with Sparta, or that Pittacus should be their ruler—at a time when he himself was also willing to rule. But when each of two people wishes himself to have the thing in question, like the captains in the *Phoenissai*, they are in a state of faction; for it is not unanimity when each of two parties thinks of the same thing, whatever that may be, but only when they think of the same thing in relation to the same person, e.g. when both the common people and those of the better class wish the best men to rule; for thus do all get what they [1167<sup>b</sup>1] aim at. Unanimity seems, then, to be political friendship, as indeed it is commonly said to be; for it is concerned with things that are to our interest and have an influence on our life.

Now such unanimity is found among good men; for they are unanimous both in [5] themselves and with one another, being, so to say, of one mind (for the wishes of such men are constant and not at the mercy of opposing currents like a strait of the sea), and they wish for what is just and what is advantageous, and these are the objects of their



common endeavour as well. But bad men cannot be unanimous except to a small extent, any more than they can be friends, since they aim at [10] getting more than their share of advantages, while in labour and public service they fall short of their share; and each man wishing for advantage to himself criticizes his neighbour and stands in his way; for if people do not watch it carefully the common interest is soon destroyed. The result is that they are in a state of faction, putting compulsion on each other but unwilling themselves to do what is just. [15]

7 · Benefactors are thought to love those they have benefited, more than those who have been well treated love those that have treated them well, and this is discussed as though it were paradoxical. Most people think it is because the latter are in the position of debtors and the former of creditors; and therefore as, in the [20] case of loans, debtors wish their creditors did not exist, while creditors actually take care of the safety of their debtors, so it is thought that benefactors wish the objects of their action to exist since they will then get their gratitude, while the beneficiaries take no interest in making this return. Epicharmus would perhaps declare that they [25] say this because they 'look at things on their bad side', but it is quite like human nature; for most people are forgetful, and are more anxious to be well treated than to treat others well. But the cause would seem to be more deeply rooted in the nature of things; the case of those who have lent money is not even analogous. For they [30] have no friendly feeling to their debtors, but only a wish that they may be kept safe with a view to what is to be got from them; while those who have done a service to others feel friendship and love for those they have served even if these are not of any use to them and never will be. This is what happens with craftsmen too; every man loves his own handiwork better than he would be loved by it if it came alive; and this [1168a1] happens perhaps most of all with poets; for they have an excessive love for their own poems, doting on them as if they were their children. This is what the position of benefactors is like; for that which they have treated well is their handiwork, and [5] therefore they love this more than the handiwork does its maker. The cause of this is that existence is to all men a thing to be chosen and loved, and that we exist by virtue of activity (i.e. by living and acting), and that the handiwork is in a sense, the producer in activity; he loves his handiwork, therefore, because he loves existence. And this is rooted in the nature of things; for what he is in potentiality, his handiwork manifests in activity.

[10] At the same time to the benefactor that is noble which depends on his action, so that he delights in the object of his action, whereas to the patient there is nothing noble in the agent, but at most something advantageous, and this is less pleasant and lovable. What is pleasant is the activity of the present, the hope of the future, the memory of the past; but most pleasant is that which depends on activity, and [15] similarly this is most lovable. Now for a man who has made something his work remains (for the noble is lasting), but for the person acted on the utility passes away. And the memory of noble things is pleasant, but that of useful things is not likely to be pleasant, or is less so; though the reverse seems true of expectation.

Further, love is like activity, being loved like passivity; and loving and its [20] concomitants are attributes of those who are the more active.

Again, all men love more what they have won by labour; e.g. those who have made their money love it more than those who have inherited it; and to be well treated seems to involve no labour, while to treat others well is a laborious task. [25] These are the reasons, too, why mothers are fonder of their children than fathers; bringing them into the world costs them more pains, and they know better that the children are their own. This last point, too, would seem to apply to benefactors.

8 · The question is also debated, whether a man should love himself most, or some one else. People criticize those who love themselves most, and call them [30] self-lovers, using this as an epithet of disgrace, and a bad man seems to do everything for his own sake, and the more so the more wicked he is—and so men reproach him, for instance, with doing nothing of his own accord—while the good man acts for honour's sake, and the more so the better he is, and acts for his friend's sake, and sacrifices his own interest.

But the facts clash with these arguments, and this is not surprising. For men [1168<sup>b</sup>1] say that one ought to love best one's best friend, and a man's best friend is one who wishes well to the object of his wish for his sake, even if no one is to know of it; and these attributes are found most of all in a man's attitude towards himself, and so are [5] all the other attributes by which a friend is defined; for, as we have said, it is from this relation that all the characteristics of friendship have extended to others. All the proverbs, too, agree with this, e.g. 'a single soul', and 'what friends have is common property', and 'friendship is equality', and 'charity begins at home'; for all these marks will be found most in a man's

relation to himself; he is his own best friend and therefore ought to love himself best. It is therefore a reasonable question, [10] which of the two views we should follow; for both are plausible.

Perhaps we ought to mark off such arguments from each other and determine how far and in what respects each view is right. Now if we grasp the sense in which each party uses the phrase 'lover of self', the truth may become evident. Those who use the term as one of reproach ascribe self-love to people who assign to themselves [15] the greater share of wealth, honours, and bodily pleasures; for these are what most people desire, and busy themselves about as though they were the best of all things, which is the reason, too, why they become objects of competition. So those who are grasping with regard to these things gratify their appetites and in general their feelings and the irrational element of the soul; and most men are of this nature thus [20] the epithet has taken its meaning from the prevailing type of self-love, which is a bad one); it is just, therefore, that men who are lovers of self in this way are reproached for being so. That it is those who give themselves the preference in regard to objects of this sort that most people usually call lovers of self is plain; for if a man were always anxious that he himself, above all things, should act justly, [25] temperately, or in accordance with any other of the excellences, and in general were always to try to secure for himself the honourable course, no one will call such a man a lover of self or blame him.

But such a man would seem more than the other a lover of self; at all events he assigns to himself the things that are noblest and best, and gratifies the most [30] authoritative element in himself and in all things obeys this; and just as a city or any other systematic whole is most properly identified with the most authoritative element in it, so is a man; and therefore the man who loves this and gratifies it is most of all a lover of self. Besides, a man is said to have or not to have self-control according as his intellect has or has not the control, on the assumption that this is the man himself; and the things men have done from reason are thought most properly their own acts and voluntary acts. That this is the man himself, then, or is [1169<sup>a</sup>1] so more than anything else, is plain, and also that the good man loves most this part of him. Whence it follows that he is most truly a lover of self, of another type than that which is a matter of reproach, and as different from that as living according to reason is from living as passion dictates, and desiring what is noble from desiring [5] what seems advantageous. Those, then, who busy themselves in an exceptional degree with noble actions all men approve and praise; and if

*all* were to strive towards what is noble and strain every nerve to do the noblest deeds, everything would be as it should be for the common good, and every one would secure for [10] himself the goods that are greatest, since excellence is the greatest of goods.

Therefore the good man should be a lover of self (for he will both himself profit by doing noble acts, and will benefit his fellows), but the wicked man should not; for he will hurt both himself and his neighbours, following as he does evil passions. For [15] the wicked man, what he does clashes with what he ought to do, but what the good man ought to do he does; for the intellect always chooses what is best for itself, and the good man obeys his intellect. It is true of the good man too that he does many acts for the sake of his friends and his country, and if necessary dies for them; for he [20] will throw away both wealth and honours and in general the goods that are objects of competition, gaining for himself nobility; since he would prefer a short period of intense pleasure to a long one of mild enjoyment, a twelvemonth of noble life to many years of humdrum existence, and one great and noble action to many trivial [25] ones. Now those who die for others doubtless attain this result; it is therefore a great prize that they choose for themselves. They will throw away wealth too on condition that their friends will gain more; for while a man's friend gains wealth he himself achieves nobility; he is therefore assigning the greater good to himself. The same too [30] is true of honour and office; all these things he will sacrifice to his friend; for this is noble and laudable for himself. Rightly then is he thought to be good, since he chooses nobility before all else. But he may even give up actions to his friend; it may be nobler to become the cause of his friend's acting than to act himself. In all the actions, therefore, that men are praised for, the good man is seen to assign to [1169<sup>b</sup>1] himself the greater share in what is noble. In this sense, then, as has been said, a man should be a lover of self; but in the sense in which most men are so, he ought not.

9 · It is also disputed whether the happy man will need friends or not. It is said that those who are blessed and self-sufficient have no need of friends; for they [5] have the things that are good, and therefore being self-sufficient they need nothing further while a friend, being another self, furnishes what a man cannot provide by his own effort; whence the saying 'when fortune is kind, what need of friends?'<sup>75</sup> But it seems strange, when one assigns all good things to the happy man, not to assign [10] friends, who are thought the greatest of external goods. And if it is

more characteristic of a friend to do well by another than to be well done by, and to confer benefits is characteristic of the good man and of excellence, and it is nobler to do well by friends than by strangers, the good man will need people to do well by. This is why the question is asked whether we need friends more in prosperity or in [15] adversity, on the assumption that not only does a man in adversity need people to confer benefits on him, but also those who are prospering need people to do well by. Surely it is strange, too, to make the blessed man a solitary; for no one would choose to possess all good things on condition of being alone, since man is a political creature and one whose nature is to live with others. Therefore even the happy man lives with others; for he has the things that are by nature good. And plainly it is [20] better to spend his days with friends and good men than with strangers or any chance persons. Therefore the happy man needs friends.

What then is it that the first party means, and in what respect is it right? Is it that most men identify friends with useful people? Of such friends indeed the blessed man will have no need, since he already has the things that are good; nor will [25] he need those whom one makes one's friends because of their pleasantness, or he will need them only to a small extent (for his life, being pleasant, has no need of adventitious pleasure); and because he does not need *such* friends he is thought not to need friends.

But that is surely not true. For we have said at the outset that happiness is an activity; and activity plainly comes into being and is not present at the start like a [30] piece of property. If happiness lies in living and being active, and the good man's activity is virtuous and pleasant in itself, as we have said at the outset, and if a thing's being one's own is one of the attributes that make it pleasant, and if we can contemplate our neighbours better than ourselves and their actions better than our own, and if the actions of virtuous men who are their friends are pleasant to good men (since these have both the attributes that are naturally pleasant)—if this be [1170<sup>a</sup>1] so, the blessed man will need friends of this sort, since he chooses to contemplate worthy actions and actions that are his own, and the actions of a good man who is his friend have both these qualities.

Further, men think that the happy man ought to live pleasantly. Now if he were a solitary, life would be hard for him; for by oneself it is not easy to be [5] continuously active; but with others and towards others it is easier. With others therefore his activity will be more continuous, being in itself pleasant, as it ought to be for the man who is blessed; for a good

man *qua* good delights in excellent actions and is vexed at vicious ones, as a musical man enjoys beautiful tunes but is pained at [10] bad ones. A certain training in excellence arises also from the company of the good, as Theognis remarks.

If we look deeper into the nature of things, a virtuous friend seems to be naturally desirable for a virtuous man. For that which is good by nature, we have said, is for the virtuous man good and pleasant in itself. Now life is defined in the [15] case of animals by the power of perception, in that of man by the power of perception or thought; and a power is referred to the corresponding activity, which is the essential thing; therefore life seems to be essentially perceiving or thinking. And life is among the things that are good and pleasant in themselves, since it is [20] determinate and the determinate is of the nature of the good; and that which is good by nature is also good for the virtuous man (which is the reason why life seems pleasant to all men); but we must not apply this to a wicked and corrupt life nor to a life spent in pain; for such a life is indeterminate, as are its attributes. The nature of pain will become plainer in what follows. But if life itself is good and pleasant [25] (which it seems to be, from the very fact that all men desire it, and particularly those who are good and blessed; for to such men life is most desirable, and their existence is the most blessed; and if he who sees perceives that he sees, and he who hears, that he hears, and he who walks, that he walks, and in the case of all other [30] activities similarly there is something which perceives that we are active, so that if we perceive, we perceive that we perceive, and if we think, that we think; and if to perceive that we perceive or think is to perceive that we exist (for existence was defined as perceiving or thinking); and if perceiving that one lives is one of the [1170<sup>b1</sup>] things that are pleasant in themselves (for life is by nature good, and to perceive what is good present in oneself is pleasant); and if life is desirable, and particularly so for good men, because to them existence is good and pleasant (for they are [5] pleased at the consciousness of what is in itself good); and if as the virtuous man is to himself, he is to his friend also (for his friend is another self):—then as his own existence is desirable for each man, so, or almost so, is that of his friend. Now his existence was seen to be desirable because he perceived his own goodness, and such [10] perception is pleasant in itself. He needs, therefore, to be conscious of the existence of his friend as well, and this will be realized in their living together and sharing in discussion and thought; for this is what living together would seem to mean in the case of man, and not, as in the case of cattle, feeding in the

same place.

If, then, existence is in itself desirable for the blessed man (since it is by its [15] nature good and pleasant), and that of his friend is very much the same, a friend will be one of the things that are desirable. Now that which is desirable for him he must have, or he will be deficient in this respect. The man who is to be happy will therefore need virtuous friends.

[20] **10** · Should we, then, make as many friends as possible, or—as in the case of hospitality it is thought to be suitable advice, that one should be ‘neither a man of many guests nor a man with none<sup>76</sup>—will that apply to friendship as well; should a man neither be friendless nor have an excessive number of friends?

To friends made with a view to *utility* this saying would seem thoroughly [25] applicable; for to do services to many people in return is a laborious task and life is not long enough for its performance. Therefore friends in excess of those who are sufficient for our own life are superfluous, and hindrances to the noble life; so that we have no need of them. Of friends made with a view to *pleasure*, also, few are enough, as a little seasoning in food is enough.

But as regards *good* friends, should we have as many as possible, or is there a [30] limit to the number of one’s friends, as there is to the size of a city? You cannot make a city of ten men, and if there are a hundred thousand it is a city no longer. But the proper number is presumably not a single number, but anything that falls [1171<sup>a</sup>1] between certain fixed points. So for friends too there is a fixed number—perhaps the largest number with whom one can live together (for that, we found, is thought to be most characteristic of friendship); and that one cannot live with many people and divide oneself up among them is plain. Further, they too must be friends of one [5] another, if they are all to spend their days together; and it is a hard business for this condition to be fulfilled with a large number. It is found difficult, too, to rejoice and to grieve in an intimate way with many people, for it may likely happen that one has at once to be merry with one friend and to mourn with another. Presumably, then, it is well not to seek to have as many friends as possible, but as many as are enough for [10] the purpose of living together; for it would seem actually impossible to be a great friend to many people. This is why one cannot love several people; love tends to be a sort of excess friendship, and that can only be felt towards one person; therefore great friendship too can only be felt towards a few people. This

seems to be confirmed in practice; for we do not find many people who are friends in the comradely way of friendship, and the famous friendships of this sort are always [15] between two people. Those who have many friends and mix intimately with them all are thought to be no one's friend, except in the way proper to fellow-citizens, and such people are also called obsequious. In the way proper to fellow-citizens, indeed, it is possible to be the friend of many and yet not be obsequious but a genuinely good man; but one cannot have with many people the friendship based on excellence and on the character of our friends themselves, and we must be content if we find even a [20] few such.

11 · Do we need friends more in good fortune or in bad? They are sought after in both; for while men in adversity need help, in prosperity they need people to live with and to make the objects of their beneficence; for they wish to do well by others. Friendship, then, is more necessary in bad fortune, and so it is useful friends [25] that one wants in this case; but it is more noble in good fortune, and so we also seek for good men as our friends, since it is more desirable to confer benefits on these and to live with these. For the very presence of friends is pleasant both in good fortune and also in bad, since grief is lightened when friends sorrow with us. Hence one [30] might ask whether they share as it were our burden, or—without that happening—their presence by its pleasantness, and the thought of their grieving with us, make our pain less. Whether it is for these reasons or for some other that our grief is lightened, is a question that may be dismissed; at all events what we have described appears to take place.

But their presence seems to contain a mixture of various factors. The very seeing of one's friends is pleasant, especially if one is in adversity, and becomes a [1171<sup>b</sup>1] safeguard against grief (for a friend tends to comfort us both by the sight of him and by his words, if he is tactful, since he knows our character and the things that please or pain us); but to see him pained at our misfortunes is painful; for every one shuns [5] being a cause of pain to his friends. For this reason people of a manly nature guard against making their friends grieve with them, and, unless he be exceptionally insensible to pain, such a man cannot stand the pain that ensues for his friends, and in general does not admit fellow-mourners because he is not himself given to mourning; but women and womanly men enjoy sympathisers in their grief, and love [10] them as friends and companions in sorrow. But in all things one obviously ought to imitate



the better type of person.

On the other hand, the presence of friends in our *prosperity* implies both a pleasant passing of our time and the thought of their pleasure at our own good fortune. For this cause it would seem that we ought to summon our friends readily [15] to share our good fortunes (for the beneficent character is a noble one), but summon them to our bad fortunes with hesitation; for we ought to give them as little a share as possible in our evils—whence the saying ‘enough is *my* misfortune’. We should summon friends to us most of all when they are likely by suffering a few inconveniences to do us a great service.

[20] Conversely, it is fitting to go unasked and readily to the aid of those in adversity (for it is characteristic of a friend to render services, and especially to those who are in need and have not demanded them; such action is nobler and pleasanter for both persons); but when our friends are prosperous we should join readily in their activities (for they need friends for these too), but be tardy in [25] coming forward to be the objects of their kindness; for it is not noble to be keen to receive benefits. Still, we must no doubt avoid getting the reputation of kill-joys by repulsing them; for that sometimes happens.

The presence of friends, then, seems desirable in all circumstances.

12 · Does it not follow, then, that, as for lovers the sight of the beloved is the [30] thing they love most, and they prefer this sense to the others because on it love depends most for its being and for its origin, so for friends the most desirable thing is living together? For friendship is a partnership, and as a man is to himself, so is he to his friend; now in his own case the perception of his existence is desirable, and so therefore is that of his friend’s, and the activity of this perception is produced when [1172<sup>a1</sup>] they live together, so that it is natural that they aim at this. And whatever existence means for each class of men, whatever it is for whose sake they value life, in *that* they wish to occupy themselves with their friends; and so some drink together, others dice together, others join in athletic exercises and hunting, or in the study of [5] philosophy, each class spending their days together in whatever they love most in life; for since they wish to live with their friends, they do and share in those things as far as they can.<sup>77</sup> Thus the friendship of bad men turns out an evil thing (for because of their instability they unite in bad pursuits, and besides they become evil by [10] becoming like each other), while the friendship of good men is good, being augmented by their

companionship; and they are thought to become better too by their activities and by improving each other; for from each other they take the mould of the characteristics they approve—whence the saying ‘noble deeds from [15] noble men’<sup>78</sup>—So much, then, for friendship; our next task must be to discuss pleasure.

# BOOK X

1 · After these matters we ought perhaps next to discuss pleasure. For it is [20] thought to be most intimately connected with our human nature, which is the reason why in educating the young we steer them by the rudders of pleasure and pain; it is thought, too, that to enjoy the things we ought and to hate the things we ought has the greatest bearing on excellence of character. For these things extend right through life, with a weight and power of their own in respect both to excellence and to the happy life, since men choose what is pleasant and avoid what is painful; [25] and such things, it will be thought, we should least of all omit to discuss, especially since they admit of much dispute. For some say pleasure is the good, while others, on the contrary, say it is thoroughly bad—some no doubt being persuaded that the facts are so, and others thinking it has a better effect on our life to exhibit pleasure [30] as a bad thing even if it is not; for most people (they think) incline towards it and are the slaves of their pleasures, for which reason they ought to lead them in the opposite direction, since thus they will reach the middle state. But surely this is not correct. For arguments about matters concerned with feelings and actions are less [35] reliable than facts: and so when they clash with the facts of perception they are despised, and discredit the truth as well; if a man who runs down pleasure is once [1172<sup>b</sup>1] seen to be aiming at it, his inclining towards it is thought to imply that it is all worthy of being aimed at; for most people are not good at drawing distinctions. True arguments seem, then, most useful, not only with a view to knowledge, but with a [5] view to life also; for since they harmonize with the facts they are believed, and so they stimulate those who understand them to live according to them.—Enough of such questions; let us proceed to review the opinions that have been expressed about pleasure.

2 · Eudoxus thought pleasure was the good because he saw all things, both rational and irrational, aiming at it, and because in all things that which is the [10] object of choice is what is excellent, and that which is most the object of choice the greatest good; thus the fact that all things moved towards the same object indicated that this was for all things the chief good (for each thing, he argued, finds its own good, as it finds its own nourishment); and that which is good for all things and at which all

aim was *the* good. His arguments were credited more because of the [15] excellence of his character than for their own sake; he was thought to be remarkably temperate, and therefore it was thought that he was not saying what he did say as a friend of pleasure, but that the facts really were so. He believed that the same conclusion followed no less plainly from a study of the contrary of pleasure; pain was in itself an object of aversion to all things, and therefore its contrary must be similarly an object of choice. And again that is most an object of choice which we [20] choose not because or for the sake of something else, and pleasure is admittedly of this nature; for no one asks to what end he is pleased, thus implying that pleasure is in itself an object of choice. Further, he argued that pleasure when added to any good, e.g. to just or temperate action, makes it more worthy of choice, and that it is [25] only by itself that the good can be increased.

*This* argument seems to show it to be one of the goods, and no more a good than any other; for every good is more worthy of choice along with another good than taken alone. And so it is by an argument of this kind that Plato<sup>79</sup> proves the good *not* to be pleasure; he argues that the pleasant life is more desirable with [30] wisdom than without, and that if the mixture is better, pleasure is not the good; for the good cannot become more desirable by the addition of anything to it. Now it is clear that nothing else either can be the good if it is made more desirable by the addition of any of the things that are good in themselves. What, then, is there that satisfies this criterion, which at the same time we can participate in? It is something of this sort that we are looking for.

[1173<sup>a</sup>1] Those who object that that at which all things aim is not necessarily good are talking nonsense. For we say that that which everyone thinks really is so; and the man who attacks this belief will hardly have anything more credible to maintain instead. If it is senseless creatures that desire the things in question, there might be something in what they say; but if intelligent creatures do so as well, what sense can there be in this view? But perhaps even in inferior creatures there is some natural [5] good stronger than themselves which aims at their proper good.

Nor does the argument about the contrary of pleasure seem to be correct. They say that if pain is an evil it does not follow that pleasure is a good; for evil is opposed to evil and at the same time both are opposed to the neutral state—which is correct enough but does not apply to the things in question. For if both belonged to the class [10] of evils they ought both to be objects of aversion, while if they belonged to the class of

neutrals neither should be or they should both be equally so; but in fact people evidently avoid the one as evil and choose the other as good; that then must be the nature of the opposition between them.

3 · Nor again, if pleasure is not a quality, does it follow that it is not a good; [15] for the activities of excellence are not qualities either, nor is happiness.

They say, however, that the good is determinate, while pleasure is indeterminate, because it admits of degrees. Now if it is from the feeling of pleasure that they judge thus, the same will be true of justice and the other excellences in respect of which we plainly say that people of a certain character are so more or less, and act [20] more or less in accordance with these excellences; for people may be more just or brave, and it is possible also to act justly or temperately more or less. But if their judgement is based on the various pleasures, surely they are not stating the cause, if in fact some pleasures are unmixed and others mixed. Again, just as health admits [25] of degrees without being indeterminate, why should not pleasure? The same proportion is not found in all things, nor a single proportion always in the same thing, but it may be relaxed and yet persist up to a point, and it may differ in degree. The case of pleasure also may therefore be of this kind.

Again, they assume that the good is complete while movements and comings [30] into being are incomplete and try to exhibit pleasure as being a movement and a coming into being. But they do not seem to be right, nor does it seem to be a movement.<sup>80</sup> For speed and slowness are thought to be proper to every movement, if not in itself (as e.g. that of the heavens) then in relation to something else; but of pleasure neither of these things is true. For while we may *become* pleased quickly as we may become angry quickly, we cannot *be* pleased quickly, not even in relation to [1173<sup>b</sup>1] some one else, while we *can* walk, or grow, or the like, quickly. While, then, we can change quickly or slowly into a state of pleasure, we cannot quickly exhibit the activity of pleasure, i.e. be pleased. Again, how can it be a coming into being? It is not thought that any chance thing can come out of any chance thing, but that a [5] thing is dissolved into that out of which it comes into being; and pain would be the destruction of that of which pleasure is the coming into being.

They say, too, that pain is the lack of that which is according to nature, and pleasure is replenishment. But these experiences are bodily. If then pleasure is replenishment with that which is according to nature,

that which feels pleasure will [10] be that in which the replenishment takes place, i.e. the body; but that is not thought to be the case; therefore the replenishment is not pleasure, though one might be pleased when replenishment was taking place, just as one would be pained if one was being operated on. This opinion seems to be based on the pains and pleasures connected with nutrition; on the fact that when people have been short of food and have felt pain beforehand they are pleased by the replenishment. But this does not [15] happen with all pleasures; for the pleasures of learning and, among the sensuous pleasures, those of smell, and also many sounds and sights, and memories and hopes, do not presuppose pain. Of what then will these be the coming into being? There has not been lack of anything of which they could be the replenishment. [20]

In reply to those who bring forward the disgraceful pleasures one may say that these are not pleasant; if things are pleasant to people of vicious constitution, we must not suppose that they are also pleasant to others than these, just as we do not reason so about the things that are wholesome or sweet or bitter to sick people, or ascribe whiteness to the things that seem white to those suffering from a disease of [25] the eye. Or one might answer thus—that the pleasures are desirable, but not from *these* sources, as wealth is desirable, but not as the reward of betrayal, and health, but not at the cost of eating anything and everything. Or perhaps pleasures differ in kind; for those derived from noble sources are different from those derived from base sources, and one cannot get the pleasure of the just man without being just, nor [30] that of the musical man without being musical, and so on.

The fact, too, that a friend is different from a flatterer seems to make it plain that pleasure is not a good or that pleasures are different in kind; for the one is thought to consort with us with a view to the good, the other with a view to our pleasure, and the one is reproached for his conduct while the other is praised on the ground that he consorts with us for different ends. And no one would choose to live [1174a1] with the intellect of a child throughout his life, however much he were to be pleased at the things that children are pleased at, nor to get enjoyment by doing some most disgraceful deed, though he were never to feel any pain in consequence. And there are many things we should be keen about even if they brought no pleasure, e.g. [5] seeing, remembering, knowing, possessing the excellences. If pleasures necessarily do accompany these, that makes no odds; we should choose these even if no pleasure resulted. It seems to be clear, then, that neither is pleasure the good nor is all [10]

pleasure desirable, and that some pleasures *are* desirable in themselves, differing in kind or in their sources from the others. So much for the things that are said about pleasure and pain.

4 · What pleasure is, or what kind of thing it is, will become plainer if we take up the question again from the beginning. Seeing seems to be at any moment [15] complete, for it does not lack anything which coming into being later will complete its form; and pleasure also seems to be of this nature. For it is a whole, and at no time can one find a pleasure whose form will be completed if the pleasure lasts longer. For this reason, too, it is not a movement. For every movement (e.g. that of [20] building) takes time and is for the sake of an end, and is complete when it has made what it aims at. It is complete, therefore, only in the whole time or at the final moment. In their parts and during the time they occupy, all movements are incomplete, and are different in kind from the whole movement and from each other. For the fitting together of the stones is different from the fluting of the column, and these are both different from the making of the temple; and the making [25] of the temple is complete (for it lacks nothing with a view to the end proposed), but the making of the base or of the triglyph is incomplete; for each is the making of a part. They differ in kind, then, and it is not possible to find at any and every time a movement complete in form, but if at all, only in the whole time. So, too, in the case [30] of walking and all other movements. For if locomotion is a movement from here to there, it, too, has differences in kind—flying, walking, leaping, and so on. And not only so, but in walking itself there are such differences; for the whence and whither are not the same in the whole racecourse and in a part of it, nor in one part and in another, nor is it the same thing to traverse this line and that; for one traverses not [1174<sup>b</sup>1] only a line but one which is in a place, and this one is in a different place from that. We have discussed movement with precision in another work, but it seems that it is not complete at any and every time, but that the many movements are incomplete [5] and different in kind, since the whence and whither give them their form. But of pleasure the form is complete at any and every time. Plainly, then, pleasure and movement must be different from each other, and pleasure must be one of the things that are whole and complete. This would seem to be the case, too, from the fact that it is not possible to move otherwise than in time, but it is possible to be pleased; for that which takes place in a moment is a whole.

From these considerations it is clear, too, that these thinkers are not right in [10] saying there is a movement or a coming into being of pleasure.<sup>81</sup> For these cannot be ascribed to all things, but only to those that are divisible and not wholes; there is no coming into being of seeing nor of a point nor of a unit, nor is any of these a movement or coming into being; therefore there is none of pleasure either; for it is a whole.

Since every sense is active in relation to its object, and a sense which is in good condition acts completely in relation to the most beautiful of its objects (for [15] complete activity seems to be especially of this nature; whether we say that *it* is active, or the organ in which it resides, may be assumed to be immaterial), it follows that in the case of each sense the best activity is that of the best-conditioned organ in relation to the finest of its objects. And this activity will be the most complete and pleasant. For, while there is pleasure in respect of any sense, and in respect of [20] thought and contemplation no less, the most complete is pleasantest, and that of a well-conditioned organ in relation to the worthiest of its objects is the most complete; and the pleasure completes the activity. But the pleasure does not complete it in the same way as the object perceived and the faculty of perception, if they are good, do—just as health and the doctor are not in the same way the cause [25] of a man's being healthy. (That pleasure is produced in respect to each sense is plain; for we speak of sights and sounds as pleasant. It is also plain that it arises most of all when both the sense is at its best and it is active in reference to an object which corresponds; when both object and perceiver are of the best there will always [30] be pleasure, since the requisite agent and patient are both present.) Pleasure completes the activity not as the inherent state does, but as an end which supervenes as the bloom of youth does on those in the flower of their age. So long, then, as both the intelligible or sensible object and the discriminating or contemplative faculty are as they should be, the pleasure will be involved in the activity; for when both the [1175<sup>a</sup>1] passive and the active factor are unchanged and are related to each other in the same way, the same result naturally follows.

How, then, is it that no one is continuously pleased? Is it that we grow weary? Certainly all human things are incapable of continuous activity. Therefore pleasure also is not continuous; for it accompanies activity. Some things delight us when they [5] are new, but later do so less, for the same reason; for at first the mind is in a state of stimulation and intensely active about them, as people are with respect to their vision when they look hard at a thing, but afterwards our activity is not of this kind, but has grown relaxed; for which reason the pleasure also is dulled.



One might think that all men desire pleasure because they all aim at life; life is an activity, and each man is active about those things and with those faculties that he loves most; e.g. the musician is active with his hearing in reference to tunes, the student with his mind in reference to theoretical questions, and so on in each case; [15] now pleasure completes the activities, and therefore life, which they desire. It is with good reason, then, that they aim at pleasure too, since for everyone it completes life, which is desirable. But whether we choose life for the sake of pleasure or pleasure for the sake of life is a question we may dismiss for the present. For they seem to be bound up together and not to admit of separation, since without activity [20] pleasure does not arise, and every activity is completed by pleasure.

5 · For this reason pleasures seem, too, to differ in kind. For things different in kind are, we think, completed by different things (we see this to be true both of natural objects and of things produced by art, e.g. animals, trees, a painting, a [25] sculpture, a house, an implement); and, similarly, we think that activities differing in kind are completed by things differing in kind. Now the activities of thought differ from those of the senses, and among themselves, in kind; so, therefore, do the pleasures that complete them.

This may be seen, too, from the fact that each of the pleasures is bound up with [30] the activity it completes. For an activity is intensified by its proper pleasure, since each class of things is better judged of and brought to precision by those who engage in the activity with pleasure; e.g. it is those who enjoy geometrical thinking that become geometers and grasp the various propositions better, and, similarly, those [35] who are fond of music or of building, and so on, make progress in their proper function by enjoying it; and the pleasures intensify the activities, and what [1175<sup>b</sup>1] intensifies a thing is proper to it, but things different in kind have properties different in kind.

This will be even more apparent from the fact that activities are hindered by pleasures arising from other sources. For people who are fond of playing the flute are incapable of attending to arguments if they overhear some one playing the flute, [5] since they enjoy flute-playing more than the activity in hand; so the pleasure connected with flute-playing destroys the activity concerned with argument. This happens, similarly, in all other cases, when one is active about two things at once;

the more pleasant activity drives out the other, and if it is much more pleasant does so all the more, so that one even ceases from the other. This is why when we enjoy [10] anything very much we do not throw ourselves into anything else, and do one thing only when we are not much pleased by another; e.g. in the theatre the people who eat sweets do so most when the actors are poor. Now since activities are made [15] precise and more enduring and better by their proper pleasure, and injured by alien pleasures, evidently the two kinds of pleasure are far apart. For alien pleasures do pretty much what proper pains do, since activities are destroyed by their proper pains; e.g. if a man finds writing or doing sums unpleasant and painful, he does not [20] write, or does not do sums, because the activity is painful. So an activity suffers contrary effects from its proper pleasures and pains, i.e. from those that supervene on it in virtue of its own nature. And alien pleasures have been stated to do much the same as pain; they destroy the activity, only not to the same degree.

Now since activities differ in respect of goodness and badness, and some are [25] worthy to be chosen, others to be avoided, and others neutral, so, too, are the pleasures; for to each activity there is a proper pleasure. The pleasure proper to a worthy activity is good and that proper to an unworthy activity bad; just as the appetites for noble objects are laudable, those for base objects culpable. But the [30] pleasures involved in activities are more proper to them than the desires; for the latter are separated both in time and in nature, while the former are close to the activities, and so hard to distinguish from them that it admits of dispute whether the activity is not the same as the pleasure. (Still, pleasure does not seem to *be* thought [35] or perception—that would be strange; but because they are not found apart they appear to some people the same.) As activities are different, then, so are the [1176<sup>a</sup>1] corresponding pleasures. Now sight is superior to touch in purity, and hearing and smell to taste; the pleasures, therefore, are similarly superior, and those of thought superior to these, and within each of the two kinds some are superior to others.

Each animal is thought to have a proper pleasure, as it has a proper function; viz. that which corresponds to its activity. If we survey them species by species, too, [5] this will be evident; horse, dog, and man have different pleasures, as Heraclitus says ‘asses would prefer sweepings to gold’;<sup>82</sup> for food is pleasanter than gold to asses. So the pleasures of creatures different in kind differ in kind, and it is plausible to suppose that those of a single species do not differ. But they vary to no small

extent, in the case of men at least; the same things delight some people and pain others, and [10] are painful and odious to some, and pleasant to and liked by others. This happens, too, in the case of sweet things; the same things do not seem sweet to a man in a fever and a healthy man—nor hot to a weak man and one in good condition. The same happens in other cases. But in all such matters that which appears to the good [15] man is thought to be really so. If this is correct, as it seems to be, and excellence and the good man as such are the measure of each thing, those also will be pleasures which appear so to him, and those things pleasant which he enjoys. If the things he finds tiresome seem pleasant to some one, that is nothing surprising; for men may be [20] ruined and spoilt in many ways; but the things are not pleasant, but only pleasant to these people and to people in this condition. Those which are admittedly disgraceful plainly should not be said to be pleasures, except to a perverted taste; but of those that are thought to be good what kind of pleasure or what pleasure should be said to be that proper to man? Is it not plain from the corresponding activities? The [25] pleasures follow these. Whether, then, the complete and blessed man has one or more activities, the pleasures that complete these will be said in the strict sense to be pleasures proper to man, and the rest will be so in a secondary and fractional way, as are the activities.

6 · Now that we have spoken of the excellences, the forms of friendship, and [30] the varieties of pleasure, what remains is to discuss in outline the nature of happiness, since this is what we state the end of human nature to be. Our discussion will be the more concise if we first sum up what we have said already. We said, then, that it is not a state; for if it were it might belong to some one who was asleep throughout his life, living the life of a plant, or, again, to some one who was suffering the greatest misfortunes. If these implications are unacceptable, and we must rather class happiness as an activity, as we have said before, and if some [1176<sup>b</sup>1] activities are necessary and desirable for the sake of something else, while others are so in themselves, evidently happiness must be placed among those desirable in themselves, not among those desirable for the sake of something else; for happiness does not lack anything, but is self-sufficient. Now those activities are desirable in [5] themselves from which nothing is sought beyond the activity. And of this nature excellent actions are thought to be; for to do noble and good deeds is a thing desirable for its own sake.

Pleasant amusements also are thought to be of this nature; we choose them not for the sake of other things; for we are injured rather than benefited by them, since [10] we are led to neglect our bodies and our property. But most of the people who are deemed happy take refuge in such pastimes, which is the reason why those who are ready-witted at them are highly esteemed at the courts of tyrants; they make [15] themselves pleasant companions in the tyrant's favourite pursuits, and that is the sort of man they want. Now these things are thought to be of the nature of happiness because people in despotic positions spend their leisure in them, but perhaps such people prove nothing; for excellence and thought, from which good activities flow, do not depend on despotic position; nor, if these people, who have [20] never tasted pure and generous pleasure, take refuge in the bodily pleasures, should these for that reason be thought more desirable; for boys, too, think the things that are valued among themselves are the best. It is to be expected, then, that, as different things seem valuable to boys and to men, so they should to bad men and to [25] good. Now, as we have often maintained, those things are both valuable and pleasant which are such to the good man; and to each man the activity in accordance with his own state is most desirable, and, therefore, to the good man that which is in accordance with excellence. Happiness, therefore, does not lie in amusement; it would, indeed, be strange if the end were amusement, and one were [30] to take trouble and suffer hardship all one's life in order to amuse oneself. For, in a word, everything that we choose we choose for the sake of something else—except happiness, which is an end. Now to exert oneself and work for the sake of amusement seems silly and utterly childish. But to amuse oneself in order that one may exert oneself, as Anacharsis puts it, seems right; for amusement is a sort of relaxation, and we need relaxation because we cannot work continuously. Relaxation, [1177<sup>a</sup>1] then, is not an end; for it is taken for the sake of activity.

The happy life is thought to be one of excellence; now an excellent life requires exertion, and does not consist in amusement. And we say that serious things are better than laughable things and those connected with amusement, and that the [5] activity of the better of any two things—whether it be two parts or two men—is the better; but the activity of the better is *ipso facto* superior and more of the nature of happiness. And any chance person—even a slave—can enjoy the bodily pleasures no less than the best man; but no one assigns to a slave a share in happiness—unless he assigns to him also a share in human life. For happiness does not lie in such [10] occupations, but, as we have said before, in excellent

activities.

7 · If happiness is activity in accordance with excellence, it is reasonable that it should be in accordance with the highest excellence; and this will be that of the best thing in us. Whether it be intellect or something else that is this element which [15] is thought to be our natural ruler and guide and to take thought of things noble and divine, whether it be itself also divine or only the most divine element in us, the activity of this in accordance with its proper excellence will be complete happiness. That this activity is contemplative we have already said.

Now this would seem to be in agreement both with what we said before and [20] with the truth. For this activity is the best (since not only is intellect the best thing in us, but the objects of intellect are the best of knowable objects); and, secondly, it is the most continuous, since we can contemplate truth more continuously than we can *do* anything. And we think happiness has pleasure mingled with it, but the activity of wisdom is admittedly the pleasantest of excellent activities; at all events philosophy is thought to offer pleasures marvellous for their purity and their [25] enduringness, and it is to be expected that those who know will pass their time more pleasantly than those who inquire. And the self-sufficiency that is spoken of must belong most to the contemplative activity. For while a wise man, as well as a just man and the rest, needs the necessities of life, when they are sufficiently equipped with things of that sort the just man needs people towards whom and with whom he [30] shall act justly, and the temperate man, the brave man, and each of the others is in the same case, but the wise man, even when by himself, can contemplate truth, and the better the wiser he is; he can perhaps do so better if he has fellow-workers, but still he is the most self-sufficient. And this activity alone would seem to be loved for [1177<sup>b</sup>1] its own sake; for nothing arises from it apart from the contemplating, while from practical activities we gain more or less apart from the action. And happiness is thought to depend on leisure; for we are busy that we may have leisure, and make [5] war that we may live in peace. Now the activity of the practical excellences is exhibited in political or military affairs, but the actions concerned with these seem to be unleisurely. Warlike actions are completely so (for no one chooses to be at war, or provokes war, for the sake of being at war; any one would seem absolutely [10] murderous if he were to make enemies of his friends in order to bring about battle and slaughter); but the action of the statesman

is also un leisuredly, and—apart from the political action itself—aims at despotic power and honours, or at all events happiness, for him and his fellow citizens—a happiness different from political action, and evidently sought as being different. So if among excellent actions [15] political and military actions are distinguished by nobility and greatness, and these are un leisuredly and aim at an end and are not desirable for their own sake, but the activity of intellect, which is contemplative, seems both to be superior in worth and to aim at no end beyond itself, and to have its pleasure proper to itself (and this [20] augments the activity), and the self-sufficiency, leisureliness, unweariedness (so far as this is possible for man), and all the other attributes ascribed to the blessed man are evidently those connected with this activity, it follows that this will be the complete happiness of man, if it be allowed a complete term of life (for none of the [25] attributes of happiness is *incomplete*).

But such a life would be too high for man; for it is not in so far as he is man that he will live so, but in so far as something divine is present in him; and by so much as this is superior to our composite nature is its activity superior to that which is the exercise of the other kind of excellence. If intellect is divine, then, in comparison [30] with man, the life according to it is divine in comparison with human life. But we must not follow those who advise us, being men, to think of human things, and, being mortal, of mortal things, but must, so far as we can, make ourselves immortal, and strain every nerve to live in accordance with the best thing in us; for even if it be small in bulk, much more does it in power and worth surpass everything. This would [1178<sup>a</sup>1] seem, too, to be each man himself, since it is the authoritative and better part of him. It would be strange, then, if he were to choose not the life of himself but that of [5] something else. And what we said before will apply now; that which is proper to each thing is by nature best and most pleasant for each thing; for man, therefore, the life according to intellect is best and pleasantest, since intellect more than anything else *is* man. This life therefore is also the happiest.

8 · But in a secondary degree the life in accordance with the other kind of [10] excellence is happy; for the activities in accordance with this befit our human estate. Just and brave acts, and other excellent acts, we do in relation to each other, observing what is proper to each with regard to contracts and services and all manner of actions and with regard to passions; and all of these seem to be human. Some of them seem even to

arise from the body, and excellence of character to be in [15] many ways bound up with the passions. Practical wisdom, too, is linked to excellence of character, and this to practical wisdom, since the principles of practical wisdom are in accordance with the moral excellences and rightness in the moral excellences is in accordance with practical wisdom. Being connected with the [20] passions also, the moral excellences must belong to our composite nature; and the excellences of our composite nature are human; so, therefore, are the life and the happiness which correspond to these. The excellence of the intellect is a thing apart; we must be content to say this much about it, for to describe it precisely is a task greater than our purpose requires. It would seem, however, also to need external [25] equipment but little, or less than moral excellence does. Grant that both need the necessities, and do so equally, even if the statesman's work is the more concerned with the body and things of that sort; for there will be little difference there; but in what they need for the exercise of their activities there will be much difference. The liberal man will need money for the doing of his liberal deeds, and the just man too [30] will need it for the returning of services (for wishes are hard to discern, and even people who are not just pretend to wish to act justly); and the brave man will need power if he is to accomplish any of the acts that correspond to his excellence, and the temperate man will need opportunity; for how else is either he or any of the others to be recognized? It is debated, too, whether the choice or the deed is more essential to excellence, which is assumed to involve both; it is surely clear that its [1178<sup>b</sup>1] completion involves both; but for deeds many things are needed, and more, the greater and nobler the deeds are. But the man who is contemplating the truth needs no such thing, at least with a view to the exercise of his activity; indeed they are, one [5] may say, even hindrances, at all events to his contemplation; but in so far as he is a man and lives with a number of people, he chooses to do excellent acts; he will therefore need such aids to living a human life.

But that complete happiness is a contemplative activity will appear from the following consideration as well. We assume the gods to be above all other beings [10] blessed and happy; but what sort of actions must we assign to them? Acts of justice? Will not the gods seem absurd if they make contracts and return deposits, and so on? Acts of a brave man, then, confronting dangers and running risks because it is noble to do so? Or liberal acts? To whom will they give? It will be strange if they are [15] really to have money or anything of the kind. And what would their temperate acts be? Is not such praise tasteless, since they have no bad

appetites? If we were to run through them all, the circumstances of action would be found trivial and unworthy of gods. Still, every one supposes that they *live* and therefore that they are active; we cannot suppose them to sleep like Endymion. Now if you take away from a living [20] being action, and still more production, what is left but contemplation? Therefore the activity of God, which surpasses all others in blessedness, must be contemplative; and of human activities, therefore, that which is most akin to this must be most of the nature of happiness.

This is indicated, too, by the fact that the other animals have no share in happiness, being completely deprived of such activity. For while the whole life of the [25] gods is blessed, and that of men too in so far as some likeness of such activity belongs to them, none of the other animals is happy, since they in no way share in contemplation. Happiness extends, then, just so far as contemplation does, and those to whom contemplation more fully belongs are more truly happy, not [30] accidentally, but in virtue of the contemplation; for this is in itself precious. Happiness, therefore, must be some form of contemplation.

But, being a man, one will also need external prosperity; for our nature is not self-sufficient for the purpose of contemplation, but our body also must be healthy and must have food and other attention. Still, we must not think that the man who is to be happy will need many things or great things, merely because he cannot be [1179<sup>a1</sup>] blessed without external goods; for self-sufficiency and action do not depend on excess, and we can do noble acts without ruling earth and sea; for even with moderate advantages one can act excellently (this is manifest enough; for private [5] persons are thought to do worthy acts no less than despots—indeed even more); and it is enough that we should have so much as that; for the life of the man who is active in accordance with excellence will be happy. Solon, too, was perhaps sketching well the happy man when he described him as moderately furnished with externals but [10] as having done (as Solon thought) the noblest acts, and lived temperately; for one can with but moderate possessions do what one ought. Anaxagoras also seems to have supposed the happy man not to be rich nor a despot, when he said that he would not be surprised if the happy man were to seem to most people a strange [15] person; for they judge by externals, since these are all they perceive. The opinions of the wise seem, then, to harmonize with our arguments. But while even such things carry some conviction, the truth in practical matters is discerned from the facts of life; for these are the decisive factor. We must therefore survey what we have [20] already said, bringing it to the test of the facts of life, and if it



harmonizes with the facts we must accept it, but if it clashes with them we must suppose it to be mere theory. Now he who exercises his intellect and cultivates it seems to be both in the best state and most dear to the gods. For if the gods have any care for human affairs, as they are thought to have, it would be reasonable both that they should delight in [25] that which was best and most akin to them (i.e. intellect) and that they should reward those who love and honour this most, as caring for the things that are dear to them and acting both rightly and nobly. And that all these attributes belong most of all to the wise man is manifest. He, therefore, is the dearest to the gods. And he who [30] is that will presumably be also the happiest; so that in this way too the wise man will more than any other be happy.

9 · If these matters and the excellences, and also friendship and pleasure, have been dealt with sufficiently in outline, are we to suppose that our programme has reached its end? Surely, as is said, where there are things to be done the end is [1179<sup>b</sup>1] not to survey and recognize the various things, but rather to do them; with regard to excellence, then, it is not enough to know, but we must try to have and use it, or try any other way there may be of becoming good. Now if arguments were in [5] themselves enough to make men good, they would justly, as Theognis says, have won very great rewards, and such rewards should have been provided; but as things are, while they seem to have power to encourage and stimulate the generous-minded among the young, and to make a character which is gently born, and a true lover of what is noble, ready to be possessed by excellence, they are not able to encourage [10] the many to nobility and goodness. For these do not by nature obey the sense of shame, but only fear, and do not abstain from bad acts because of their baseness but through fear of punishment; living by passion they pursue their own pleasures and the means to them, and avoid the opposite pains, and have not even a conception of [15] what is noble and truly pleasant, since they have never tasted it. What argument would remould such people? It is hard, if not impossible, to remove by argument the traits that have long since been incorporated in the character; and perhaps we must be content if, when all the influences by which we are thought to become good are present, we get some tincture of excellence.

[20] Now some think that we are made good by nature, others by habituation, others by teaching. Nature's part evidently does not depend on us, but as a result of some divine causes is present in those who are

truly fortunate; while argument and teaching, we may suspect, are not powerful with all men, but the soul of the student [25] must first have been cultivated by means of habits for noble joy and noble hatred, like earth which is to nourish the seed. For he who lives as passion directs will not hear argument that dissuades him, nor understand it if he does; and how can we persuade one in such a state to change his ways? And in general passion seems to yield not to argument but to force. The character, then, must somehow be there [30] already with a kinship to excellence, loving what is noble and hating what is base.

But it is difficult to get from youth up a right training for excellence if one has not been brought up under right laws; for to live temperately and hardily is not pleasant to most people, especially when they are young. For this reason their nurture and occupations should be fixed by law; for they will not be painful when [1180<sup>a</sup>1] they have become customary. But it is surely not enough that when they are young they should get the right nurture and attention; since they must, even when they are grown up, practise and be habituated to them, we shall need laws for this as well, and generally speaking to cover the whole of life; for most people obey necessity [5] rather than argument, and punishments rather than what is noble.

This is why some think that legislators ought to stimulate men to excellence and urge them forward by the motive of the noble, on the assumption that those who have been well advanced by the formation of habits will attend to such influences; and that punishments and penalties should be imposed on those who disobey and are of inferior nature, while the incurably bad should be completely banished. A good man (they think), since he lives with his mind fixed on what is noble, will submit to [10] argument, while a bad man, whose desire is for pleasure, is corrected by pain like a beast of burden. This is, too, why they say the pains inflicted should be those that are most opposed to the pleasures such men love.

However that may be, if (as we have said) the man who is to be good must be well trained and habituated, and go on to spend his time in worthy occupations and [15] neither willingly nor unwillingly do bad actions, and if this can be brought about if men live in accordance with a sort of intellect and right order, provided this has force,—if this be so, the paternal command indeed has not the required force or compulsive power (nor in general has the command of one man, unless he be a king [20] or something similar), but the law *has* compulsive power, while it is at the same time an account proceeding from a sort of practical wisdom and

intellect. And while people hate *men* who oppose their impulses, even if they oppose them rightly, the law in its ordaining of what is good is not burdensome.

In the Spartan state alone, or almost alone, the legislator seems to have paid [25] attention to questions of nurture and occupations; in most states such matters have been neglected, and each man lives as he pleases, Cyclops-fashion, 'to his own wife and children dealing law'.<sup>83</sup> Now it is best that there should be a public and proper care for such matters; but if they are neglected by the community it would seem [30] right for each man to help his children and friends towards excellence, and that they should be able or at least choose, to do this.<sup>84</sup>

It would seem from what has been said that he can do this better if he makes himself capable of legislating. For public care is plainly effected by laws, and good care by good laws; whether written or unwritten would seem to make no difference, [1180<sup>b</sup>1] nor whether they are laws providing for the education of individuals or of groups—any more than it does in the case of music or gymnastics and other such pursuits. For as in cities laws and character have force, so in households do the injunctions and the habits of the father, and these have even more because of the tie [5] of blood and the benefits he confers; for the children start with a natural affection and disposition to obey. Further, individual education has an advantage over education in common, as individual medical treatment has; for while in general rest and abstinence from food are good for a man in a fever, for a particular man they may not be; and a boxer presumably does not prescribe the same style of fighting to [10] all his pupils. It would seem, then, that the detail is worked out with more precision if the care is particular to individuals; for each person is more likely to get what suits his case.

But individuals<sup>85</sup> can be best cared for by a doctor or gymnastic instructor or any one else who has the universal knowledge of what is good for every one or for [15] people of a certain kind (for the sciences both are said to be, and are, concerned with what is common); not but what some particular detail may perhaps be well looked after by an unscientific person, if he has studied accurately in the light of experience what happens in each case, just as some people seem to be their own best doctors, though they could give no help to any one else. None the less, it will perhaps be [20] agreed that if a man does wish to become master of an art or science he must go to the universal, and come to know it as well as possible; for, as we have said, it is with this that the sciences are concerned.

And surely he who wants to make men, whether many or few, better by his [25] care must try to become capable of legislating, if it is through laws that we can become good. For to get anyone whatever—anyone who is put before us—into the right condition is not for the first chance comer; if anyone can do it, it is the man who knows, just as in medicine and all other matters which give scope for care and practical wisdom.

Must we not, then, next examine whence or how one can learn how to [30] legislate? Is it, as in all other cases, from statesmen? Certainly it was thought to be a part of statesmanship. Or is a difference apparent between statesmanship and the other sciences and faculties? In the others the same people are found offering to teach the faculties and practising them, e.g. doctors or painters; but while the sophists profess to teach politics, it is practised not by any of them but by the [1181<sup>a</sup>1] politicians, who would seem to do so by dint of a certain faculty and experience rather than of thought; for they are not found either writing or speaking about such matters (though it were a nobler occupation perhaps than composing speeches for [5] the law-courts and the assembly), nor again are they found to have made statesmen of their own sons or any other of their friends. But it was to be expected that they should if they could; for there is nothing better than such a skill that they could have left to their cities, or could choose to have for themselves, or, therefore, for those [10] dearest to them. Still, experience seems to contribute not a little; else they could not have become politicians by familiarity with politics; and so it seems that those who aim at knowing about the art of politics need experience as well.

But those of the sophists who profess the art seem to be very far from teaching it. For, to put the matter generally, they do not even know what kind of thing it is nor what kinds of things it is about; otherwise they would not have classed it as [15] identical with rhetoric or even inferior to it, nor have thought it easy to legislate by collecting the laws that are thought well of; they say it is possible to select the best laws, as though even the selection did not demand intelligence and as though right judgement were not the greatest thing, as in matters of music. For while people experienced in any department judge rightly the works produced in it, and [20] understand by what means or how they are achieved, and what harmonizes with what, the inexperienced must be content if they do not fail to see whether the work has been well or ill made—as in the case of painting. Now laws are as it were the [1181<sup>b</sup>1] works of the political art; how then can one learn from them to be a legislator, or judge which are best? Even medical men do not seem to be made by a study of text-

books. Yet people try, at any rate, to state not only the treatments, but also how particular classes of people can be cured and should be treated—distinguishing the various states; but while this seems useful to experienced people, to the ignorant it is [5] valueless. Surely, then, while collections of laws, and of constitutions also, may be serviceable to those who can study them and judge what is good or bad and what enactments suit what circumstances, those who go through such collections without a practised faculty will not have right judgement (unless it be spontaneous), though [10] they may perhaps become more intelligent in such matters.

Now our predecessors have left the subject of legislation to us unexamined; it is perhaps best, therefore, that we should ourselves study it, and in general study the question of the constitution, in order to complete to the best of our ability the philosophy of human nature. First, then, if anything has been said well in detail by [15] earlier thinkers, let us try to review it; then in the light of the constitutions we have collected let us study what sorts of influence preserve and destroy states, and what sorts preserve or destroy the particular kinds of constitution, and to what causes it is due that some are well and others ill administered. When these have been studied [20] we shall perhaps be more likely to see which constitution is best, and how each must be ordered, and what laws and customs it must use. Let us make a beginning of our discussion.

<sup>1</sup>*Works and Days* 293–7.

<sup>2</sup>Excised by Bywater.

<sup>3</sup>Omitting τάληθές.

<sup>4</sup>Omitting ψυχικάς.

<sup>5</sup>Omitting κατ' ἀρετήν.

<sup>6</sup>Λόγον ἔχειν means (i) 'possess reason', (ii) 'pay heed to', 'obey', (iii) 'be rational' (in the mathematical sense).

<sup>7</sup>'Moral', here and hereafter, is used in the archaic sense of 'pertaining to character or *mores*'.

<sup>8</sup>ἠθικὴ from ἔθος.

<sup>9</sup>Reading πράττειν δεῖν.

<sup>10</sup>Reading ὥς ἄν.

<sup>11</sup>Reading ἐναντίως δὲ αὐτοῖς.

<sup>12</sup>Reading μικρᾷς τιμῆς.

<sup>13</sup>*Odyssey* XII 219.

<sup>14</sup>Reading λέγοντας . . . αὐτούς.

<sup>15</sup>Reading δοκεῖ ὃ καὶ οὐ ἔνεκα.

<sup>16</sup>Readings δέ.

<sup>17</sup>πρὸ αἰρέσεις' connected with 'πρὸ ἐτέρων αἰρετόν'.

<sup>18</sup>Reading καίτοι εἰ.

<sup>19</sup>Reading ὥς ὁ λόγος, ὑπομενεῖ τε.

<sup>20</sup>Reading ἀνδρείῳ δὴ · ἡδ' ἀνδρεία.

<sup>21</sup>*Iliad* XXII 100.

<sup>22</sup>*Iliad* VIII 148.

<sup>23</sup>See *Iliad* II 391; XV 348.

<sup>24</sup>See *Iliad* V 470; XI 11; XVI 529; *Odyssey* XXIV 318.

<sup>25</sup>Excised in Bywater.

<sup>26</sup>*Iliad* III 24.

<sup>27</sup>ἄκόλαστος ('self-indulgent') is connected with κολλάζειν ('chasten,' 'punish').

<sup>28</sup>Omitting διδωσιν.

<sup>29</sup>*Odyssey* XVII 420.

<sup>30</sup>Omitting ἡ μεγαλοπρέπεια.

<sup>31</sup>Omitting ὥς.

<sup>32</sup>'Ambitious' translates φιλότιμος, a compound of the form 'fond-of-such-and-such,' φιλοτοιοῦτος.

<sup>33</sup>Reading δεῖται.

<sup>34</sup>Reading τοῦ ἥ λυπεῖν.

<sup>35</sup>Omitting Bywater's καὶ εἰρωνείας.

<sup>36</sup>Reading ὥς γ' ἀλαζών.

<sup>37</sup>Reading καὶ ἀποτελεῖ τι.

<sup>38</sup>Reading ταῦτά.

<sup>39</sup>Reading ἀλλ' ὅ.

<sup>40</sup>In the MSS, and in Bywater, this sentence occurs after '... what is equal,' line 29.

<sup>41</sup>Excised in Bywater: see 1133<sup>a</sup>14–16.

<sup>42</sup>Excised by Ramsauer.

<sup>43</sup>Reading νόμον for λόγον ('reason').

<sup>44</sup>Reading ἀγνοίας for αἰτίας.

<sup>45</sup>*Iliad* VI 236.

<sup>46</sup>Reading τῷ ἐπιεικέστερον.

<sup>47</sup>Omitting οὐ δίκαιον.

<sup>50</sup>*Posterior Analytics* I 1.

<sup>51</sup>Reading ἀρχῆς.

<sup>52</sup>Omitting διό.

<sup>53</sup>Σωφροσύνη connected with σῶζειν τὴν φρόνησιν.

<sup>54</sup>Reading δεῖν for ἰδεῖν.

<sup>55</sup>Συγγνώμη, ‘forgiveness’, is a form of γνώμη, ‘judgement’.

<sup>56</sup>Bywater thinks that this sentence has been misplaced.

<sup>57</sup>Reading χρήσιμον for φρόνιμον.

<sup>58</sup>Reading οὖσιν for ἔχονσιν.

<sup>59</sup>Reading τοὺς πανούργους.

<sup>60</sup>*Iliad* XXIV 258.

<sup>61</sup>Reading περιγίνεται for παρούσης γίνεται.

<sup>62</sup>Omitting ἧ.

<sup>63</sup>*Iliad* XIV 214.

<sup>64</sup>Reading τι for τινι.

<sup>65</sup>Reading καθ’ ὑπερβολήν, καί.

<sup>66</sup>μακάριος from χαίρειν.

<sup>67</sup>Omitting ἡδεῖ.

<sup>68</sup>Retaining τις for τισιν.

<sup>69</sup>Hesiod, *Works and Days* 763.

<sup>70</sup>Placing a comma after ἀκόλαστος.

<sup>71</sup>Reading τινές.

<sup>72</sup>Euripides, *Orestes* 234.

<sup>73</sup>Excised by Cook Wilson.

<sup>74</sup>Hesiod, *Works and Days* 370.

<sup>75</sup>Euripides, *Orestes* 667.



<sup>76</sup>Hesiod, *Works and Days* 715.

<sup>77</sup>Reading ὥς οἶόν τε for οἷς οἶονται συζῆν.

<sup>78</sup>Theognis, 35.

<sup>79</sup>See *Philebus* 60BE.

<sup>80</sup>Reading κίνησις.

<sup>81</sup>Reading τῆς ἡδονῆς.

<sup>82</sup>Frag. 9 Diels-Kranz.

<sup>83</sup>*Odyssey IX* 114.

<sup>84</sup>Placing καὶ δρᾶν αὐτὸ δύνασθαι after συμβάλλεσθαι.

<sup>85</sup>Reading καθ' ἓνα.

# MAGNA MORALIA\*\*

*St. G. Stock*

## BOOK I

1 · Since our purpose is to speak about matters to do with character, we must [1181<sup>a</sup>25] first inquire of what character is a branch. To speak concisely, then, it would seem to be a branch of nothing else than statecraft. For it is not possible to act at all in affairs of state unless one is of a certain kind, to wit, good. Now to be good is to [1181<sup>b</sup>25] possess the excellences. If therefore one is to act successfully in affairs of state, one must be of a good character. The treatment of character then is, as it seems, a branch and starting-point of statecraft. And as a whole it seems to me that the subject ought rightly to be called, not Ethics, but Politics.

[1182<sup>a</sup>1] We must therefore, as it seems, speak first about excellence, both what it is and from what it comes. For it is perhaps of no use to know excellence without understanding how or from what it is to arise. We must not limit our inquiry to [5] knowing what it is, but extend it to how it is to be produced. For we wish not only to know but also ourselves to be such; and this will be impossible for us, unless we know from what and how it is to be produced. Of course, it is indispensable to know what excellence is (for it is not easy to know the source and manner of its production, if [10] one does not know what it is, any more than in the sciences); but we ought to be aware also of what others have said before us on this subject.

Pythagoras first attempted to speak about excellence, but not successfully; for by referring the excellences to numbers he submitted the excellences to a treatment which was not proper to them. For justice is not a square number.

[15] After him came Socrates, who spoke better and further about this subject, but even he was not successful. For he used to make the excellences sciences, and this is impossible. For the sciences all involve

reason, and reason is to be found in the intellectual part of the soul. So that all the excellences, according to him, are to be [20] found in the rational part of the soul. The result is that in making the excellences sciences he is doing away with the irrational part of the soul, and is thereby doing away also both with passion and character; so that he has not been successful in this respect in his treatment of the excellences.

After this Plato divided the soul into the rational and the irrational part—and in this he was right—assigning appropriate excellences to each. So far so good. But [25] after this he went astray. For he mixed up excellence with the treatment of the good, which cannot be right, not being appropriate. For in speaking about the truth of things he ought not to have discoursed upon excellence; for there is nothing common [30] to the two.

The above-mentioned, then, have touched upon the subject so far and in the way above described. The next thing will be to see what we ought to say ourselves upon the subject.

First of all, then, we must see that every science and capacity has an end, and that too a good one; for no science or capacity exists for the sake of evil. Since then [35] in every capacity the end is good, it is plain that the end of the best will be the best good. But statecraft is the best capacity, so that the end of this will be the good.<sup>1</sup> It is [1182<sup>b</sup>1] about good, then, as it seems, that we must speak, and about good not without qualification, but relatively to ourselves. For we have not to do with the good of the Gods. To speak about that is a different matter, and the inquiry is foreign to our present purpose. It is therefore about the good of the state that we must speak. [5]

But we must make a distinction here. About good in what sense of the term have we to speak? For the word is not univocal. For ‘good’ is used either of what is best in the case of each being, that is, what is desirable because of its own nature, or of that by partaking in which all other things are good, that is, the Idea of [10] Good.

Are we, then, to speak of the Idea of Good? Or not of that, but of good as the element common to all goods? For this would seem to be different from the Idea. For the Idea is a thing apart and by itself, whereas the common element exists in all: it therefore is not identical with what is apart. For that which is apart and whose nature it is to be by itself cannot possibly exist in all. Are we then to speak about this [15] indwelling good? Surely not! And why? Because the common element is that which is got by definition or by induction. Now the aim of defining is to state the substance of each thing, either what good is<sup>2</sup> or what evil is,

or whatever else it may be. But the definition states that whatever thing is of such a kind as to be desirable for its own [20] sake is good in all cases. And the common element in all goods is much the same as the definition. And the definition says what is good, whereas no science or capacity whatsoever states of its own end that it is good, but it is the province of another capacity to speculate as to this (for neither the physician nor the mason says that [25] health or a house is good, but that one thing produces health, and how it produces it, and another thing a house). It is evident then that neither has statecraft to do with the common element of good. For it is itself only one science among the rest, and we have seen that it is not the business of any capacity or science to talk of this as end. It is not therefore the business of statecraft to speak of the common element of good [30] corresponding to the definition.

But neither has it to speak of the common element as arrived at by induction. Why so? Because when we wish to prove some particular good, we either prove by defining that the same description applies to the good and to the thing which we wish to prove to be good, or else have recourse to induction; for instance, when we [1183<sup>a1</sup>] wish to prove that magnanimity is a good, we say that justice is a good and courage is a good, and so of the excellences generally, and that magnanimity is an excellence, so that magnanimity also is a good. Neither then will statecraft have to speak of the common good arrived at by induction, because the same impossible [5] consequences will ensue in this case as in that of the common good conformable to the definition. For here also one will be saying that the end is good. It is clear therefore that what it has to speak about is the best good, and the best in the sense of the best for us.

And generally one can see that it is not the part of any one science or capacity to consider the question of good in general. Why so? Because good occurs in all the [10] categories—in that of substance, quality, quantity, time, relation, and generally in all. But what is good at a given time is known in medicine by the doctor, in navigation by the pilot, and in each art by the expert in that art. For it is the doctor [15] who knows when one ought to amputate, and the pilot when one ought to sail. And in each art each expert will know the time of the good which concerns himself. For neither will the doctor know the time of the good in navigation nor the pilot that in medicine. It follows then from this point of view also that we have not to speak about the common good; for time is common to all the arts. Similarly the relative good and [20] the good which corresponds to other categories is common to all, and it does not

belong to any capacity or science to speak of what is good in each at a given time, nor, we may add, is it the part of statecraft to speak about the common element of good. Our subject then is the good, in the sense of the best, and that the best for us.

[25] Perhaps when one wishes to prove something, one ought not to employ illustrations that are not manifest, but to illustrate the obscure by the manifest, and the things of mind by the things of sense; for the latter are more manifest. When, therefore, one undertakes to speak about the good, one ought not to speak about the Idea. And yet they think it quite necessary, when they are speaking about the good, [30] to speak about the Idea. For they say that it is necessary to speak about what is most good, and the thing-itself in each kind has the quality of that kind in the highest degree, so that the Idea will be the most good, as they think. Possibly there is truth in such a contention; but all the same the science or capacity of statecraft, about which we are now speaking, does not inquire about this good, but about that which [35] is good for us. [For no science or capacity pronounces its end to be good, so that statecraft does not do so either.]<sup>3</sup> Hence it does not concern itself to speak about the good in the sense of the Idea.

But, it may be said, one may employ this good as a first principle to start from in speaking about particular goods. Even this is not correct. For the first principles that one assumes ought to be appropriate. How absurd it would be if, when one [1183<sup>b</sup>1] wished to prove that the three angles of a triangle are equal to two right angles, one were to assume as a principle that the soul is immortal! For it is not appropriate, and the first principle ought to be appropriate and connected. As a matter of fact, one can prove that the three angles of a triangle are equal to two right angles quite as [5] well without the immortality of the soul. In the same way in the case of goods, one can speculate about the rest without the Ideal Good. Hence such a good is not an appropriate principle.<sup>4</sup>

Neither was Socrates right in making the excellences sciences. For he used to think that nothing ought to be in vain, but from the excellences being sciences he [10] met with the result that the excellences were in vain. Why so? Because in the case of the sciences, as soon as one knows what the science is, it results that one is scientific (for any one who knows what medicine is is forthwith a physician, and so with the other sciences). But this result does not follow in the case of the excellences. For any [15] one who knows what justice is is not forthwith just, and similarly in the case of the rest. It follows then that the excellences are actually in vain and that they are not sciences.

2 · Now that we have settled these points, let us try to say in how many senses the term 'good' is used. For goods may be divided into the honourable, the [20] praiseworthy, and capacities. By the honourable I mean such a thing as the divine, the more excellent (for instance, soul, intellect), the more ancient, the first principle, and so on. For those things are honourable which attract honour, and all such things as these are attended with honour. Excellence then also is a thing that is honourable, at least when some one has become a good man in consequence of it; for [25] already such a one has come into the form of excellence. Other goods are praiseworthy, as excellences; for praise is bestowed in consequence of the actions which are prompted by them. Others are capacities—for instance, office, wealth, strength, beauty; for these are things which the good man can use well and the bad man ill. Hence such goods are called capacities. Goods indeed they are (for [30] everything is judged by the use made of it by the good man, not by that of the bad); and it is incidental to these same goods that fortune is the cause of their production. For from fortune comes wealth, and also office, and generally all the things which [35] rank as capacities. The fourth and last class of goods is that which is preservative and productive of good, as exercise of health, and other things of that sort.

But goods admit of another division, to wit, some goods are everywhere and absolutely desirable, and some are not. For instance, justice and the other excellences are everywhere and absolutely desirable, but strength, and wealth, and [1184<sup>a</sup>1] power, and the like, are not so everywhere nor absolutely.

Again, take another division. Some goods are ends and some are not; for instance, health is an end, but the means to health are not ends: and wherever things stand in this relation, the end is always better; for instance, health is better [5] than the means to health, and without exception, always and universally, that thing is better for the sake of which the rest are.

Again, among ends themselves the complete is always better than the incomplete. A complete good is one the presence of which leaves us in need of [10] nothing; an incomplete good is one which may be present while yet we need something further; for instance, we may have justice and yet need many things besides, but when we have happiness we need nothing more. This then is the best thing of which we are in search, which is the complete end. The complete end then is the good and end of goods.

[15] The next point is how we are to look for the best good. Is it itself to be reckoned in with other goods? Surely that is absurd. For the best is the complete end, and the complete end, roughly speaking, would seem to be nothing else than happiness, and happiness we regard as made up of many goods; so that if, in looking for the best, [20] you reckon in itself also, it will be better than itself, because it is itself the best thing. For instance, take the means to health, and health, and raise the question which is the best of all these. The answer is that health is the best. If then this is the best of all, it is also better than itself; so that an absurdity ensues. Perhaps then this is not [25] the way in which we ought to look for the best. Are the other goods then to be separated from it?<sup>5</sup> Is not this also absurd? For happiness is composed of certain goods. But to raise the question whether a given thing is better than its own components is absurd. For happiness is not something else apart from these, but just these.

[30] But perhaps the right method of inquiry may be by comparison of the best somewhat as follows. I.e., by comparing happiness itself, which is made up of these goods, with others which are not contained in it, would this be the right way of inquiring into the best thing? But the best of which we are now in search is not of a simple nature. For instance, one might say that wisdom is the best of all goods when [35] they are compared one by one. But perhaps this is not the way in which we ought to seek for the best good. For it is the complete good we are in search of, and wisdom by itself is not complete. It is not, therefore, the best in this sense, nor in this way, of which we are in search.

[1184<sup>b</sup>1] **3** · After this, then, goods admit of another division. For some goods are in the soul—for instance, the virtues; some in the body—for instance, health, beauty; and some outside of us—wealth, office, honour, and such like. Of these those in the [5] soul are best. But the goods in the soul are divided into three—wisdom, excellence, and pleasure.

Now we come to happiness, which we all declare to be, and which seems in fact to be, the end of goods and the most complete thing, and this we maintain to be [10] identical with<sup>6</sup> doing well and living well. But the end is not single but twofold. For the end of some things is the activity and use itself—for instance, of sight; and the using is more desirable than the having; for the using is the end. For no one would care to have sight, if he were destined never to see, but always to have his

eyes shut. And the same with hearing and the like. When then a thing may be both used and had, the using is always better and more desirable than the having. For the use and [15] exercise are the end, whereas the having is with a view to the using.

Next, then, if one examines this point in the case of all the sciences, he will see that it is not one that makes a house and another that makes a good house, but simply the art of housebuilding; and what the housebuilder makes, that same thing [20] his excellence enables him to make well. Similarly in all other cases.

4 · After this, then, we see that it is by nothing else than soul that we live. Excellence is in the soul. We maintain that the soul and the excellence of the soul do the same thing. But excellence in each thing does that well of which it is the [25] excellence, and, among the other functions of the soul, it is by it we live. It is therefore owing to the excellence of the soul that we shall live well. But to live well and do well, we say, is nothing else than being happy. Being happy, then, and happiness, consist in living well, and living well is living in accordance with the excellences. This, then, is the end and happiness and the best thing. Happiness [30] therefore will consist in a kind of use and activity. For we found that where there was having and using, the use and exercise are the end. Now excellence is a habit of the soul. And there is such a thing as the exercise and use of it;<sup>7</sup> so that the end will be its activity and use. Happiness therefore will consist in living in accordance with [35] the excellences. Since then the best good is happiness, and this is the end, and the complete end is an activity,<sup>8</sup> it follows that it is by living in accordance with the excellences that we shall be happy and shall have the best good. [1185<sup>a</sup>1]

Since, then, happiness is a complete good and end, we must not fail to observe that it will be found in that which is complete. For it will not be found in a child (for a child is not happy), but in a man; for he is complete. Nor will it be found in an incomplete, but in a complete, period. And a complete period of time will be as long [5] as a man lives. For it is rightly said among the many that one ought to judge of the happy man in the longest time of his life, on the assumption that what is complete ought to be in a complete period and a complete person. But that it is an activity can be seen also from the following consideration. For supposing some one to be asleep [10] all his life, we should hardly consent to call such a man happy. Life indeed he has, but life in



accordance with the excellences he has not, and it was in this that we made the activity to consist.

The topic that is next about to be treated of is neither very intimately connected with our main subject nor yet quite alien from it. I mean, since there is, as [15] it seems, a part of the soul whereby we are nourished, which we call nutritive (for it is reasonable to suppose that this exists; at all events we see that stones are incapable of being nourished, so that it is evident that to be nourished is a property of living things; and, if so, the soul will be the cause of it; but none of these parts of the soul will be the cause of nourishment, to wit, the rational or spirited or [20] appetitive, but something else besides these, to which we can apply no more appropriate name than 'nutritive'), one might say, 'Very well, has this part of the soul also an excellence? For if it has, it is plain that we ought to act with this also. [25] For happiness is the exercise of complete excellence'. Now, whether there is or is not an excellence of this part is another question; but, if there is, it has no activity. For those things which have no impulse will not have any activity either; and there does not seem to be any impulse in this part, but it seems to be on a par with fire. For that [30] also will consume whatever you throw in, but if you do not throw anything in, it has no impulse to get it. So it is also with this part of the soul; for, if you throw in food, it nourishes, but, if you fail to throw in food, it has no impulse to nourish. Hence it has [35] no activity, being devoid of impulse. So that this part in no way co-operates towards happiness.

After this, then, we must say what excellence is, since it is the exercise of this which is happiness. Speaking generally, then, excellence is the best state. But perhaps it is not sufficient to speak thus generally, but it is necessary to define more clearly.

[1185<sup>b</sup>1] **5** · First, then, we ought to speak about the soul in which it resides, not to say what the soul is (for to speak about that is another matter), but to divide it in outline. Now the soul is, as we say, divided into two parts, the rational and the [5] irrational. In the rational part, then, there resides wisdom, readiness of wit, philosophy, aptitude to learn, memory, and so on; but in the irrational those which are called the excellences—temperance, justice, courage, and such other states of character as are held to be praiseworthy. For it is in respect of these that we are called praiseworthy; but no one is praised for the excellences of the rational part. [10] For no one is praised for being philosophical or for

being wise, or generally on the ground of anything of that sort. Nor indeed is the irrational part praised, except in so far as it is capable of subserving or actually subserves the rational part.

Moral excellence<sup>9</sup> is destroyed by defect and excess. Now, that defect and [15] excess destroy can be seen from perceptible instances, and we must use what we can see as evidence for what we cannot see. For one can see this at once in the case of gymnastic exercises. If they are overdone, the strength is destroyed, while if they are deficient, it is so also. And the same is the case with food and drink. For if too [20] much is taken health is destroyed, and also if too little, but by the right proportion strength and health are preserved. The same is the case with temperance and courage and the rest of the excellences. For if you make a man too fearless, so as not even to fear the gods, he is not brave but mad, but if you make him afraid of [25] everything, he is a coward. To be brave, then, a man must not either fear everything or nothing. The same things, then, both increase and destroy excellence. For undue and indiscriminate fears destroy, and so does the lack of fear about anything at all. And courage has to do with fears, so that moderate fears increase courage. [30] Courage, then, is both increased and destroyed by the same things. For men are liable to this effect owing to fears. And the same holds true of the other excellences.

6 · In addition, excellence may also be determined by pleasure and pain. For it is owing to pleasure that we commit base actions, and owing to pain that we [35] abstain from noble ones. And generally it is not possible to achieve excellence or vice without pain and pleasure. Excellence then has to do with pleasures and pains.

Moral excellence gets its name as follows, if etymology has any bearing upon truth, as perhaps it has. ‘Character (ἥθος)’ derives from ‘custom (ἔθος)’; for it is [1186<sup>a</sup>1] called moral (ἠθικὴ) excellence because it is the result of accustoming. Whereby it is evident that no one of the excellences of the irrational part springs up in us by nature. For nothing that is by nature becomes other by custom. For instance, a stone, and heavy things in general, naturally go downwards. If any one, then, throws [5] them up repeatedly, and tries to accustom them to go up, all the same they never would go up, but always down. Similarly in all other such cases.

7 · After this, then, as we wish to say what excellence is, we must

know what are the things that there are in the soul. They are these—feelings, capacities, states; [10] so that it is evident that excellence will be some one of these. Now feelings are anger, fear, hate, regret, emulation, pity, and the like, which are usually attended by pain or pleasure. Capacities are those things in virtue of which we are said to be capable of these feelings; for instance, those things in virtue of which we are capable [15] of feeling anger or pain or pity, and so on. States are those things in virtue of which we stand in a good or bad relation to these feelings; for instance, towards being angered: if we are angry overmuch, we stand in a bad relation towards anger, whereas if we are not angry at all where we ought to be, in that case also we stand in a bad relation towards anger.

The mean state, then, is neither to be pained overmuch nor to be absolutely [20] insensible. When, then, we stand thus, we are in a good disposition. And similarly as regards other like things. For good temper and gentleness are in a mean between anger and insensibility to anger. Similarly in the case of boastfulness and mock-humility. For to pretend to more than one has shows boastfulness, while to [25] pretend to less shows mock-humility. The mean state, then, between these is truthfulness.

8 · Similarly in all other cases. For this is what marks the state, to stand in a good or bad relation towards these feelings, and to stand in a good relation towards them is to incline neither towards the excess nor towards the defect. The state, then, [30] which implies a good relation is directed towards the mean of such things, in respect of which we are called praiseworthy, whereas that which implies a bad relation inclines towards excess or defect.

Since, then, excellence is a mean of these feelings, and the feelings are either pains or pleasures or impossible apart from pain or pleasure, it is evident from this [35] that excellence has to do with pains and pleasures.

But there are other feelings, as one might think, in the case of which the vice does not lie in any excess or defect; for instance, adultery and the adulterer. The [1186<sup>b</sup>1] adulterer is not the man who corrupts free women too much; but both this and anything else of the kind which is comprised under the pleasure of intemperance, whether<sup>10</sup> it be something in the way of excess or of defect, is blamed.

9 · After this, then, it is perhaps necessary to have it stated what is opposed [5] to the mean, whether it is the excess or the defect. For to some means the defect is opposed and to some the excess; for instance, to courage it is not rashness, which is the excess, that is opposed, but cowardice, which is the defect; and to temperance, which is a mean between intemperance and insensibility to pleasures, it does not [10] seem that insensibility, which is the defect, is opposed, but intemperance, which is the excess. But both are opposed to the mean, excess and defect. For the mean is in defect of the excess and in excess of the defect. Hence it is that prodigals call the [15] liberal illiberal, while the illiberal call the liberal prodigals, and the rash and headlong call the brave cowards, while cowards call the brave headlong and mad.

There would seem to be two reasons for our opposing the excess or the defect to the mean. Either people look at the matter from the point of view of the thing itself, [20] to see which is nearer to, or further from, the mean; for instance, in the case of liberality, whether prodigality or illiberality is further from it. For prodigality would seem more to be liberality than illiberality is. Illiberality, then, is further off. But things which are further distant from the mean would seem to be more opposed [25] to it. From the point of view, then, of the thing itself the defect presents itself as more opposed. But there is also another way, to wit, those things are more opposed to the mean to which we have a greater natural inclination. For instance, we have a greater natural inclination to be intemperate than sober in our conduct. The tendency, therefore, occurs rather towards the things to which nature inclines us; and the things to which we have a greater tendency are more opposed; and our [30] tendency is towards intemperance rather than towards sobriety; so that the excess of the mean will be the more opposed; for intemperance is the excess in the case of temperance.

What excellence is, then, has been examined (for it seems to be a mean of the feelings, so that it will be necessary for the man who is to obtain credit for his [35] character to observe the mean with regard to each of the feelings; for which reason it is a difficult matter to be good; for to seize the mean in anything is a difficult matter; for instance, any one can draw a circle, but to fix upon the mean point in it is [187<sup>a</sup>1] hard; and in the same way to be angry indeed is easy, and so is the opposite of this, but to be in the mean is hard; and generally in each of the feelings one can see that what surrounds the mean is easy, but the mean is hard, and this is the point for which we are praised; for which

reason the good is rare).

Since, then, excellence has been spoken of . . .<sup>11</sup> we must next inquire whether [5] it is possible of attainment or is not, but, as Socrates said, to be good or bad does not rest with us to come about. For if, he says, one were to ask any one whatever whether he would wish to be just or unjust, no one would choose injustice. Similarly in the case of courage and cowardice, and so on always with the rest of the [10] excellences. And it is evident that any who are bad will not be bad voluntarily; so that it is evident that neither will they be voluntarily good.

Such a statement is not true. For why does the lawgiver forbid the doing of wrong acts, and bid the doing of right and good ones? And why does he appoint a [15] penalty for wrong acts, if one does them, and for right acts, if one fails to do them? Yet it would be absurd to legislate about those things which are not in our power to do. But, as it seems, it is in our power to be good or bad.

Again, we have evidence in the praise and blame that are accorded. For there is praise for excellence and blame for vice. But praise and blame are not bestowed [20] upon things involuntary. So it is evident that it is equally in our power to do good and bad acts.

They used also to employ some such comparison as this in their desire to show that it is not voluntary. For why, they say, when we are ill or ugly, does no one blame [25] us for things of this sort? But this is not true. For we do blame people for things of this sort, when we think that they themselves are the causes of being ill or of their having their body in a bad state, on the assumption that there is voluntary action even there. It seems, then, that there is voluntariness in being excellent and vicious.

**10** · One can see this still more clearly from the following considerations. [30] Every natural kind is given to begetting a being like itself, i.e. plants and animals; for both are apt to beget. And they are given to beget from their first principles—for instance, the tree from the seed; for this is a kind of principle. And what follows the principles stands thus: as are the principles, so is what comes from the principles. [35]

This can be seen more clearly in matters of geometry. For there also, when certain principles are assumed, as are the principles, so are what follow the principles; for instance, if the triangle has its angles equal to two right angles, and the quadrilateral to four, then according as the triangle changes, so does the [1187<sup>b1</sup>] quadrilateral share in its changes (for it is convertible), and if the quadrilateral has not its angles equal to

four right angles, neither will the triangle have its angles equal to two right angles.

**11** · So, then, and in the like way with this, is it in the case of man. For since man is apt to produce things, he tends to produce the actions which he does from [5] certain principles. How else could it be? For we do not say that any of the things without life acts, nor any other of the things with life, except men. It is evident, then, that man is the begetter of his acts.

[10] Since, then, we see that the acts change, and we never do the same things, and the acts have been brought into being from certain principles, it is evident that, since the acts change, the principles from which the acts proceed also change, as we said in our comparison was the case with geometrical properties.

[15] Now the principle of an act, whether good or bad, is choice and wish, and all that accords with reason. It is evident, then, that these also change. But we change in our actions voluntarily. So that the principle also, choice, changes voluntarily. So [20] that it is plain that it will be in our power to be either good or bad.

Perhaps, then, some one may say, 'Since it is in my power to be just and good, if I wish I shall be the best of all men'. This, of course, is not possible. Why so? Because in the case of the body it is not so either. For if one wishes to bestow attention upon his body, it does not follow that he will have the best body that any [25] one has. For it is necessary not merely for attention to be bestowed, but also for the body to be beautiful and good by nature. He will then have his body better, but best of all men, No. And so we must suppose it to be also in the case of soul. For he who [30] chooses to be best will not be so, unless nature also be presupposed; better, however, he will be.

**12** · Since, then, it appears that to be good is in our power, it is necessary next to say what the voluntary is. For this is what chiefly determines excellence, to wit, the voluntary. Roughly speaking, that is voluntary which we do when not under [35] compulsion. But perhaps we ought to speak more clearly about it.

What prompts us to action is desire; and desire has three forms—appetite, passion, wish.

First of all, then, we must inquire into the act which is in accordance

with appetite. Is that voluntary or involuntary? That it is involuntary would not seem to [1188<sup>a1</sup>] be the case. Why so? And on what ground? Because wherever we do not act voluntarily, we act under compulsion, and all acts done under compulsion are attended with pain, whereas acts due to appetite are attended with pleasure, so that on this way of looking at the matter acts due to appetite will not be involuntary, but voluntary.

[5] But, again, there is another argument opposed to this, which makes its appeal to incontinence. No one, it is maintained, does evil voluntarily, knowing it to be evil. But yet the incontinent, knowing that what he does is bad, nevertheless does it, and does it in accordance with appetite; he is not therefore acting voluntarily; therefore [10] he is under compulsion. There again the same answer will meet this argument. For if the act is in accordance with appetite, it is not of compulsion; for appetite is attended with pleasure, and acts due to pleasure are not of compulsion.

There is another way in which this may be made plain—I mean, that the incontinent acts voluntarily. For those who commit injustice do so voluntarily, and [15] the incontinent are unjust and act unjustly. So that the incontinent man will voluntarily commit his acts of incontinence.

13 · But, again, there is another argument opposed to this, which maintains that it is not voluntary. For the self-restrained man voluntarily performs his acts of self-restraint. For he is praised, and people are praised for voluntary acts. But if that which is in accordance with appetite is voluntary, that which runs counter to [20] appetite is involuntary. But the man of self-restraint acts contrary to his appetite. So that the man of self-restraint will not be self-restrained voluntarily. But this conclusion does not commend itself. Therefore the act which is in accordance with appetite is not voluntary.

Again, the same thing holds of acts prompted by passion. For the same arguments apply as to appetite, so that they will cause the difficulty. For it is [25] possible to be incontinent or continent of anger.

Among the desires in our division we have still to inquire about wish, whether it is voluntary. Now the incontinent wish for the time being the things to which their impulse is directed. Therefore the incontinent perform their bad acts with their own wish. But no one voluntarily does evil, knowing it to be evil. But the incontinent [30] man, knowing evil to be evil, does it with his own wish. Therefore he is not a voluntary agent, and wish therefore is not a voluntary thing. But this argument annuls incontinence and the incontinent man. For if he is not a voluntary agent,

he is not blameworthy. But the incontinent is blameworthy. Therefore he is a voluntary agent. Therefore wish is voluntary. [35]

Since, then, certain arguments seem opposed, we must speak more clearly about the voluntary.

**14** · Before doing so, however, we must speak about force and about necessity. Force may occur even in the case of things without life. For things [1188<sup>b</sup>1] without life have each their proper place assigned to them—to fire the upper region and to earth the lower. It is, however, possible to force a stone to go up and fire to go down. It is also possible to apply force to an animal; for instance, when a horse is [5] galloping straight ahead, one may take hold of him and divert his course. Now whenever the cause of men's doing something contrary to their nature or contrary to their wish is outside of them, we will say that they are forced to do what they do. But when the cause is in themselves, we will not in that case say that they are forced. Otherwise the incontinent man will have his answer ready, in denying that he is bad. [10] For he will say that he is forced by his appetite to perform the bad acts.

**15** · Let this, then, be our definition of what is due to force—those things of which the cause by which men are forced to do them is external (but where the cause is internal and in themselves there is no force).

But now we must speak about necessity and the necessary. The term [15] 'necessary' must not be used in all circumstances nor in every case—for instance, of what we do for the sake of pleasure. For if one were to say 'I was necessitated by pleasure to debauch my friend's wife', he would be a strange person. For 'necessary' does not apply to everything, but only to externals; for instance, whenever a man receives some damage by way of alternative to some other greater, when compelled [20] by circumstances. For instance, 'I found it necessary to hurry my steps to the country; otherwise I should have found my stock destroyed'. Such, then, are the cases in which we have the necessary.

[25] **16** · But since the voluntary lies in no impulse, there will remain what proceeds from thought. For the involuntary is what is done from necessity or from force, and, thirdly, what is not accompanied by thought. This is plain from facts. For whenever a man has struck or killed a man, or has done something of that sort [30] without having thought



about it beforehand, we say that he has acted involuntarily, implying that the voluntariness lies in the having thought about it. For instance, they say that once a woman gave a love-potion to somebody; then the man died from the effects of the love-potion, and the woman was put on trial before the Areopagus; on her appearance she was acquitted, just for the reason that she did not do it with [35] design. For she gave it in love, but missed her mark; hence it was not held to be voluntary, because in giving the love-potion she did not give it with the thought of killing. In that case, therefore, the voluntary falls under the head of what is accompanied with thought.

[1189<sup>a</sup>1] **17** · It now remains for us to inquire into choice. Is choice desire or is it not? Now desire is found in the lower animals, but not choice; for choice is attended with reason, and none of the lower animals has reason. Therefore it will not be desire.

[5] Is it then wish? Or is it not this either? For wish is concerned even with the impossible; for instance, we wish that we may live for ever, but we do not choose it. Again, choice is not concerned with the end but with what contributes to the end; for instance, no one chooses to be in health, but we choose what leads to health, e.g. [10] walking, running; but we wish for the ends. For we wish to be in health. So that it is evident in this way also that wish and choice are not the same thing.

But choice seems to be what its name suggests; I mean, we choose one thing instead of another; for instance, the better instead of the worse. Whenever, then, we [15] take the better in exchange for the worse as a matter of choice, there the term ‘to choose’ would seem to be appropriate.

Since, then, choice is none of these things, can it be thought that constitutes choice? Or is this not so either? For we entertain many thoughts and opinions in our [20] minds. Do we then choose whatever we think? Or is this not so? For often we think about things in India, but it does not follow that we choose them. Choice therefore is not thought either.

Since, then, choice is not any of these singly, and these are the things that there are in the soul, choice must result from the combination of some of them.

[25] Since, then, choice, as was said before, is concerned with the goods that contribute to the end and not with the end, and with the things that are possible to us, and with such as afford ground for controversy as to whether this or that is desirable, it is evident that one

must have thought and deliberated about them beforehand; then when a thing appears best to us after having thought it over, there [30] ensues an impulse to act, and it is when we act in this way that we are held to act on choice.

Since, then, choice is a deliberate desire attended with thought, the voluntary is not necessarily done by choice. For there are many acts which we do voluntarily before thinking and deliberating about them; for instance, we sit down and stand up, and do many other things of the same sort voluntarily but without having [35] thought about them, whereas every act done by choice was found to be attended with thought. The voluntary, therefore, is not necessarily done by choice, but the act [1189<sup>b</sup>1] done by choice is voluntary; for if we choose to do anything after deliberation, we act voluntarily. And a few legislators, even, appear to distinguish the voluntary act from the act done by choice as being something different, in making the penalties that they appoint for voluntary acts less than for those that are done by choice. [5]

Choice, then, lies in matters of action, and in those in which it is in our power to do or not to do, and to act in this way or not in this way, and where we can know the reason why.

But the reason why is not always of the same kind. For in geometry, when one says that the quadrilateral has its angles equal to four right angles, and one asks the [10] reason why, one says, 'Because the triangle has its angles equal to two right angles'. Now in such cases they reached the reason why from a definite principle; but in matters of action, with which choice has to do, it is not so (for there is no definite principle laid down), but if one asks, 'Why did you do this?' the answer is, 'Because [15] it was the only thing possible', or 'Because it was better so'. It is from the consequences themselves, according as they appear to be better, that one chooses, and these are the reason why.

Hence in such matters the deliberation is as to the how, but not so in the sciences. For no one deliberates how he ought to write the name Archicles, because [20] it is a settled matter how one ought to write the name Archicles. The error, then, does not arise in the thought, but in the act of writing. For where the error is not in the thought, neither do people deliberate about those things. But wherever there is an indefiniteness about the how, there error comes in.

Now there is the element of indefiniteness in matters of action, and in those [25] matters in which the errors are two-fold. We err, then, in matters of action and in what pertains to the excellences in the same way. For in aiming at excellence we err in the natural directions. For there is

error both in defect and in excess, and we are carried in both these directions through pleasure and pain. For it is owing to [30] pleasure that we do base deeds, and owing to pain that we abstain from noble ones.

18 · Again, thought is not like the senses; for instance, with sight one could not do anything else than see, nor with hearing anything else than hear. So also we do not deliberate whether we ought to hear with hearing or see. But thought is not like this, but it is able to do one thing and others also. That is why deliberation [1190<sup>a</sup>1] comes in there.

The error, then, in the choice of goods is not about the ends (for as to these all are at one in their judgement, for instance, that health is a good), but only about those which lead to the ends; for instance, whether a particular food is good for [5] health or not. The chief cause of our going wrong in these matters is pleasure and pain; for we avoid the one and choose the other.

Since, then, it has been settled in what error takes place and how, it remains to ask what it is that excellence aims at. Does it aim at the end or at what contributes [10] to the end? for instance, at what is right or at what contributes to it?

How, then, is it with science? Does it belong to the science of housebuilding to design the end rightly, or to see what contributes to it? For if the design is right—I mean, to make a beautiful house—it is no other than the housebuilder who will [15] discover and provide what contributes to it. And similarly in the case of all the other sciences.

So, then, it would seem to be also in the case of excellence, that its aim is rather the end, which it must design rightly, than what contributes to the end. And no one else will provide the materials for this or discover what is needed to contribute to it. And it is reasonable to suppose that excellence should have this in view. For both [20] design and execution always belong to that with which the origination of the best lies. Now there is nothing better than excellence; for it is for its sake that all other things are, and the origination looks to this, and the contributory factors are rather for the sake of it; now the end seems to be a kind of principle, and everything is for [25] the sake of it. But this will be as it ought to be. So that it is plain also in the case of excellence, since it is the best mode of causation, that it aims at the end rather than at what contributes to the end.

19 · Now the end of excellence is the right. This, then, is what excellence aims at rather than the things from which it will be produced. But it has to do also [30] with these. But to make these its whole concern is manifestly absurd. For perhaps in painting one might be a good imitator and yet not be praised, if one does not make it his aim to imitate the best subjects. This, therefore, is quite the business of excellence, to design the right.

Why, then, someone may say, did we say before that the activity was better [35] than the corresponding state, whereas now we are assigning to excellence as nobler not the material for activity, but something in which there is no activity? Yes, but [1190<sup>b</sup>1] now also we assert this just the same, that the activity is better than the state. For his fellow men in viewing the good man judge him from his acts, owing to its not being possible to make clear the choice which each has, since if it were possible to [5] know how the judgement of each man stands towards the right, he would have been thought good even without acting.

But since we reckoned up certain means of the feelings, we must say with what sort of feelings they are concerned.

20 . . . <sup>12</sup> Since, then, courage has to do with feelings of confidence and fear, [10] we must examine with what sort of fears and confidences it has to do. If, then, any one is afraid of losing his property, is he a coward? And if any one is confident about these matters, is he brave? Surely not! And in the same way if one is afraid of or confident about illness, one ought not to say that the man who fears is a coward or that the man who does not fear is brave. It is not, therefore, in such fears and confidences as these that courage consists. Nor yet in such as follow; for instance, if [15] one is not afraid of thunder or lightning or any other superhuman terror, he is not brave but a sort of madman. It is with human fears and confidences, then, that the brave man has to do; I mean to say that anyone who is confident under circumstances in which most people or all are afraid, is a brave man. [20]

These points having been settled, we must inquire, since there are many ways in which men are brave, which is the brave man. For you may have a man who is brave from experience, like soldiers. For they know, owing to experience, that in such a place or time or condition it is impossible to suffer any damage. But the man [25] who knows these things and for this reason stands his ground against the enemy is not brave; for if none of these things is the case, he does not stand his ground.

Hence one ought not to call those brave whose courage is due to experience. Nor indeed was Socrates right in asserting that courage was knowledge. For knowledge becomes knowledge by getting experience from custom. But of those whose [30] endurance is due to experience we do not say, nor would men in general say, that they are brave. Courage, therefore, will not consist in knowledge.

But again, on the other hand, there are some who are brave from the opposite of experience. For those who have no experience of the probable results are free from fear owing to their inexperience. Neither, then, must we call these brave.

Again, there are others who appear brave owing to their passions; for instance, those who are in love or are inspired by the gods. We must not call these brave either. For if their passion is taken away, they are not brave any more, whereas the [1191<sup>a</sup>1] truly brave man must always be brave. Hence one would not call wild beasts like boars brave, owing to their defending themselves when they have been pained by a wound, nor ought the brave man to be brave through passion.

Again, there is another form of courage, which we may call civic; for instance, [5] if men endure dangers out of shame before their fellow citizens, and so appear to be brave. In illustration of this we may take the way in which Homer has represented Hector as saying—

Then were Polydamas first to pile reproaches upon me;<sup>13</sup>

for which reason he thinks that he ought to fight. We must not call this sort courage [10] either. For the same definition will apply to each of these. For he whose courage does not endure on the deprivation of something cannot properly be considered brave; if, then, I take away the shame owing to which he was brave, he will no longer be brave.

There is yet another way of appearing brave, namely, through hope and anticipation of good. We must not say that these are brave either, since it appears [15] absurd to call those brave who are of such a character and under such circumstances.

No one, then, of the above kinds must be put down as brave.

We have then to ask who is to be so put down, and who is the brave man. Broadly speaking, then, it is he who is brave owing to none of the things [20] above-mentioned, but owing to his thinking it to be right, and who acts bravely whether any one is present or not.

Not, indeed, that courage arises in one entirely without passion and impulse. But the impulse must proceed from reason and be directed to the

right. He, then, who is carried by a rational impulse to face danger for the sake of right, being free [25] from fear about these things, is brave; and these are the things with which courage has to do.

When we say 'free from fear', it is not to be understood that the brave man feels no fear at all. For such a person is not brave, for whom nothing at all has any terrors. For in that way a stone and other things without life would be brave. But it is necessary that while he feels fear he should still face the danger; for if he faces it without feeling fear, he will not be brave.

[30] Further, according to the distinction that we made above, it is not concerned with all fears and dangers, but only with those which threaten existence. Moreover, not at any and every time, but when the fears and the dangers are near. For if one is void of fear with regard to a danger that is ten years off, it does not follow that he is [35] brave. For some are confident owing to its being far away, but, if they come near it, are ready to die with fear. Such, then, are courage and the brave man.

**21** · Temperance is a mean between intemperance and insensibility to pleasures. For temperance and generally every excellence is the best state, and the [1191<sup>b</sup>1] best state lies in the attainment of the best thing, and the best thing is the mean between excess and defect; for people are blameworthy on both grounds, both on that of excess and on that of defect. So that, since the mean is best, temperance will be a mean state between intemperance and insensibility. These, then, are the vices [5] between which it will be a mean.

Temperance is concerned with pleasures and pains, but not with all, nor with those that have to do with all objects. For one is not intemperate if one takes pleasure in beholding a painting or a statue or something of that sort, and in the same way not so in the case of hearing or smell; but only in the pleasures which have to do with touch and taste.

[10] Nor yet with regard to these will a man be temperate who is in such a state as not to be affected at all by any pleasures of this sort (for such a person is devoid of feeling), but rather he who feels them and yet does not let himself be led away into enjoying them to excess and regarding everything else as of secondary consideration; [15] and, we must add, the man who acts for the sake of right and nothing else ....<sup>14</sup> For whoever abstains from the excess of such pleasures either from fear or some other such motive is not temperate. For neither do we call the other animals temperate except man, because there is not reason in them

whereby they test and choose the right. For every excellence is concerned with and aims at the right. So [20] temperance will be concerned with pleasures and pains, and these those that occur in touch and taste.

22 · Next to this we must speak about the definition and sphere of gentleness. Gentleness, then, is in a mean between irascibility and a want of anger. And generally the excellences seem to be a kind of means. One can show that they [25] are so in this way as well. For if the best is in the mean, and excellence is the best state excellence will be the mean. But it will be more plain as we inquire into them separately. For since he is irascible who gets angry with everybody and under all [30] circumstances and to too great an extent, and such a one is blameworthy (for one ought not to be angry with everybody nor at everything nor under all circumstances and always, nor yet again ought one to be in such a state as never to be angry with anybody; for this character also is blameworthy, as being insensible), since then both he who is in the excess is blameworthy and he who is in the defect, the man who [35] is in the mean between them will be gentle and praiseworthy. For neither he who is in defect in anger nor he who is in excess is praiseworthy, but he who stands in a mean with regard to these things. He is gentle; and gentleness will be a mean state with regard to these feelings.

23 · Liberality is a mean state between prodigality and illiberality. Feelings of this sort have to do with property. The prodigal is he who spends on wrong objects [1192<sup>a</sup>1] and more than he ought and at wrong times, while the illiberal man, in the opposite way to him, is he who does not spend on right objects and as much as he ought and when he ought. And both these characters are blameworthy. And one of them is [5] characterized by defect and the other by excess. The liberal man, therefore, since he is praiseworthy, will be in a mean between them. Who, then, is he? He who spends on right objects and right amounts and at right times.

24 · There are several forms of illiberality; for instance, we call some people *niggards* and *cheese-parers*, and *lovers of base gain*, and *petty*. Now all these fall [10] under the head of illiberality. For evil is multiform, but good uniform; for instance, health is single, but disease has many shapes. In the same way excellence is single, but vice has many shapes. For all

these characters are blameworthy in relation to property.

Is it, then, the business of the liberal man also to get and procure property? [15] Surely not! That sort of thing is not the business of any excellence at all. It is not the business of courage to make weapons, but of something else, but it is the business of this when it has got them to make a right use of them; and so in the case of temperance and the other excellences. This, then, is not the business of liberality, but rather of the art of procuring property. [20]

**25** · Greatness of soul is a mean between vanity and littleness of soul, and it has to do with honour and dishonour, not with honour from the many but with that from the good, or at any rate<sup>15</sup> more with the latter. For the good will bestow honour [25] with knowledge and good judgement. He will wish then rather to be honoured by those who know as he does himself that he deserves honour. For he will not be concerned with every honour, but with the best, and with the good that is honourable and ranks as a principle. Those, then, who are despicable and bad, but [30] who deem themselves worthy of great things, and besides that think that they ought to be honoured, are vain. But those who deem themselves worthy of less than befits them are men of little soul. The man, therefore, who is in the mean between these is he who neither deems himself worthy of less honour than is befitting to him, nor of greater than he deserves, nor of all. And he is the man of great soul. So that it is [35] evident that greatness of soul is a mean between vanity and littleness of soul.

**26** · Magnificence is a mean between ostentation and shabbiness. Now magnificence has to do with expenses which are proper to be incurred by a man of [1192<sup>b</sup>1] eminence. Whoever therefore spends on the wrong occasions is ostentatious; for instance, one who feasts his dinner-club as though he were giving a wedding-banquet is ostentatious (for the ostentatious man is the sort of person who shows off [5] his own means on the wrong occasion). But the shabby man is the opposite of this, who fails to make a great expenditure when he ought; or if, without going to that length, when, for instance, he is spending money on a wedding-feast or the mounting of a play, he does it in an unworthy and deficient way—such a person is shabby. Magnificence from its very name shows itself to be such as we are [10] describing. For since it spends the great amount on the fitting occasion, it is rightly called magnificence.



Magnificence, then, since it is praiseworthy, is a mean between defect and excess with regard to proper expenses on the right occasions.

But there are, as people think, more kinds of magnificence than one; for [15] instance, people say, 'his gait was magnificent', and there are of course other uses of the term 'magnificent' in a metaphorical, not in a strict sense. For it is not in those things that magnificence lies, but in those which we have mentioned.

**27** · Righteous indignation is a mean state between enviousness and malice. For both these states are blameworthy, but the man who shows righteous indignation [20] is praiseworthy. Now righteous indignation is a kind of pain with regard to good things which are found to attach to the undeserving. The man, then, who feels righteous indignation is he who is apt to feel pain at such things. And this same person again will feel pain, if he sees a man faring ill, who does not deserve it. Righteous indignation, then, and the person who feels it, are perhaps of this sort, [25] but the envious man is the opposite of this. For he will feel pain without distinction, whether one deserves the good fortune or not. In the same way the malicious man will be pleased at ill-fortune, whether deserved or undeserved. Not so with the man who feels righteous indignation, but he is in the mean between these.

**28** · Dignity is in a mean between pride and complaisance, and has to do [30] with social intercourse. For the proud man is inclined not to meet or talk to anybody (but his name seems to be given to him from his character; for it means self-pleasing, from his gratifying himself); but the complaisant is ready to associate with every one under all circumstances and in all places. Neither of these characters [35] is praiseworthy; but the dignified man, being in the mean between them, is praiseworthy. For he does not lay himself out to please everybody, but only those who are worthy, nor yet nobody, for he does so to these same.

**29** · Modesty is a mean between shamelessness and bashfulness, and it has [1193<sup>a</sup>1] to do with deeds and words. For the shameless man is he who says and does anything on any occasion or before any people; but the bashful man is the opposite of this, who is afraid to say or do anything before anybody (for such a man is incapacitated [5] for action, who is bashful about everything); but modesty and the modest man are a

mean between these. For he will not say and do anything under any circumstances, like the shameless man, nor, like the bashful man, be afraid on every occasion and under all circumstances, but will say and do what he ought, where he ought, and [10] when he ought.

**30** · Wit is a mean state between buffoonery and boorishness, and it is concerned with jests. For the buffoon is he who thinks fit to jest at every one and everything, and the boor is he who neither thinks fit to make jests nor to have them made at him, but gets angry. But the witty man is midway between these, who [15] neither jests at all persons and under all circumstances, nor on the other hand is a boor. But wit is of two sorts. For both he who is able to jest in good taste and he who can stand being jested at may be called a man of wit. Such, then, is wit.

**31** · Friendliness is a mean state between flattery and unfriendliness, and it [20] has to do with acts and words. For the flatterer is he who adds more than is proper and true, while the unfriendly man is hostile and detracts from the truth. Neither of them, then, can rightly be praised, but the friendly man is between the two. For he will not add more than the facts, nor praise what is not proper, nor on the other hand [25] will he represent things as less than they are, nor oppose in all cases contrary to what he thinks. Such, then, is the friendly man.

**32** · Truthfulness is a mean between self-depreciation and boastfulness. It has to do with words, but not with all words. For the boaster is he who pretends to have more than he has, or to know what he does not know; while the self-depreciator, [30] on the other hand, lays claim to less than he really has and does not declare what he knows, but tries to hide his knowledge. But the truthful man will do neither of these things. For he will not pretend either to more than he has or less, but will say that he has and knows what as a matter of fact he does have and does [35] know.

Whether, then, these are excellences or not is another question. But that they are means of the above-mentioned states is plain. For those who live according to them are praised.

**33** · It remains to speak about justice—what it is, in what, and about

what. [1193<sup>b</sup>1] First, then, if we could fix upon what justice is. Justice is twofold, of which one kind is legal justice. For people say that what the law commands is just. Now the law commands us to act bravely and temperately, and generally to perform the [5] actions which come under the head of the excellences. For which reason also, they say, justice appears to be a kind of complete excellence. For if the things which the law commands us to do are just, and the law ordains what is in accordance with all excellences, it follows that he who abides by legal justice will be completely good, so [10] that the just man and justice are a kind of complete excellence.

The just, then, in one sense is in these things and about these things. But it is not the just in this sense, nor the justice which deals with these things, of which we are in search. For in respect of just conduct of this sort it is possible to be just when one is alone (for the temperate and the brave and the self-controlled is each of them [15] so when alone). But what is just towards one's neighbour is different from the legal justice that has been spoken of. For in things just towards one's neighbour it is not possible to be just when alone. But it is the just in this sense of which we are in search, and the justice which has to do with these things.

The just, then, in relation to one's neighbour is, speaking generally, the equal. [20] For the unjust is the unequal. For when people assign more of the goods to themselves and less of the evils, this is unequal, and in that case they think that injustice is done and suffered. It is evident, therefore, that since injustice implies unequal things, justice and the just will consist in an equality of contracts. So that it [25] is evident that justice will be a mean between excess and defect, between too much and too little. For the unjust man by doing wrong has more, and his victim by being wronged has less; but the mean between these is just. And the mean is equal. So that [30] the equal between more and less will be just, and he will be just who wishes to have what is equal. But the equal implies two things at least. To be equal therefore in relation to one's neighbour is just, and a man of this sort will be just.

Since, then, justice consists in just and equal dealing and in a mean, we must notice that the just is said to be just as between certain persons, and the equal is a [35] relation between certain persons, and the mean is a mean for certain persons; so that justice and the just will have relation to certain persons and be between certain persons.

Since, then, the just is equal, the proportionally equal will be just. Now proportion implies four terms at least; for as *A* is to *B*, *C* is to *D*. For instance, it is [1194<sup>a</sup>1] proportional that he who has much should

contribute much, and that he who has little should contribute little; again, in the same way, that he who has worked much should receive much, and that he who has worked little should receive little. But as the man who has worked is to the man who has not worked, so is the much to the [5] little; and as the man who has worked is to the much, so is the man who has not worked to the little. Plato also seems to employ proportional justice in his *Republic*. For the farmer, he says, produces food, and the housebuilder a house, and the weaver a cloak, and the shoemaker a shoe. Now the farmer gives the housebuilder food, and the housebuilder gives the farmer a house; and in the same way all the rest [10] exchange their products for those of others. And this is the proportion. As the farmer is to the housebuilder, so is the housebuilder to the farmer. In the same way with the shoemaker, the weaver, and all the rest, the same proportion holds towards [15] one another. And this proportion holds the republic together. So that the just seems to be the proportional. For the just holds republics together, and the just is the same thing as the proportional.

But since the work which the housebuilder produces is of more value than that of the shoemaker, and the shoemaker had to exchange his work with the [20] housebuilder, but it was not possible to get a house for shoes; under these circumstances they had recourse to using something for which all these things are purchasable, to wit silver, which they called money, and to effecting their mutual exchanges by each paying the worth of each product, and thereby holding the political communion together. [25]

Since, then, the just is in those things and in what was mentioned before, the justice which is concerned with these things will be an habitual impulse attended with choice about and in these things.

Reciprocation also is just; not, however, as the Pythagoreans maintained. For they thought that it was just that a man should suffer in return what he had done. [30] But this cannot be the case in relation to all persons. For the same thing is not just for a servant as for a freeman. For if the servant has struck the freeman, it is not just that he should merely be struck in return, but many times. And reciprocal justice, also consists in proportion. For as the freeman is to the slave in being [35] superior, so is retaliation to aggression. It will be the same with one freeman in relation to another. For it is not just, if a man has knocked out somebody's eye, merely that he should have his own knocked out, but that he should suffer more, if he is to observe the proportion. For he was the first to begin and did a wrong, and is in the wrong in both ways, so

that the acts of injustice are proportional, and for him [1194<sup>b</sup>1] to suffer more than he did is just.

But since the term 'just' is used in more senses than one, we must determine what kind of justice it is about which our inquiry is.

There is, then, a sort of justice, as they say, for a servant as against his master, [5] and a son as against his father. But the just in these cases would seem to be homonymous with political justice (for the justice about which we are inquiring is political justice); for this above all consists in equality (for citizens are a sort of partners, and tend to be on a par by nature, though they differ in character), but a [10] son against his father or a servant against his master would not seem to have any justice at all, any more than my foot or my hand has any justice against me, and in the same way with each of the members. The same, then, would seem to be the case with the son as against his father. For the son is, as it were, a part of his father, except when he has already attained to the position of a man and has been separated [15] from him; then he is the equal and peer of his father. Now citizens are supposed to be on that footing. And in the same way neither has a servant any justice as against his master for the same reason. For the servant is a part of his master. Or if he has [20] any justice against him, it is in the way of economic justice. But this is not what we are in search of, but political justice; for political justice seems to lie in equality and similarity. Though, indeed, the justice that there is in the partnership between wife and husband comes near to political justice. For the wife is inferior to the husband, [25] but more intimately connected with him, and partakes in a way more of equality, because their life is an approximation to political society, so that justice between man and wife is more than any other like that between citizens. Since, then, the just is that which is found in political society, justice also and the just man will be concerned with the politically just.

[30] Things are just either by nature or by law. But we must not regard the natural as being something which cannot by any possibility change; for even the things which are by nature partake of change. I mean, for instance, if we were all to practice always throwing with the left hand, we should become ambidextrous. But [35] still by nature left is left, and the right is none the less naturally superior to the left hand, even if we do everything with the left as we do with the right. Nor because things change does it follow that they are not by nature. But if for the most part and for the greater length of time the left continues thus to be left and the right right, [1195<sup>a</sup>1] this is by nature. The same is the case with things just by nature. Do not suppose that, if things change owing to

our use, there is not therefore a natural justice; because there is. For that which continues for the most part can plainly be seen to be naturally just. As to what we establish for ourselves and practise, that is thereby [5] just, and we call it just according to law. Natural justice, then, is better than legal. But what we are in search of is political justice. Now the politically just is the legal, not the natural.

The unjust and the unjust act might seem to be the same, but they are not. For [10] the unjust is that which is determined by law; for instance, it is unjust to steal a deposit, but the unjust act is the actual doing of something unjustly. And in the same way the just is not the same as a just act. For the just is what is determined by law, but a just act is the doing of just deeds.

When, therefore, have we the just, and when not? Generally speaking, when [15] one acts in accordance with choice and voluntarily (what was meant by the voluntary has been stated by us above), and when one does so knowing the person, the means, and the end, those are the conditions of a just act. In the very same way the unjust man will be he who knows the person, the means, and the end. But when without knowing any of these things one has done something that is unjust, one is [20] not unjust oneself, but unfortunate. For if a man has slain his father under the idea that he was slaying an enemy, though he has done something that is unjust, still he is not doing injustice to anybody, but is unfortunate.

The possibility, then, of not committing injustice when one does things that are unjust lies in being ignorant of what was mentioned a little above, viz. when one does not know whom one is hurting, nor with what, nor to what end. But we must [25] now define the ignorance, and say how the ignorance must arise if a man is not to be doing an injustice to the person whom he hurts. Let this, then, be the definition. When the ignorance is the cause of his doing something, he does not do this voluntarily, so that he does not commit injustice; but when he is himself the cause of his ignorance and does something in accordance with the ignorance of which he is himself the cause, then he is guilty of injustice, and such a person will justly be [30] called unjust. Take for instance people who are drunk. Those who are drunk and have done something bad commit injustice. For they are themselves the causes of their ignorance. For they need not have drunk so much as not to know that they were beating their father. Similarly with the other sorts of ignorance which are due to men themselves, the people who commit injustice from them are unjust. But [35] where they are not themselves the causes, but

their ignorance is the cause of their doing what they do, they are not unjust. This sort of ignorance is that which comes from nature; for instance, children strike their parents in ignorance, but the [1195<sup>b1</sup>] ignorance which is in them, being due to nature, does not make the children be called unjust owing to this conduct. For it is ignorance which is the cause of their behaving thus, and they are not themselves causes of their ignorance, for which reason they are not called unjust either.

But how about being injured? Can a man be injured voluntarily? Surely not. [5] We do indeed voluntarily perform just and unjust acts, but we cannot be said to be injured voluntarily. For we avoid being punished, so that it is evident that we would not voluntarily let ourselves be injured. For no one voluntarily endures to be hurt. Now to be injured is to be hurt.

Yes, but there are some who, when they ought to have an equal share, give way [10] to others, so that if, as we have seen, to have the equal is just, and to have less is to be injured, and a man voluntarily has less, it follows, it is maintained, that he is injured voluntarily. But from the following consideration it is evident, on the other hand, that this is not so. For all who accept less get compensation for it in the way of honour, or praise, or glory, or friendship, or something of that sort. But he who takes [15] compensation of some kind for what he forgoes cannot be said to be injured; and if he is not injured, then he is not injured voluntarily.

Yet again, those who get less and are injured in so far as they do not get what is equal, pride and plume themselves on such things, for they say, 'Though I might have had my share, I did not take it, but gave way to an elder' or 'to a friend'. But no [20] one prides himself on being injured. But if they do not pride themselves upon suffering acts of injustice and do pride themselves upon such things, it follows generally that they will not be injured by thus getting less. And if they are not injured, then they will not be injured voluntarily.

But as against these and the like arguments<sup>16</sup> we have a counter-argument in [25] the case of the incontinent man. For the incontinent man hurts himself by doing bad acts, and these acts he does voluntarily; he therefore hurts himself knowingly, so that he is voluntarily injured by himself. But here if we add a distinction, it will impede the force of the argument. And the distinction is this, that no one wishes to [30] be injured. The incontinent man does with his own wish what is prompted by his incontinence, so that he injures himself; he therefore wishes to do to himself what is bad. But no one wishes to be injured, so that even the

incontinent man will not voluntarily be doing an injury to himself.

[35] But here again one might perhaps raise a difficulty. Is it possible for a man to be unjust to himself? Judging from the incontinent man it would seem possible. [1196<sup>a</sup>1] And, again, in this way. If it is just to do those things which the law ordains to be done, he who does not do these is committing injustice; and if when he does not do them to him to whom the law commands, he is doing an injustice to that person, but the law commands one to be temperate, to possess property, to take care of one's body, and all other such things, then he who does not do these things is doing an [5] injustice to himself. For it is not possible to refer such acts of injustice to anyone else.

But these statements can hardly be true, nor is it possible for a man to be unjust to himself. For it is not possible for the same man at the same time to have more and less, nor at once to act voluntarily and involuntarily. But yet he who does [10] injustice, in so far as he does it, has more, and he who suffers it, in so far as he suffers it, has less. If therefore a man does injustice to himself, it is possible for the same man at the same time to have more and less. But this is impossible. It is not therefore possible for a man to be unjust to himself.

Again, he who does injustice does it voluntarily, and he who suffers it suffers it involuntarily, so that, if it is possible for a man to be unjust to himself, it would be [15] possible at the same time to do something involuntarily and voluntarily. But this is impossible. So in this way also it is not possible for a man to be unjust to himself.

Again, one might look at the question from the point of view of particular acts of injustice. Whenever men commit injustice, it is either by stealing a deposit, or [20] committing adultery, or thieving, or doing some other particular act of injustice; but no one ever robbed himself of a deposit, or committed adultery with his own wife, or stole his own property; so that if the commission of injustice lies in such things, and it is not possible to do any of them to oneself, it will not be possible to commit injustice against oneself.

[25] Or if so, it will not be an act of injustice of the political, but rather of the economic type. For the soul being divided into several parts has in itself a better and a worse, so that if there is any act of injustice within the soul, it will be done by the parts against one another. Now we distinguished the economic act of injustice by its [30] being directed against the better or worse, so that in this sense a man may be unjust or just to himself. But this is not what we are investigating, but the political act of injustice. So that in such acts of injustice as form the subject of our



inquiry, it is not possible for a man to commit injustice against himself.

Which of the two, again, commits injustice, and with which of the two does the [35] act of injustice lie, when a man has anything unjustly? Is it not with him who has judged and made the award, as in the games? For he who takes the palm from the president who has adjudged it to him is not committing injustice, even if it be wrongly awarded to him; but without doubt it is he who has judged badly and given [1196<sup>b</sup>1] it who commits injustice. And he is in a way committing injustice, while in a way he is not. For in that he has not judged what is really and naturally just, he is committing an injustice, while in that he has judged what appears to him to be just, he is not committing an injustice.

**34** · Now since we have spoken about the excellences in general, saying what they are and in what and about what, and about each of them in particular, how we [5] must do the best in accordance with right reason, to say no more than this, namely, ‘to act in accordance with right reason’, would be much the same as if one were to say that health would be best secured if one were to adopt the means of health. Such a statement is unilluminating. I shall have it said to me, ‘Explain what are the means of health’. So also in the case of reason, ‘What is reason and which is right [10] reason?’

Perhaps it is necessary first of all to make a division of that in which reason is found. A distinction, indeed, was made in outline about soul before, how one part of it is possessed of reason, while there is another part of the soul that is irrational. But the part of the soul which is possessed of reason has two divisions, of which one is the [15] deliberative faculty, the other the faculty by which we know. That they are different from one another will be evident from their subject-matter. For as colour and flavour and sound and smell are different from one another, so also nature has rendered the senses whereby we perceive them different (for sound we recognize by [20] hearing, flavour by taste, and colour by sight), and in like manner we must suppose it to be the same with all other things. When, then, the subject-matters are different, we must suppose that the parts of the soul whereby we recognize these are also different. Now there is a difference between the object of thought and the [25] object of sense; and these we recognize by soul. The part of the soul, therefore, which is concerned with objects of sense will be different from that which is concerned with objects of thought. But the faculty of deliberation and choice has to do with objects of sense that are

liable to change, and generally all that is subject to generation and destruction. For we deliberate about those things which depend upon us and our choice to do or not to do, about which there is deliberation and [30] choice as to whether to do them or not. And these are sensible objects which are in process of change. So that the part of the soul in which choice resides will correspond to sensible objects.

These points having been settled, we must go on as follows. The question is one of truth, and the subject of our inquiry is how the truth stands, and we have to do [35] with knowledge, wisdom, intuition, philosophy, belief. What, then, is the object of each of these?

Now knowledge deals with the object of knowledge, and this through a process accompanied with demonstration and reason, but wisdom with matters of action, in [1197<sup>a</sup>1] which there is choice and avoidance, and it is in our power to do or not to do.

When things are made and done, that which makes and that which does them are not the same. For the arts of making have some other end beyond the making; [5] for instance, beyond housebuilding, since that is the art of making a house, there is a house as its end beyond the making, and similarly in the case of carpentry and the other arts of making; but in the processes of doing there is no other end beyond the [10] doing; for instance, beyond playing the harp there is no other end, but just this is the end, the activity and the doing. Wisdom, then, is concerned with doing and things done, but art with making and things made; for it is in things made rather than in things done that artistic contrivance is displayed.

So that wisdom will be a state of choosing and doing things which it is in our [15] own power to do or not to do, so far as they are of actual importance to welfare. Wisdom is an excellence, it would seem, not a science. For the wise are praiseworthy, and praise is bestowed on excellence. Again, every science has its excellence, but wisdom has no excellence, but, as it seems, is itself an excellence.

[20] Intuition has to do with the first principles of things intelligible and real. For knowledge has to do with things that admit of demonstration, but the principles are indemonstrable, so that it will not be knowledge but intuition that is concerned with the principles.

Philosophy is compounded of knowledge and intuition. For philosophy has to [25] do both with the principles and with what can be proved from the principles, with which knowledge deals. In so far, then, as it deals with the principles, it itself partakes of intuition, but in so far

as it deals with demonstrative conclusions from the principles, it partakes of knowledge. So that it is evident that philosophy is compounded of intuition and knowledge, so that it will deal with the same things with which intuition and knowledge do.

[30] Belief is that whereby we are left in doubt about all things as to whether they are in a particular way or not.

Are wisdom and philosophy the same thing? Surely not! For philosophy has to do with things that can be demonstrated and are eternally the same, but wisdom has [35] not to do with these, but with things that undergo change. I mean, for instance, straight or crooked or convex and the like are always what they are, but things expedient do not follow this analogy, so as never to change into anything else; they do change, and a given thing is expedient now, but not to-morrow, to this man but [1197<sup>b</sup>1] not to that, and is expedient in this way, but not in that way. Now wisdom has to do with things expedient, but philosophy not. Therefore philosophy and wisdom are not the same.

Is philosophy an excellence or not? It can become plain to us that it is an [5] excellence by merely looking at wisdom. For if wisdom is, as we maintain, the excellence of one of the two rational parts, and wisdom is inferior to philosophy (for its objects are inferior; for philosophy has to do with the eternal and the divine, as we maintain, but wisdom with what is expedient for man), if, then, the inferior thing is an excellence, it is reasonable that the better should be an excellence, so that it is [10] evident that philosophy is an excellence.

What is intelligence, and with what is it concerned? The sphere of intelligence is the same as that of wisdom, having to do with matters of action. For the intelligent man is doubtless so called from his capacity for deliberation, and in that he judges and sees a thing rightly. But his judgement is about small things and on [15] small occasions. Intelligence, then, and the intelligent man are a part of wisdom and the wise man, and cannot be found apart from these; for you cannot separate the intelligent from the wise man.

The case would seem to be the same with cleverness. For cleverness and the clever man are not wisdom and the wise man; the wise man, however, is clever, [20] hence cleverness co-operates in a way with wisdom. But the bad man also is called clever; for instance, Mentor was thought to be clever, but he was not wise. For it is the part of the wise man and of wisdom to aim at the best things, and always to choose and do these, but it is the part of cleverness and the clever man to consider by [25] what means each object of action may be effected, and to provide

these. Such, then, would seem to be the province and sphere of the clever man.

It may raise a question and cause surprise that, when speaking of character and dealing with a department of state-craft, we are speaking about philosophy. Perhaps the reason is, firstly, that the inquiry about it will not appear foreign to our [30] subject, if it is an excellence, as we maintain. Again, it is perhaps the part of the philosopher to glance also at subjects adjacent to his main interest. And it is necessary, when we are speaking about the contents of soul, to speak about them all; now philosophy is also in soul; so that we are not going beyond our proper subject in [35] speaking about soul.<sup>17</sup>

But as cleverness is to wisdom, so it would seem to be in the case of all the excellences. What I mean is that there are excellences which spring up even by nature in different persons, a sort of impulses in the individual, apart from reason, to courageous and just conduct and the like behaviour; and there are also [1198<sup>a</sup>1] excellences due to custom and choice. But the excellences that are accompanied with reason, when they supervene, are completely praiseworthy.

Now this natural excellence which is unaccompanied by reason, so long as it remains apart from reason, is of little account, and falls short of being praised, but [5] when added to reason and choice, it makes complete excellence. Hence also the natural impulse to excellence co-operates with reason and is not apart from reason. Nor, on the other hand, are reason and choice quite completed as excellence without the natural impulse.

Hence Socrates was not speaking correctly when he said that excellence was [10] reason, thinking that it was no use doing brave and just acts, unless one did them from knowledge and rational choice. This was why he said that excellence was reason. Herein he was not right, but the men of the present day say better; for they say that excellence is doing what is good in accordance with right reason. Even they, indeed, are not right. For one might do what is just without any choice at all or [15] knowledge of the good, but from an irrational impulse, and yet do this rightly and in accordance with right reason (I mean he may have acted in the way that right reason would command); but all the same, this sort of conduct does not merit praise. But it is better to say, according to our definition, that it is the accompaniment by [20] reason of the impulse to good. For that is excellence and that is praiseworthy.

The question might be raised whether wisdom is an excellence or not. It will be evident, however, from the following consideration that it is an

excellence. For if justice and courage and the rest of the excellences, because they lead to the doing of [25] right, are also praiseworthy, it is evident that wisdom will also be among the things that are praiseworthy and that rank as excellences. For wisdom also has an impulse towards those acts which courage has an impulse to do. For, speaking generally, [30] courage acts as wisdom ordains, so that if it is itself praiseworthy for doing what wisdom ordains, wisdom will be in a complete degree both praiseworthy and an excellence.

But whether wisdom is practical or not one might see from this, namely, by looking at the sciences, for instance at housebuilding. For there is, as we say, in [35] housebuilding one person who is called an architect, and another, who is subordinate to him, a housebuilder; and he is capable of making a house. But the architect also, inasmuch as he made the house, is capable of making a house. And the case is the same in all the other productive arts, in which there is a [1198<sup>b</sup>1] master-craftsman and his subordinate. The master-craftsman therefore also will be capable of making something, and that the same thing which his subordinate is capable of making. If, then, the analogy holds in the case of the excellences, as is likely and reasonable, wisdom also will be practical. For all the excellences are [5] practical, and wisdom is a kind of master-craftsman of them. For as it shall ordain, so the excellences and good men act. Since then the excellences are practical, wisdom also will be practical.

But does this hold sway over all things in the soul, as is held and also [10] questioned? Surely not! For it would not seem to do so over what is superior to itself; for instance, it does not hold sway over philosophy. But, it is said, this has charge of all, and is supreme in issuing commands. But perhaps it holds the same position as the steward in the household. For he is supreme over all and manages everything. But it does not follow that he holds sway over all; instead of that he is procuring [15] leisure for the master, in order that he may not be hindered by necessary cares and so shut out from doing something that is noble and befitting. So and in like manner with him wisdom is, as it were, a kind of steward of philosophy, and is procuring leisure for it and for the doing of its work, by subduing the passions and keeping [20] them in order.

## BOOK II

[25] **1** · After this we must inquire into equity. What is it? And what is its field and sphere? Equity and the equitable man is he who is inclined to take less than his legal rights. There are matters in which it is impossible for the lawgiver to enter into exact details in defining, and where he has to content himself with a general statement. When, then, a man gives way in these matters, and chooses those things [30] which the lawgiver would have wished indeed to determine in detail, but was not able to, such a man is equitable. It is not the way with him to take less than what is just absolutely; for he does not fall short of what is naturally and really just, but only of what is legally just in matters which the law left undetermined for want of power.

**2** · Considerateness and the considerate man have to do with the same things as equity, with points of justice that have been omitted by the lawgiver owing to the [35] inexactness of his definitions. The considerate man criticizes the omissions of the lawgiver, and knows that, though things have been omitted by the lawgiver, they are nevertheless just. Such is the considerate man. Now considerateness is not found [1199<sup>a</sup>1] apart from equity. To the considerate man it belongs to judge, and to the equitable man to act in accordance with the judgement.

**3** · Good counsel is concerned with the same things as wisdom (dealing with matters of action which concern choice and avoidance), and it is not found apart [5] from wisdom. For wisdom leads to the doing of these things, while good counsel is a state or disposition or something of that sort, which leads to the attainment of the best and most expedient in matters of action. Hence things that turn out right spontaneously do not seem to form the subject of good counsel. For where there is no [10] reason which is on the look-out for what is best, you would not in that case say that a man to whom something turned out as it should be was well counselled, but lucky. For things that go right without the judgement of reason are due to good luck.

Is it in the part of the just man to put himself on a level with everybody in his intercourse (I mean in the way of becoming all things to

all men)? Surely not. For [15] this would seem to be the part of a flatterer and obsequious person. But to suit his intercourse to the worth of each, this would seem to be the part of the man who is absolutely just and good.

Here is also a difficulty that might be raised. If doing injustice is hurting somebody voluntarily and with full knowledge of the person and the manner and the [20] end, and harm and injustice are in and concerned with good things, it follows that the doer of injustice and the unjust man will know what kind of things are good and what bad. But to know about these things is a peculiar property of the wise man and of wisdom. The absurdity then follows that wisdom, which is the greatest good, is [25] attendant upon the unjust man. Surely it will not be thought that wisdom is attendant upon the unjust man. For the unjust man does not discern and is not able to judge between what is good in itself and what is good for him, but makes a mistake. But this is the province of wisdom, to be able to take a right view of these [30] things (just as in matters of medicine we all know what is absolutely wholesome and what is productive of health, that hellebore and an aperient and surgery and cautery are wholesome and productive of health, and yet we do not possess the science of medicine), for without it we no longer know what is good in particular cases, just as [35] the doctor knows for whom a given thing is good and when and in what disposition; for herein the science of medicine displays itself. Now we may know things that are absolutely wholesome, and yet not have the science of medicine attendant upon us; and the same is the case with the unjust man. That in an absolute sense autocracy [1199<sup>b</sup>1] and government and power are good, he knows; but whether they are good for him or not, or when, or in what condition, that is what he does not also know. But this is just the business of wisdom, so that wisdom does not attend upon the unjust man. [5] For the goods which he chooses and for which he commits injustice are what are absolutely good, not what are good for him. For wealth and office are good absolutely, but for him perhaps they are not good; for by obtaining wealth and office he will do much evil to himself and his friends, for he will not be able to make a right use of office.

[10] Here also is a point which presents a difficulty and suggest inquiry. Can justice be done to a bad man or not? For if injustice consists in hurt, and hurt in the deprivation of goods, it would seem not to hurt him. For the goods which he supposes to be good for him are not really so. For office and wealth will hurt the bad [15] man who is not able to make a right use of them. If then they will hurt him by their presence, he

who deprives him of these would seem to be doing him an injustice. This kind of argument indeed will appear a paradox to the many. For all think that they are able to use office and power and wealth, but they are not right in this [20] supposition. This is made plain by the lawgiver. For the lawgiver does not allow all to hold office, but there is a standard of age and means which must be possessed by him who is to hold office, implying that it is not possible for every one to do so. If then some one were to make it a grievance that he does not hold office or that he is [25] not allowed to steer the ship, the answer would be, 'Well, you have nothing in your soul of a kind which will enable you to hold office or steer the ship'. In the case of the body we see that those cannot be in good health who apply to themselves things that are absolutely good, but if a man is to have his bad body in health, he must first [30] apply to it water and a low diet. And when a man has his soul in a vicious state, in order that he may not work any ill must we not withhold him from wealth and office and power and things of that sort generally, the more so as soul is easier to move and more ready to change than body? For as the man whose body was bad was fit to be [35] dieted in that way, so the man whose soul is bad is fit to live thus, without having any things of this sort.

This also presents a difficulty. For instance, when it is not possible at the same time to do brave and just acts, which is one to do? Now in the case of the natural [1200a1] excellences we said that there existed only the impulse to right without reason; but he who has choice has it in reason and the rational part. So that as soon as choice is present, complete excellence will be there, which we said was accompanied by [5] wisdom, but not without the natural impulse to right. Nor will one excellence run counter to another, for its nature is to obey the dictates of reason, so that it inclines to that to which reason leads. For it is this which chooses the better. For the other excellences do not come into existence without wisdom, nor is wisdom complete [10] without the other excellences, but they co-operate in a way with one another, attending upon wisdom.

No less will the following present itself as a difficulty. Is it in the case of the excellences as it is in the case of the other goods, whether external or bodily? For [15] these when they run to excess make men worse; for instance, when wealth becomes great it makes men supercilious and disagreeable. And so also with the other goods—office, honour, beauty, stature. Is it, then, thus in the case of excellence also, so that, if one comes to have justice or courage to excess, he will be worse? Surely not!



But, it will be said, from excellence comes honour, and when honour [20] becomes great, it makes men worse, so that it is evident that excellence when progressing to a great extent will make men worse. For excellence is the cause of honour, so that excellence also, if it becomes great, will make men worse. Surely this cannot be true! For excellence, though it may have many other functions, as it has, has this among the most special, to be able to make a right use of these and the like [25] goods when they are there. If therefore the good man on there coming to him high honour or high office shall not make a right use of these, it shows that he is not a good man. Therefore neither honour nor office will make the good man worse, so that neither will excellence. But generally, since it was laid down by us at the start [30] that the excellences are mean states, it follows that the more any state is an excellence, the more it is a mean; so that not only will excellence as it becomes great not make a man worse, but it will make him better. For the mean in question was found to be the mean between excess and defect in the passions. So much then for these matters.

4 · After this we must make a new start and speak about self-control and [35] incontinence. But as the excellence and the vice are themselves of a strange nature, so the discussion which will ensue about them must necessarily be strange also. For this excellence is not like the rest. For in the rest reason and passion have an impulse [1200<sup>b</sup>1] towards the same objects and are not opposed to one another, but in the case of this reason and passion are opposed to one another.

There are three things in the soul in respect of which we are called bad—vice, [5] incontinence, brutality. About excellence and vice, then, their nature and their sphere, we have spoken above; but now we must speak about incontinence and brutality.

5 · Brutality is a kind of excessive vice. For when we see some one utterly degraded, we say that he is not even a man but a brute, implying that there is a vice [10] of brutality. Now the excellence opposed to this is without a name, but this sort of thing is above man, a kind of heroic and divine excellence. But this excellence is without a name, because excellence does not belong to god. For god is superior to excellence and it is not in the way of excellence that his goodness lies. For, if it were, [15] excellence would be better than god. For this reason the excellence which is opposed to the vice of brutality is without a name. But the usual

antithesis to this kind of vice is divine and superhuman excellence. For as the vice of brutality transcends man, so also does the excellence opposed to it.

6 · But with regard to incontinence and self-control we must first state the [20] difficulties and the arguments which run counter to appearances, in order that, having viewed the matter together from the point of view of the difficulties and counter-arguments, and having examined these, we may see the truth about them so far as possible; for it will be more easy to see the truth in that way.

[25] Now Socrates the elder used to reject and deny incontinence altogether, saying that no one would choose evil who knew it to be such. But the incontinent seems, while knowing things to be bad, to choose them all the same, letting himself be led by passion. Owing to such considerations he did not think that there was [30] incontinence. But there he was wrong. For it is absurd that conviction of the truth of this argument should lead to the rejection of what credibly occurs. For men do display incontinence, and do things which they themselves know to be bad.

Since, then, there is such a thing as incontinence, does the incontinent possess some knowledge whereby he views and examines his bad acts? But, again, this [35] would not seem so. For it would be strange that the strongest and surest thing in us should be vanquished by anything. For knowledge is of all things in us the most permanent and the most constraining. So that this argument again runs counter to there being knowledge.<sup>18</sup>

Is it then not knowledge, but opinion? But if the incontinent man has opinion, [1201<sup>a</sup>1] he will not be blameworthy. For if he does something bad with respect to which he has no exact knowledge but only an opinion, one would make allowances for his siding with pleasure and doing what is bad, if he does not know for certain that it is bad, but only has an opinion; and those for whom we make allowances we do not [5] blame. So that the incontinent, if he only has opinion, will not be to blame. But he is to blame. Such arguments then land us in difficulties. For some denied knowledge on the ground of absurd consequences, and others again denied opinion on the ground that there were absurd consequences from that also.

[10] Here is another difficulty that might be raised. It is held that the temperate man is also self-controlled. Will this involve the temperate

man's having vehement appetites? If then he is to be self-controlled, it will be necessary for him to have vehement appetites (for you would not speak of a man as self-controlled who masters moderate appetites); but if he is to have vehement appetites, in that case he [15] will not be temperate (for the temperate is he who does not display appetite or feeling at all).

The following considerations again present a difficulty. For it results from the statements that the incontinent man is sometimes praiseworthy and the self-controlled man blameworthy. For let it be supposed, it may be said, that some one has gone wrong in his reasoning, and let it appear to him as the result of his [20] reasoning that which is right is wrong, but let appetite lead him to the right; then reason indeed will forbid his doing it, but being led by appetite he does it (for such we found was the incontinent man); he will therefore do what is right, supposing that appetite leads him thereto (but reason will try to hinder him; for let it be [25] supposed that he is mistaken in his reasoning about right); it follows that he will be incontinent and yet be praiseworthy; for in so far as he does what is right, he is praiseworthy. The result then is a paradox.

Again, on the other hand, let his reason be mistaken, and let what is right not seem to him to be so, but let appetite lead him to the right. Now he is self-controlled who, though he has an appetite for a thing, yet does not act upon it owing to reason; [30] therefore if his reason is wrong it will hinder him from doing what he has an appetite for;<sup>19</sup> therefore it hinders him from doing what is right (for to that we supposed that his appetite led him); but he who fails to do what is right, when it is his duty to do it, is blameworthy; therefore the man of self-control will sometimes be blameworthy. In this way then also the result is a paradox. [35]

A difficulty might also be raised as to whether incontinence and the incontinent man display themselves in and about everything, for instance, property and honour and anger and glory (for people seem to be incontinent with regard to all these things), or whether they do not, but incontinence has a certain definite sphere.

The above, then, are the points which present a difficulty; but it is necessary to [1201<sup>b</sup>1] solve these difficulties. First, then, that which is connected with knowledge. For it appeared to be an absurdity that one who possessed knowledge should cast it from him or fall away from it. But the same reasoning applies also to opinion; for it makes no difference whether it is opinion or knowledge. For if opinion is intensely firm and [5] unalterable by persuasion, it will not differ from knowledge, opinion carrying with it the belief that things are as he opines them to be; for

instance, Heraclitus of Ephesus has this sort of opinion about his own opinions.

But there is no paradox in the incontinent man's doing something bad, whether he has knowledge or opinion such as we describe. For there are two ways of [10] knowing, one of which is the possessing knowledge (for we say that one knows when he possesses knowledge), the other is putting the knowledge into operation. He then who possesses the knowledge of right, but does not operate with it, is incontinent. When, then, he does not operate with this knowledge, it is nothing surprising that he [15] should do what is bad, though he possesses the knowledge. For the case is the same as that of sleepers. For they, though they possess the knowledge, nevertheless in their sleep both do and suffer many disgusting things. For the knowledge is not operative in them. So it is in the case of the incontinent. For he seems like one asleep [20] and does not operate with his knowledge. Thus, then, is the difficulty solved. For the difficulty was whether the incontinent man expels his knowledge or falls away from it, both of which appear paradoxical.

But, again, the thing may be made manifest in this way: as we said in the *Analytics* deduction depends on two propositions, and of these the first is universal, [25] while the second is subsumed under it and is particular. For instance, I know how to cure any one with a fever, this man has a fever: therefore I know how to cure this man.

Now there are things which I know with the knowledge of the universal, but [30] not with that of the particular. Here then also mistake becomes possible to the man who possesses the knowledge: for instance I know how to cure any one with a fever, but I do not know if this man has a fever. Similarly then in the case of the incontinent man who possesses the knowledge the same mistake will arise. For it is [35] possible for the incontinent man to possess the knowledge of the universal, that such and such things are bad and hurtful, but yet not to know that these particular things are bad, so that while possessing knowledge in this way he will go wrong; for he has the universal knowledge, but not the particular. Neither, then, in this way is it at all [1202<sup>a</sup>1] a surprising result in the case of the incontinent man, that he who has the knowledge should do something bad.

For it is so in the case of persons who are drunk. For those who are drunk, when the intoxication has passed off, are themselves again. Reason was not expelled from them, nor was knowledge, but it was overcome by the intoxication; and when they [5] have got rid of the intoxication, they are themselves again. So, then, it is with the incontinent. His passion

gains the mastery and brings his reasoning to a standstill. But when the passion, like the intoxication, has been got rid of, he is himself again.

There was another argument touching incontinence which presented a difficulty as seeming to show that the incontinent man will sometimes be praiseworthy, [10] and the self-controlled man blameworthy. But this is not the case. For the man who is deceived in his reason is neither continent nor incontinent, but only he who possesses right reason and thereby judges of right and wrong, and it is the man who disobeys this kind of reason who is incontinent, while he who obeys it and is not led [15] by his appetites is self-controlled. If a man does not think it disgraceful to strike his father and has a desire to strike him, but abstains from doing so, he is not a man of self-control. So that, since there is neither self-control nor incontinence in such cases, neither will incontinence be praiseworthy or self-control blameworthy in the way that was thought.

There are forms of incontinence which are morbid and others which are due to [20] nature. For instance, such as these are morbid. There are some people who pluck their hairs and nibble them. If one masters this pleasure, then, he is not praiseworthy, nor blameworthy if he fails to do so, or not very much. As an instance of incontinence due to nature we may take the story of a son who was brought to trial in court for beating his father, and who defended himself by saying, 'Why, he [25] did so to his own father'—and he was acquitted, for the judges thought that his going wrong was due to nature. If, then, one were to master the impulse to beat his father, he is not praiseworthy. It is not, then, such forms of incontinence or continence as these of which we are now in search, but those for which we are called blameworthy or praiseworthy without qualification.

[30] Of goods some are external, as wealth, office, honour, friends, glory; others necessary and concerned with the body, for instance, touch and taste, and bodily pleasures.<sup>20</sup> He, then, who is incontinent with respect to these, would appear to be incontinent without qualification. And the incontinence of which we are in search would seem to be concerned with just these. And the difficulty was about the sphere [35] of incontinence. As regards honour, then, a man is not incontinent without qualification; for he who is incontinent with regard to honour is praised in a way, as being ambitious. And generally when we call a man incontinent in the case of such things we do it with some addition, incontinent 'as regards honour or glory or anger'. But when a man is incontinent without qualification, we do not add the [1202<sup>b</sup>1] sphere, it

being assumed in his case, and being manifest without the addition, what the sphere is. For he who is incontinent without qualification has to do with the pleasures and pains of the body.

It is evident also from the following consideration that incontinence has to do with these things. For since the incontinent man is blameworthy, the subject-matter [5] of his incontinence ought also to be blameworthy. Now honour and glory and office and riches, and the other things with respect to which people are called incontinent, are not blameworthy, whereas bodily pleasures are blameworthy. Therefore, reasonably enough, the man who is concerned with these more than he ought is called incontinent in the complete sense.

Among the so-called incontinences with respect to other things that which is [10] concerned with anger is the most blameworthy. But which is more blameworthy, this or incontinence with regard to pleasures? Now incontinence with regard to anger resembles servants who are eager to minister to one's needs. For they, when the master says 'Give me', are carried away by their eagerness, and before they hear [15] what they ought to give, give something, and give the wrong thing. For often, when they ought to give a book, they give a pen. Something like this is the case with the man who cannot control his anger. For passion, as soon as it hears the first mention of injury, is impelled to take vengeance, without waiting to hear whether it ought or [20] ought not, or not so vehemently. This sort of impulse, then, to anger, which appears to be incontinence of anger, is not greatly to be blamed, but the impulse to pleasure is blameworthy. For this latter differs from the former owing to the injunction of reason to abstain, which it nevertheless acts against; for which reason it is more [25] blameworthy than incontinence due to anger. For incontinence due to anger is a pain (for no one feels anger without being pained), but that which is due to appetite is attended with pleasure, for which reason it is more blameworthy. For incontinence due to pleasure seems to involve wantonness.

Are self-control and endurance the same thing? Surely not! For self-control has to do with pleasures and the man of self-control is he who masters pleasures, but [30] endurance has to do with pains. For the man of endurance is he who endures and undergoes pains. Again, lack of self-control and softness are not the same thing. For softness and the soft person is he who does not undergo pains—not all of them, but [35] such as any one else would undergo, if he had to; whereas the incontinent man is he who is not able to endure pleasures, but succumbs to them and lets himself be led by them.

Again, there is another character who is called intemperate. Is the intemperate, then, the same as the incontinent? Surely not! For the intemperate is the kind of [1203<sup>a</sup>1] man who thinks that what he does is best and most expedient for himself, and who has no reason opposing the things which appear pleasant to himself, whereas the incontinent does possess reason which opposes his going in pursuit of those things to [5] which his appetite leads.

But which is the more curable, the intemperate or the incontinent? On first sight, indeed, it might seem that it is not the incontinent. The intemperate, it may be urged, is more easy to cure; for if reason could be engendered in him, to teach him that things are bad, he will leave off doing them; but the incontinent man has [10] reason, and yet acts as he does, so that such a person would seem to be incurable. But on the other hand which is in the worse condition, he who has no good at all, or he who has some good joined with these evils? Plainly the former, the more so inasmuch as it is the more valuable part that is in a bad condition. The incontinent man, then, does possess a good in his reason being right, while the intemperate does [15] not. Again, reason is the principle in each. Now in the incontinent the principle, which is the most valuable thing, is in a good condition, but in the intemperate in a bad; so that the intemperate will be worse than the incontinent. Again, like the vice of brutality of which we spoke, you cannot see it in a beast, but only in a human [20] being (for brutality is a name for excessive vice). Why so? Just because a beast has in it no bad principle. Now the principle is reason. For which would do more evil, a lion, or Dionysius or Phalaris or Clearchus, or some of those wicked men? Plainly the latter. For their having in them a bad principle contributes greatly to their [25] powers of mischief, but in the beast there is no principle at all. In the intemperate, then, there is a bad principle. For inasmuch as he does bad acts and reason assents to these, and it seems to him that he ought to do these things, there is in him a principle which is not a sound one. Hence the incontinent would seem to be better than the intemperate.

[30] There are two species of incontinence, one in the way of precipitancy and want of forethought, a kind that comes on suddenly (for instance, when we see a beautiful woman, we are at once affected in some way, and from the affection there ensues an impulse to do something which perhaps we ought not), the other a sort of weakness, but attended with reason which warns against action. Now the former would not seem to be very blameworthy. For this kind occurs even in the good, in those who are [1203<sup>b</sup>1] of warm temperament and of a rich natural

endowment; but the other in the cold and atrabilious, and such are blameworthy. Again, one may avoid being affected by fortifying oneself beforehand with the thought, There will come a pretty woman, so one must control oneself. So that, if he has fortified himself beforehand with a thought of this kind, he whose incontinence is due to the suddenness of the [5] impression will not be affected at all, nor do anything wrong. But he who knows indeed from reason that he ought not, but gives in to pleasure and succumbs to it, is more blameworthy. The good man would never become incontinent in that way, and fortification by reason would be no cure for it. For this is the guide within the man, [10] and yet he does not obey it, but gives in to pleasure, and succumbs with a sort of weakness.

Whether the temperate man is self-controlled was raised as a difficulty above, but now let us speak of it. Yes, the temperate man is also self-controlled. For the man of self-control is not merely he who, when he has appetites in him, represses [15] these owing to reason, but also he who is of such a kind that, though he has not appetites in him, he would repress them, if they did arise. But it is he who has not bad desires and who has his reason right with respect to these things who is temperate, while the man of self-control is he who has bad desires and who has his reason right with regard to these things; so that self-control will go along with temperance, and the temperate will be self-controlled, but not the self-controlled [20] temperate. For the temperate is he who does not feel passion, while the self-controlled man is he who does feel passion, or is capable of feeling it, but subdues it. But neither of these is actually the case with the temperate. Hence the self-controlled is not temperate.

But is the intemperate incontinent or the incontinent intemperate? Or does neither follow on the other? For the incontinent is he whose reason fights with his [25] passions, but the intemperate is not of this sort, but he who in doing base deeds has the consent of his reason. Neither then is the intemperate like the incontinent nor the incontinent like the intemperate. Further, the intemperate is worse than the incontinent. For what comes by nature is harder to cure than what results from [30] custom (for the reason why custom is held to be so strong is that it turns things into nature). The intemperate, then, is in himself the kind of man who is bad by nature, owing to which, and as a result of which, the reason in him is bad. But not so the incontinent. It is not true of him that his reason is not good because he is himself such (for he would have to be bad, if he were of himself by nature such as the bad). The incontinent, then, seems to be bad by custom, but the intemperate by nature. [1204<sup>a</sup>1]



Therefore the intemperate is the harder to cure. For one custom is dislodged by another, but nothing will dislodge nature.

But seeing that the incontinent is the kind of man who knows and is not [5] deceived in his reason, while the wise man also is of the same kind, who views everything by right reason, is it possible for the wise man to be incontinent? Surely not! For though one might raise the foregoing difficulties, yet if we keep consistent with our former statements, the wise man will not be incontinent. For we said that the wise man was not merely he in whom right reason exists, but he who also does [10] what appears in accordance with right reason to be best. Now if the wise man does what is best, the wise man will not be incontinent; but an incontinent man may be clever. For we distinguished above between the clever and the wise as being different. For though their spheres are the same, yet the one does what he ought and [15] the other does not. It is possible, then, for the clever man to be incontinent (for he does not succeed in doing what he ought), but it is not possible for the wise man to be incontinent.

7 · After this we must speak about pleasure, since our discussion is on the subject of happiness, and all think that happiness is either pleasure and living [20] pleasantly, or not without pleasure. Even those who feel disgust at pleasure, and do not think that pleasure ought to be reckoned among goods, at least add the absence of pain; now to live without pain borders on pleasure. Therefore we must speak about pleasure, not merely because other people think that we ought, but because it [25] is actually indispensable for us to do so. For since our discussion is about happiness, and we have defined and declare happiness to be an exercise of excellence in a complete life, and excellence has to do with pleasure and pain, it is indispensable to [30] speak about pleasure, since happiness is not apart from pleasure.

First, then, let us mention the reasons which some people give for thinking that one ought not to regard pleasure as part of good. First, they say that pleasure is a becoming, and that a becoming is something incomplete, but that the good never [35] occupies the place of the incomplete. Secondly, that there are some bad pleasures, whereas the good is never to be found in badness. Again, that it is found in all, both in the bad man and in the good, and in beasts wild and tame; but the good is unmixed [1204<sup>b</sup>1] with the bad and not promiscuous. And that pleasure is not the best thing, whereas the good is the best thing. And

that it is an impediment to right action, and what tends to impede right cannot be good.

First, then, we must address ourselves to the first argument, that about [5] becoming, and must endeavour to dispose of this on the ground of its not being true. For, to begin with, not every pleasure is a becoming. For the pleasure which results from thought is not a becoming, nor that which comes from hearing and seeing and smelling. For it is not the effect of deficiency, as in the other cases; for instance, [10] those of eating and drinking. For these are the result of defect and excess, owing to the fulfilment of a deficiency or the relief of an excess; which is why they are held to be a becoming. Now defect and excess are pain. There is therefore pain wherever there is a becoming of pleasure. But in the case of seeing and hearing and smelling [15] there is no previous pain. For no one in taking pleasure in seeing or smelling was affected with pain beforehand. Similarly in the case of thought. One may speculate on something with pleasure without having felt any pain beforehand. So that there may be a pleasure which is not a becoming. If then pleasure, as their argument maintained, is not a good for this reason, namely, that is a becoming, but there is [20] some pleasure which is not a becoming, this pleasure may be good.

But generally no pleasure is a becoming. For even the pleasures of eating and drinking are not becomings, but there is a mistake on the part of those who say that these pleasures are becomings. For they think that pleasure is a becoming because it [25] ensues on the application of the remedy; but it is not. For there being a part of the soul with which we feel pleasure, this part of the soul acts and moves simultaneously with the application of the things which we need, and its movement and action are pleasure. Owing, then, to that part of the soul acting simultaneously with the [30] application, or owing to its activity, they think that pleasure is a becoming, from the application being visible, but the part of the soul invisible. It is like thinking that man is body, because this is perceptible by sense, while the soul is not; but the soul also exists. So it is also in this case; for there is a part of the soul with which we feel [35] pleasure, which acts along with the application. Therefore no pleasure is a becoming.

And it is, they say, a conscious restoration to a normal state. But there is pleasure without such restoration to a normal state. For restoration means the [1205<sup>a</sup>1] filling up of what by nature is deficient but it is possible, as we maintain, to feel pleasure without any deficiency. For deficiency is pain, and we say that there is pleasure without pain and

prior to pain. So that pleasure will not be a restoration of a deficiency. For in such pleasures there is no deficiency. So that if the reason for thinking that pleasure is not a good was because it is a becoming, and it is found that [5] no pleasure is a becoming, pleasure may be a good.

But next it is maintained that some pleasures are not good. One can get a comprehensive view of this point as follows. Since we maintain that good is mentioned in all the categories (in that of substance and relation and quantity and [10] time and generally in all), this much is plain at once. Every activity of good is attended with a certain pleasure, so that, since good is in all the categories, pleasure also will be in all;<sup>21</sup> so that since the goods and pleasure are in these, and the pleasure that comes from the goods is pleasure, every pleasure will be good. [15]

At the same time it is manifest from this that pleasures differ in kind. For the categories are different in which pleasure is. For it is not as in the sciences, for instance grammar or any other science whatever. For if Lampros possesses the science of grammar, he as a grammarian will be disposed by this knowledge of [20] grammar in the same way as any one else who possesses the science; there will not be two different sciences of grammar, that in Lampros and that in Ileus. But in the case of pleasure it is not so. For the pleasure which comes from drunkenness and that which comes from the commerce of the sexes do not dispose in the same way. Therefore pleasures would seem to differ in kind. [25]

But another reason why pleasure was held by them not to be good was because some pleasures are bad. But this sort of objection and this kind of judgement is not peculiar to pleasure, but applies also to nature and knowledge. For there is such a thing as a bad nature, for example that of worms and beetles and of ignoble [30] creatures generally, but it does not follow that nature is a bad thing. In the same way there are bad branches of knowledge, for instance the mechanical; nevertheless it does not follow that knowledge is a bad thing, but both knowledge and nature are good in kind. For just as one must not form one's views of the quality of a sculptor from his failures and bad workmanship, but from his successes, so one must not [35] judge of the quality of knowledge or nature or of anything else from the bad, but from the good.

In the same way pleasure is good in kind, though there are bad pleasures—of [1205<sup>b</sup>1] that we ourselves are as well aware as any one. For since the natures of creatures differ in the way of bad and good, for instance that of man is good, but that of a wolf or some other beast bad, and in like manner there is one nature of a horse, another [5] of a man, an ass, or a dog, and since pleasure is a restoration of each to its own

nature from that which runs counter to it, it follows that this will be appropriate, that the bad nature should have the bad pleasure. For the thing is not the same for a horse and a man, any more than for any of the rest. But since their natures are different, their pleasures also are different. For pleasure, as we saw, is a restoration, [10] and the restoration, they maintain, restores to nature, so that the restoration of the bad nature is bad, and that of the good, good.

But those who assert that pleasure is not a good thing are in much the same [15] case as those who, not knowing nectar, think that the gods drink wine, and that there is nothing more delightful than this. But this is owing to their ignorance. In much the same case are all those who assert that all pleasures are becoming, and therefore not a good. For owing to their not knowing other than bodily pleasures, and seeing these to be becomings and not good, for this reason they think in general [20] that pleasure is not a good.

Since, then, there are pleasures both of a nature undergoing restoration and also of one in its normal state, for instance of the former the satisfactions which follow upon deficiency, but of a nature in its normal state the pleasures of sight, hearing, and so on, the activities of the nature in its normal state will be better—for [25] the pleasures of both kinds are activities. It is evident, then, that the pleasures of sight, hearing, and thought will be best, since the bodily pleasures result from a satisfaction.

Again, this was also said by way of showing that it is not a good, that what [30] exists in all and is common to all is not good. Such an objection might seem to be appropriate in the case of a man who covets honour and is actuated by that feeling. For the man who is covetous of honour is one who wishes to be sole possessor of something and by some such means to surpass all others; so he thinks that, if pleasure is to be a good, it too must be something of this sort. Surely this is not so, but, on the contrary, it would seem to be a good for this reason, that all things aim at [35] it. For it is the nature of all things to aim at the good, so that, if all things aim at pleasure, pleasure must be good in kind.

[1206<sup>a</sup>1] Again, it was denied that pleasure is a good on the ground that it is an impediment. But their asserting it to be an impediment seems to arise from a wrong view of the matter. For the pleasure that comes from the performance of the action is not an impediment; if, however, it be a different pleasure, it is an impediment; for [5] instance, the pleasure of intoxication is an impediment to action; but on this principle one kind of knowledge will be a hindrance to another, for one cannot exercise both

at once. But why is knowledge not good, if it produces the pleasure that comes from knowledge? And will that pleasure be an impediment? Surely not; but it will intensify the action. For the pleasure is an incentive to increased action, if [10] it comes from the action itself. For suppose the good man to be doing his acts of excellence, and to be doing them pleasantly; will he not much more exert himself in the action? And if he acts with pleasure, he will be good, but if he does the right with pain, he is not good. For pain attends upon what is due to compulsion, so that if [15] one is pained at doing right, he is acting under compulsion; and he who acts under compulsion is not good.

But indeed it is not possible to perform excellent acts without pain or pleasure. The middle state does not exist. Why so? Because excellence implies feeling, and [20] feeling pain or pleasure, and there is nothing intermediate. It is evident, then, that excellence is either attended with pain or with pleasure. Now if one does the right with pain he is not good. So that excellence will not be attended with pain. Therefore with pleasure. Not only, then, is pleasure not an impediment, but it is actually an incentive to action, and generally excellence cannot exist without the [25] pleasure that comes from it.

There was another argument, to the effect that there is no science which produces pleasure. But this is not true either. For cooks and garland-makers and perfumers are engaged in the production of pleasure. But indeed the other sciences do not have pleasure as their end, but the end is with pleasure and not without it; there is, therefore, a science productive of pleasure. [30]

Again, there was another argument, that it is not the best thing. But in that way and by the like reasoning you will reject the particular excellences too. For courage is not the best thing. Is it, therefore, not a good? Surely this is absurd! And the same with the rest. Neither, then, is pleasure not a good simply because it is not [35] the best thing.

To pass on, a difficulty of the following kind might be raised in the case of the excellences. I mean, since the reason sometimes masters the passions (for we say so in the case of the man of self-control), and the passions again conversely master the reason (as happens in the case of the incontinent), since, then, the irrational part of the soul, being vicious, masters the reason, which is well-disposed (for the [1206<sup>b</sup>1] incontinent man is of this kind), the reason in like manner, being in a bad condition, will master the passions, which are well-disposed and have their proper excellence, and if this should be the case, the result will be a bad use of excellence (for the [5] reason being in a bad condition and using

excellence will use it badly); now such a result would appear paradoxical.

This difficulty it is easy to answer and resolve from what has been said by us before about excellence. For we assert that there is excellence when reason being in a good condition is commensurate with the passions, these possessing their proper [10] excellence, and the passions with the reason; for in such a condition they will accord with one another, so that reason should always ordain what is best, and the passions being well disposed find it easy to carry out what reason ordains. If, then, the reason is in a bad condition, and the passions not, there will not be excellence owing to the [15] failure of reason (for excellence consists in both). So that it is not possible to make a bad use of excellence.

Speaking generally, it is not the case, as others think, that reason is the principle and guide to excellence, but rather the feelings. For there must first be produced in us (as indeed is the case) an irrational impulse to the right, and then [20] later on reason must put the question to the vote and decide it. One may see this from the case of children and those who live without reason. For in these, apart from reason, there spring up, first, impulses of the feelings towards right, and reason supervening later and giving its vote the same way is the cause of right action. But if [25] they have received from reason the principle that leads to right, the feelings do not necessarily follow and consent thereto, but often oppose it. Hence a right disposition of the feelings seems to be the principle that leads to excellence rather than the reason.

8 · Since our discussion is about happiness, it will be connected with the [30] preceding to speak about good fortune. For the majority think that the happy must be the fortunate life, or not apart from good fortune, and perhaps they are right in thinking so. For it is not possible to be happy without external goods, over which [35] fortune is supreme. Therefore we must speak about good fortune, saying generally who the fortunate man is, and what is his province and his sphere.

First, then, one may raise difficulties by having recourse to the following considerations. One would not say of fortune that it is nature. For what nature is the cause of, that she produces for the most part or without exception,<sup>22</sup> but this is never [1207<sup>a</sup>1] the case with fortune—her effects are disorderly and as it may chance; this is why we speak of chance in the case of such things.

Neither would one identify it with any mind or right reason. For here

more than ever is there order and uniformity, but not chance. Hence, where there is most [5] of mind and reason, there is least chance, and where there is most chance, there is there least mind.

Can it be, then, that good fortune is a sort of care of the gods? Surely it will not be thought to be this! For we suppose that, if god is the disposer of such things, he assigns both good and evil in accordance with desert, whereas chance and the things [10] of chance do really occur as it may chance. But if we assign such a dispensation to god, we shall be making him a bad judge or else unjust. And this is not befitting to god.

And yet outside of these there is no other position which one can assign to fortune, so that it is plain that it must be one of these. Now mind and reason and knowledge seem to be a thing utterly foreign to it. And yet neither would the care [15] and providence of god seem to be good fortune, owing to its being found also in the bad, though it is not likely that god would have a care of the bad.

Nature, then, is left as being most connected with good fortune. And good fortune and fortune generally displays itself in things that are not in our own power, [20] and of which we are not masters nor able to bring them about. For which reason no one calls the just man, in so far as he is just, fortunate, nor yet the brave man, nor any other excellent character. For these things are in our power to have or not to have. But it is just in such things as follow that we shall speak more appropriately of good fortune. For we do call the well-born fortunate, and generally the man who [25] possesses such kinds of goods of which he is not himself the controller.

But all the same even there good fortune would not seem to be used in its strict sense. But there are more meanings than one of the term 'fortunate'. For we call a man fortunate to whom it has befallen to achieve some good beyond his own calculation, and him who has made a gain when he ought reasonably to have [30] incurred a loss. Good fortune, then, consists in some good accruing beyond expectation, and in escaping some evil that might reasonably have been expected. But good fortune would seem to consist to a greater extent and more properly in the obtaining of good. For the obtaining of good would seem to be in itself a piece of [35] good fortune, while the escaping evil is a piece of good fortune accidentally.

Good fortune, then, is nature without reason. For the fortunate man is he who apart from reason has an impulse to good things and obtains these, and this comes from nature. For there is in the soul by nature something of this sort whereby we are impelled, not under the guidance

of reason, towards things for which we are well fitted. And if one were to ask a man in this state, 'Why does it please you to do [1207<sup>b</sup>1] so'?—he would say, 'I don't know, except that it does please me', being in the same condition as those who are inspired by religious frenzy; for they also have an impulse to do something apart from reason.

We cannot call good fortune by a proper name of its own, but we often say that [5] it is a cause, though cause is not a suitable name for it. For a cause and its effect are different, and what is called a cause contains no reference to an impulse which attains good, in the way either of avoiding evil or on the other hand of obtaining [10] good, when not thinking to obtain it. Good fortune, then, in this sense is different from the former, and this seems to result from the way in which things fall out, and to be good fortune accidentally. So that, if this also is to be called good fortune, at all events the other sort has a more intimate connexion with happiness, namely, that wherein the principle of impulse towards the attainment of goods is in the man [15] himself.

Since, then, happiness cannot exist apart from external goods, and these result from good fortune, as we said just now, it follows that it will work along with happiness. So much then about good fortune.

9 · But since we have spoken about each of the excellences in detail, it [20] remains to sum up the particulars under one general statement. There is a phrase, then, which is not badly used of the completely good man, namely, 'nobility and goodness'. For he is noble and good, they say, when he is completely good. For it is in the case of excellence that they use the expression 'noble and good'; for instance, [25] they say that the just man is noble and good, the brave man, the temperate, and generally in the case of the excellences. Since, then, we make a dual division, and say that some things are noble and others good, and that some goods are absolutely good and others not so, calling noble such things as the excellences and the actions which spring from them, and good, office, wealth, glory, honour, and the like, the [30] noble and good man is he to whom the things that are absolutely good are good, and the things that are absolutely noble are noble. For such a man is noble and good. But he to whom things absolutely good are not good is not noble and good, any more than he would be thought to be in health to whom the things that are absolutely [35] healthy are not healthy. For if the accession of wealth and office were to hurt anybody, they would not be desirable, but he will wish to have for himself such things as will not hurt him. But he who is of



such a nature as to shrink from having [1208<sup>a</sup>1] anything good would not seem to be noble and good. But he for whom the possession of all good things is good and who is not spoilt by them, as, for instance, by wealth and power, such a man is noble and good.

10 · But about acting rightly in accordance with the excellences something [5] indeed has been said, but not enough. For we said that it was acting in accordance with right reason. But possibly one might be ignorant as to this very point, and might ask, ‘What is acting in accordance with right reason? And where is right reason?’ To act, then, in accordance with right reason is when the irrational part of [10] the soul does not prevent the rational from displaying its own activity. For then the action will be in accordance with right reason. For seeing that in the soul we have a worse and a better part and the worse is always for the sake of the better, as in the case of body and soul the body is for the sake of the soul, and we shall say that we [15] have our body in a good state, when its state is such as not to hinder, but actually to help and take part in inciting towards the soul accomplishing its own work (for the worse is for the sake of the better, to aid the better in its work); when, then, the passions do not hinder the mind from performing its own work, then you will have [20] what is done in accordance with right reason.

Yes, but perhaps some one may say, ‘In what state must the passions be so as not to act as a hindrance, and when are they in this state? For I do not know’, This sort of thing is not easy to put into words, any more than the doctor finds it so. But when he has given orders that barley-gruel shall be administered to a patient in a fever, and you say to him, ‘But how am I to know when he has a fever?’—he replies, [25] ‘When you see him pale’. ‘But how am I to know when he is pale?’ There the doctor . . . says,<sup>23</sup> ‘Well, if you can’t perceive that much yourself, it’s no good talking to you any more’. The same thing applies in like manner to all such subjects. And the case is the same with regard to recognizing the passions. For one must contribute [30] something oneself towards the perception.

But perhaps one might raise the following sort of question also, ‘If I really know these things, shall I then be happy?’ For they think they must be; whereas it is not so. For none of the other sciences transmits to the learner the use and exercise, [35] but only the faculty. So in this case also the knowing of these things does not transmit the use (for happiness is an activity, as we maintain), but the faculty, nor does happiness consist in

the knowledge of what produces it, but comes from the use of these means. Now the use and exercise of these it is not the business of this [1208<sup>b</sup>1] treatise to impart, any more than any other science imparts the use of anything, but only the faculty.

**11** · In addition to all that has gone before, it is necessary to speak about friendship, saying what it is, and what are its circumstances and sphere. For since [5] we see that it is co-extensive with life and presents itself on every occasion, and that it is a good, we must embrace it also in our view of happiness.

First, then, perhaps it will be as well to go through the difficulties and questions that are raised about it. Does friendship exist among the like, as is thought and said? For ‘Jackdaw sits by jackdaw’, as the proverb has it, and

[10] Unto the like God ever brings the like.<sup>24</sup>

There is a story also of a dog that used always to sleep upon the same tile, and how Empedocles, on being asked, ‘Why does the dog sleep on the same tile?’ said, ‘Because the dog has something that is like the tile’, implying that it was owing to the likeness that the dog resorted to it.

But again, on the other hand, some people think that friendship occurs rather [15] among opposites. Take the line:

Earth loves the shower, what time the plain is dry.

It is the opposite, they say, that loves to be friends with the opposite; for among the like there is no room for friendship. For the like, they say, has no need of the like, and more to the same effect.

Again, is it hard or easy to become a friend? Flatterers, at all events, who [20] quickly gain a footing of close attendance, are not friends, though they appear to be.

Further, such difficulties as the following are raised. Will the good man be a friend to the bad? Or will he not? For friendship implies fidelity and steadfastness, and the bad man is not at all of this character. And will one bad man be a friend to [25] another? Or will this not be the case either?

First, then, we must determine what kind of friendship we are in search of. For there is, people think, a friendship towards god and towards things without life, but here they are wrong. For friendship, we

maintain, exists only where there can be a return of affection, but friendship towards god does not admit of love being returned, nor at all of loving. For it would be strange if one were to say that he loved [30] Zeus. Neither is it possible to have affection returned by lifeless objects, though there is a love for such things, for instance wine or something else of that sort. Therefore it is not love towards god of which we are in search, nor love towards things without life, but love towards things with life, that is, where there can be a [35] return of affection.

If, then, one were to inquire next what is the lovable, it is none other than the good. Now there is a difference between the lovable and what is to be loved, as between the desirable and what is to be desired. For that is desirable which is absolutely good, but that is to be desired by each which is good for him; so also that [1209<sup>a</sup>1] which is absolutely good is lovable, but that is to be loved which is good for oneself, so that what is to be loved is lovable, but the lovable is not to be loved.

Here, then, we see the source of the difficulty as to whether the good man is a friend to the bad man or not. For what is good for oneself is in a way attached to the [5] good, and so is that which is to be loved to the lovable, and it depends as a consequence upon the good that it should be pleasant and that it should be useful. Now the friendship of the good lies in their loving one another; and they love one another in so far as they are lovable; and they are lovable in so far as they are good. 'The good man, then', it will be replied, 'will not be a friend to the bad'. Yes he will. [10] For since the good had as its consequence the useful and the pleasant, in so far as, though bad, he is pleasant, so far he is a friend; again, being useful, then so far as he is useful, so far is he a friend. But this sort of friendship will not depend upon lovableness. For the good, we saw, was lovable, but the bad man is not lovable. [15] Rather such a friendship will depend on a man's being one who is to be loved. For springing from the perfect friendship which exists among the good there are also these forms of friendship, that which refers to the pleasant and that which refers to the useful. He, then, whose love is based on the pleasant does not love with the love which is based on the good, nor does he whose friendship is based upon the useful. [20] And these forms of friendship, that of the good, the pleasant, and the useful, are not indeed the same, nor yet absolutely different from one another, but hang in a way from the same point. Just so we call a knife surgical, a man surgical, and knowledge [25] surgical. They are not called so in the same way, but the knife is called surgical from being useful in surgery, and the man from his being able to produce health, and the knowledge from its being cause

and principle. Similarly, the forms of friendship are not all called so in the same way, the friendship of the good which is based on the good, the friendship depending on pleasure, and that depending on [30] utility. Nor yet is it a mere case of homonymy, but, while they are not actually the same, they have still in a way the same sphere and the same origin. If, therefore, some one were to say, 'He whose love is prompted by pleasure is not a friend to so-and-so; for his friendship is not based on the good', he is having recourse to the friendship of the virtuous, which is a compound of all these, of the good and the [35] pleasant and the useful, so that it is true that he is not a friend in respect of that friendship, but only in respect of the friendship depending on the pleasant or the useful.

Will the good man then be a friend to the good, or will he not? For the like, it is urged, has no need of the like. An argument of this sort is on the look-out for the [1209<sup>b</sup>1] friendship based on utility; for if they are friends in so far as the one has need of the other, they are in the friendship which is based on utility. But the friendship which is based on utility has been distinguished from that which is based on excellence or on pleasure. It is likely, then, that the good should be much more friends; for they [5] have all the qualifications for friendship, the good and the pleasant and the useful. But the good may also be a friend to the bad; for it may be that he is a friend in so far as he is pleasant. And the bad also to the bad; for it may be that they are friends in so far as they have the same interest. For we see this as a matter of fact, that, when persons have the same interest, they are friends owing to that interest, so that [10] there will be nothing to prevent the bad also having to some extent the same interest.

Now friendship among the good, which is founded on excellence and the good, is naturally the surest, the most abiding, and the finest form. For excellence, to which the friendship is due, is unchangeable, so that it is natural that this form of [15] friendship should be unchangeable, whereas interest is never the same. Hence the friendship which rests on interest is never secure, but changes along with the interest; and the same with the friendship which rests on pleasure. The friendship, then, of the best men is that which arises from excellence, but that of the common run of men depends upon utility, while that which rests on pleasure is found among vulgar and commonplace persons.

[20] When people find their friends bad, the result is complaint and expressions of surprise; but it is nothing extraordinary. For when friendship has taken its start from pleasure, and this is why they are friends, or from interest, so soon as these fail the friendship does not

continue. Very often the friendship does remain, but a man treats his friend badly, owing to which there are complaints; but neither is this [25] anything out of the way. For your friendship with this man was not from the first founded on excellence, so that it is not extraordinary that he should do nothing of what excellence requires. The complaints, then, are unreasonable. Having formed their friendship with a view to pleasure, they think they ought to have the kind which is due to excellence; but that is not possible. For the friendship of pleasure [30] and interest does not depend on excellence. Having entered then into a partnership in pleasure, they expect excellence, but there they are wrong. For excellence does not follow upon pleasure and utility, but both these follow upon excellence. For it would be strange not to suppose that the good are the most pleasant to one another. For even the bad, as Euripides says, are pleasant to one another. 'The bad man is [35] fused into one with the bad'. For excellence does not follow upon pleasure, whereas pleasure does follow upon excellence.

But is it necessary that there should be pleasure in the friendship of the good? Or is it not? It would be strange indeed to say that it is not. For if you deprive them of the quality of being pleasant to one another, they will procure other friends, who [1210a1] are pleasant, to live with, for in view of that there is nothing more important than being pleasant. It would be curious then not to think that the good ought above all others to live in common one with another; and this cannot be without the element of pleasure. It will be necessary, then, as it seems, for them above all to be [5] pleasant.

But since friendships have been divided into three species, and in the case of these the question was raised whether friendship takes place in equality or in inequality, the answer is that it may depend on either. For that which implies likeness is the friendship of the good, and complete friendship; but that which implies unlikeness is the friendship of utility. For the poor man is a friend to the rich owing to his own lack of what the wealthy man has in abundance, and the bad man [10] to the good for the same reason. For owing to his lack of excellence he is for this reason a friend to him from whom he thinks he will get it. Among the unequal then there arises friendship based on utility. So that Euripides says,

Earth loves the shower, what time the plain is dry,

intimating that the friendship of utility has place between these as opposites. For if [15] you like to set down fire and water as the extreme opposites, these are useful to one another. For fire, they say, if it has not

moisture, perishes, as this provides it with a kind of nutriment, but that to such an extent as it can get the better of; for if you make the moisture too great, it will obtain the mastery, and will cause the fire to go [20] out, but if you supply it in moderation, it will be of service to it. It is evident, then, that friendship based on utility occurs among things the most opposite.

All the forms of friendship, both those in equality and those in inequality, are referred to the three in our division. But in all the forms of friendship there is a difference that arises between the partners when they are not on a level in love or in [25] benefaction or in service, or whatever else of the kind it may be. For when one exerts himself energetically, and the other is in defect, there is complaint and blame on the score of the defect. Not but that the defect on the part of the one is plain to see in the case of such persons as have the same end in view in their friendship; for instance, if [30] both are friends to one another on the ground of utility or of pleasure or of excellence. If, then, you do me more good than I do you, I do not even dispute that you ought to be loved more by me; but in a friendship where we are not friends with [35] the same object, there is more room for differences. For the defect on one side or the other is not manifest. For instance, if one is a friend for pleasure and the other for interest, that is where the dispute will arise. For he who is superior in utility does not think the pleasure a fair exchange for the utility, and he who is more pleasant does [1210<sup>b</sup>1] not think that he receives in the utility an adequate return for the pleasure which bestows. Hence differences are more likely to arise in such kinds of friendship.

When men are friends on an unequal footing, those who are superior in wealth or anything of that sort do not think that they themselves ought to love, but think [5] that they ought to be loved by their inferiors. But it is better to love than to be loved. For to love is a pleasurable activity and a good, whereas from being loved there results no activity to the object of the love. Again, it is better to know than to be [10] known; for to be known and to be loved attach even to things without life, but to know and to love to things with life. Again, to be inclined to benefit is better than not; now he who loves is inclined to benefit, just in so far as he loves, but this is not the case with him who is loved, in so far as he is loved.

But owing to ambition men wish rather to be loved than to love, because of [15] there being a certain superiority in being loved. For he who is loved has always a superiority in pleasure or wealth or excellence,

and the ambitious man reaches out after superiority. And those who are in a position of superiority do not think that they themselves ought to love, since they make a return to those who love them, in those things in which they are superior. And again the others are inferior to them, for which reason the superiors do not think they themselves ought to love but to be [20] loved. But he who is deficient in wealth or pleasures or excellence admires him who has a superiority in these things, and loves him owing to his getting these things or thinking that he will get them.

Now such friendships arise from sympathy, that is, from wishing good to some one. But the friendship which takes place in these cases has not all the required [25] attributes. For often we wish good to one person and like to live with another. But ought we to say that these things are characteristics of friendship or of complete friendship which is founded on excellence? For in that friendship all these things are contained; for there is none other with whom we should wish to live (for [30] pleasantness and usefulness and excellence are attributes of the good man), and it is to him that we should most wish good, and to live and to live well we should wish to none other than he.

Whether a man can have friendship for and towards himself may be omitted for the present, but we shall speak of it later. But all the things that we wish for a [35] friend we wish for ourselves. For we wish to live along with ourselves (though that is perhaps unavoidable), and to live well, and to live, and the wishing of the good applies to none so much. Further, we are most sympathetic with ourselves; for if we meet with a defeat or fall into any kind of misfortune, we are at once grieved. So looking at the matter in this way it would seem that there is friendship towards oneself. In speaking then of such things as sympathy and living well and so on we [1211<sup>a</sup>1] are referring either to friendship towards ourselves or to complete friendship. For all these things are found in both. For the living together and the wish for a thing's existence and for its well-being and all the rest are found in these. [5]

Further, it may perhaps be thought that wherever justice is possible, there friendship may exist too. Hence there are as many species of friendship as there are of just dealing. Now there can be justice between a foreigner and a citizen, between a slave and his master, between one citizen and another, between son and father, between wife and husband, and generally every form of association has its separate [10] form of friendship. But the firmest of friendships would seem to be that with a foreigner; for they have no common aim about which to dispute, as is the case with fellow-citizens; for when these dispute with one another for the

priority, they do not [15] remain friends.

It will be in place now to speak about this, whether there is friendship towards oneself or not. Since then we see, as we said just a little above, that the act of loving is recognized from the particulars, and it is to ourselves that we should most wish the particulars (the good, and existence, and well-being; and we are most sympathetic [20] with ourselves, and we most wish to live along with ourselves); therefore, if friendship is known from the particulars, and we should wish the particulars to belong to ourselves, it is plain that there is friendship towards ourselves, just as we maintained that there is injustice towards oneself. Though, indeed, as it takes one [25] person to inflict and another to receive an injury, while each individual is the same person, it appeared for that reason that there was no injustice towards oneself. It is possible, however, as we said on examining the parts of the soul, when these, as they are more than one, are not in agreement, that then there should be injustice towards oneself. In the same way then there would seem to be friendship towards oneself. [30] For the friend being, according to the proverb—when we wish to describe a very great friend, we say ‘my soul and his are one’; since then the parts of the soul are more than one, then only will the soul be one, when the reason and the passions are in accord with one another (for so it will be one): so that when it has become one [35] there will be friendship towards oneself. And this friendship towards oneself will exist in the good man; for in him alone the parts of the soul are in proper relation to one another owing to their not being at variance, since the bad man is never a friend to himself, for he is always at odds with himself. At all events the incontinent man, when he has done something to which pleasure prompts, not long afterwards repents [1211<sup>b</sup>1] and reviles himself. It is the same with the bad man in other vices. For he is always fighting with and opposing himself.

There is also a friendship in equality; for instance, that of comrades is on an equality in respect of number and capacity of good (for neither of them deserves to [5] have a greater share of goods either in number or capacity or size, but what is equal; for comrades are supposed to be a kind of equals). But that between father and son is on an inequality, and that between ruler and subject, between worse and better, [10] between wife and husband, and generally in all cases where there is one who occupies the position of worse or better in friendship. This friendship in inequality indeed, is proportional. For in giving of good no one would ever give an equal share to the better and the worse, but always a greater to the one who was superior. And [15] this is the proportionally equal.



For the worse with a less good is in a kind of way equal to the better with a greater.

12 · Among all the above-mentioned forms of friendship love is in a way strongest in that which is based on kindred, and more particularly in the relation of [20] father to son. Now why is it that the father loves the son more than the son the father? Is it, as some say rightly enough as regards the many, because the father has been a kind of benefactor to the son, and the son owes him a return for the benefit? Now this cause would seem to hold good in the friendship which is based on utility. [25] But as we see it to be in the sciences, so it is here also. What I mean is that in some the end and the activity are the same, and there is not any other end beyond the activity; for instance, to the flute-player the activity and end are the same (for to [30] play the flute is both his end and his activity); but not to the art of housebuilding (for it has a different end beyond the activity); now friendship is a sort of activity, and there is not any other end beyond the act of loving, but just this. Now the father is always in a way more active owing to the son being a kind of production of his [35] own. And this we see to be so in the other cases also. For all feel a sort of kindness towards what they have themselves produced. The father, then, feels a sort of kindness towards the son as being his own production, led on by memory and by hope. This is why the father loves the son more than the son the father.

There are other things which are called and are thought to be forms of [1212<sup>a</sup>1] friendship, about which we must inquire whether they are friendship. For instance, goodwill is thought to be friendship. Now, speaking absolutely, goodwill would seem not to be friendship (for towards many persons and on many occasions we entertain a feeling of goodwill either from seeing or hearing some good about them. Does it follow then that we are friends? Surely not! For if some one felt goodwill [5] towards Darius, when he was alive among the Persians, as some one may have done, it did not follow that he had a friendship towards Darius); but goodwill would seem to be sometimes the beginning of friendship, and goodwill may become friendship if, where one has the power to do good, there be added the wish to do it for the sake of the person towards whom the goodwill is felt. But goodwill implies character and is [10] relative to it. For no one is said to have a goodwill towards wine or towards anything else without life that is good or pleasant, but if any one be of a good character, goodwill is felt towards him. And

goodwill is not separate from friendship, but acts in the same sphere. This is why it is thought to be friendship.

Unanimity borders close on friendship, if the kind of unanimity that you take is [15] that which is strictly so called. For if one entertains the same notions as Empedocles and has the same views about the elements as he, is he unanimous with Empedocles? Surely not! Since the same thing would have to hold in any like case. For to begin with, the sphere of unanimity is not matters of thought but matters of action, and herein it is not in so far as they think the same, but in so far as in addition to [20] thinking the same they choose to do the same about what they think. For if both think to rule, but each of them thinks that he is to be ruler, are they therefore unanimous? Surely not. But if I wish to be ruler myself, and he wishes me to be so, then it is that we are unanimous. Unanimity, then, is found in matters of action coupled with the wish for the same thing. It is therefore the establishment of the [25] same ruler in matters of action that is the sphere of unanimity in the strict sense.

13 · Since there is, as we maintain, such a thing as friendship towards oneself, will the good man be a lover of self or not? Now the lover of self is he who does everything for his own sake in matters of advantage. The bad man is a lover of [30] self (for he does everything for his own sake), but not the good man. For the reason why he is a good man is because he does so and so for the sake of another; hence he is not a lover of self. But it is true that all feel an impulse towards things that are good, and think that they themselves ought to have these in the highest degree. This is [35] most apparent in the case of wealth and rule. Now the good man will resign these to another, not on the ground that it does not become him in the highest degree to have them, but if he sees that another will be able to make more use of these than he; but other men will not do this owing to ignorance (for they do not think they might make a bad use of such goods) or else owing to the ambition of ruling. But the good [1212<sup>b</sup>1] man will not be affected in either of these ways. Hence he is not a lover of self as regards such goods at least; but, if at all, in respect of the noble. For this is the only thing in which he will not resign his share, but in respect of things useful and [5] pleasant he will. In the choice, then, of things in accordance with the noble he will display his love of self, but in the choice which we describe as being prompted by the useful and the pleasant it is not he who will do so, but the bad man.

14 · Will the good man love himself most of all or not? In a way he will love himself most and in a way not. For since we say that the good man will resign goods [10] in the way of utility to his friend, he will be loving his friend more than himself. Yes; but his resignation of such goods implies that he is compassing the noble for himself in resigning these to his friend. In a way, therefore, he is loving his friend more than [15] himself, and in a way he is loving himself most. In respect of the useful he is loving his friend, but in respect of the noble and good he is loving himself most; for he is compassing these for himself as being noblest. He is therefore a lover of good, not a lover of self. For, if he does love himself, it is only because he is good. But the bad man is a lover of self. For he has nothing in the way of nobility for which he should [20] love himself, but apart from these grounds he will love himself *qua* self. Hence it is he who will be called a lover of self in the strict sense.

15 · It will come next to speak about self-sufficingness and the self-sufficing man. Will the self-sufficing man require friendship too? Or will he not, but will he [25] be sufficient to himself as regards that also? For even the poets have such sayings as these—

What need of friends, when Heaven bestows the good?<sup>25</sup>

Whence also the difficulty arises, whether he who has all the goods and is [30] self-sufficing will need a friend too? Or is it then that he will need him most? For to whom will he do good? Or with whom will he live? For surely he will not live alone. If, then, he will need these things, and these are not possible without friendship, the self-sufficing man will need friendship too. Now the analogy that is generally [35] derived from god in discussions is not right there, nor will it be useful here. For if god is self-sufficing and has need of none, it does not follow that we shall need no one. For we hear this kind of thing said about god. Seeing that god, so it is said, possesses all goods and is self-sufficing, what will he do? We can hardly suppose that he will sleep. It follows, we are told, that he will contemplate something; for [1213<sup>a</sup>1] this is the noblest and the most appropriate employment. What, then, will he contemplate? For if he is to contemplate anything else, it must be something better than himself that he will contemplate. But this is absurd, that there should be anything better than god. Therefore he will contemplate himself. But this also is [5] absurd. For if a human being surveys himself, we censure him as stupid. It will be absurd therefore, it is said, for god to contemplate

himself. As to what god is to contemplate, then, we may let that pass. But the self-sufficingness about which we are conducting our inquiry is not that of god but of man, the question being whether [10] the self-sufficing man will require friendship or not. If, then, when one looked upon a friend one could see the nature and attributes of the friend, . . .<sup>26</sup> such as to be a second self, at least if you make a very great friend, as the saying has it, 'Here is another Heracles, a dear other self. Since then it is both a most difficult thing, as some of the sages have said, to attain a knowledge of oneself, and also a most [15] pleasant (for to know oneself is pleasant)—now we are not able to see what we are from ourselves (and that we cannot do so is plain from the way in which we blame others without being aware that we do the same things ourselves; and this is the effect of favour or passion, and there are many of us who are blinded by these things [20] so that we judge not aright); as then when we wish to see our own face, we do so by looking into the mirror, in the same way when we wish to know ourselves we can obtain that knowledge by looking at our friend. For the friend is, as we assert, a second self. If, then, it is pleasant to know oneself, and it is not possible to know this [25] without having some one else for a friend, the self-sufficing man will require friendship in order to know himself.

Again, if it is a fine thing, as it is, to do good when one has the goods of fortune, to whom will he do good? And with whom will he live? For surely he will not spend his time alone; for to live with some one is pleasant and necessary. If, then, these [1213<sup>b</sup>1] things are fine and pleasant and necessary, and these things cannot be without friendship, the self-sufficing man will need friendship too.

**16** · Should one acquire many friends or few? They ought neither to be absolutely many nor yet few. For if they are many, it is difficult to apportion one's [5] love to each. For in all other things also the weakness of our nature incapacitates us from reaching far. For we do not see far with our eyes, but if you set the object too far off, the sight fails owing to the weakness of nature; and the case is the same with hearing and with all other things alike. Failing, then, to show love through [10] incapacity one would, not unjustly, incur accusations, and would not be a friend, as one would be loving only in name; but this is not what friendship means. Again, if they are many, one can never be quit of grief. For if they are many, it is always likely that something unfortunate will occur to one at least of them, and when these [15] things take place grief is unavoidable.

Nor yet, on the other hand, should one have few, only one or two, but a number commensurate with one's circumstances and one's own impulse to love.

17 · After this we must inquire how one ought to treat a friend. This inquiry does not present itself in every friendship, but in that in which friends are most liable to bring complaints against one another. They do not do this so much in the [20] other cases; for instance, in the friendship between father and son there is no complaint such as the claim that we hear made in some forms of friendship, 'As I to you, so you to me', failing which there is in those cases grave complaint. But between unequal friends equality is not expected, and the relation between father and son is on a footing of inequality, as is also that between wife and husband, or [25] between servant and master, and generally between the worse and the better. They will therefore not have complaints of this sort. But it is between equal friends and in a friendship of that sort that a complaint of this kind arises. So we must inquire how we ought to treat a friend in the friendship between friends who are on a footing of [30] equality.

<sup>1</sup>Reading τὰγαθόν.

<sup>2</sup>Reading ὅ τι for ὅτι, twice.

<sup>3</sup>Excised by Susemihl.

<sup>4</sup>Text uncertain.

<sup>5</sup>Reading αὐτό for αὐτοῦ.

<sup>6</sup>Reading τῷ for τό.

<sup>7</sup>Omitting τῶν ἀρετῶν.

<sup>8</sup>Reading ἐνέργεια.

<sup>9</sup>I.e. excellence of character.

<sup>10</sup>Omitting ἧ.

<sup>11</sup>There is a lacuna in the text.

<sup>12</sup>There is a lacuna in the text.

<sup>13</sup>*Iliad* XXII 100.

<sup>14</sup>There is a lacuna in the text.

<sup>15</sup>Reading ἧ μᾶλλον γε δή.

<sup>16</sup>Reading τοὺς τοιοῦτους λόγους.

<sup>17</sup>Text uncertain.

<sup>18</sup>Retaining ἐναντιοῦται τῷ μὴ εἶναι.

<sup>19</sup>Text uncertain.

<sup>20</sup>Transposing καὶ ἡδοναὶ σωματικαὶ to follow γεῦσις.

<sup>21</sup>Reading ἐν ἀπάσαις for ἀγαθόν.

<sup>22</sup>Transposing αἰεὶ to follow ἐπὶ τὸ πολὺ ἧ.

<sup>23</sup>Text uncertain.

<sup>24</sup>See *Odyssey* XVII 218.

<sup>25</sup>Euripides, *Orestes* 667.

<sup>26</sup>There is a lacuna in the text.

# EUDEMIAN ETHICS\*\*

*J. Solomon*

## BOOK I

[1214<sup>a</sup>1] 1 · The man who stated his judgement in the god's precinct in Delos made an inscription on the propylaeum to the temple of Leto, in which he separated from one another the good, the beautiful, and the pleasant as not all properties of the same [5] thing; he wrote, 'Most beautiful is what is most just, but best is health, and pleasantest the obtaining of what one desires'. But let us disagree with him; for happiness is at once the most beautiful and best of all things and also the pleasantest.

[10] Now about each thing and kind there are many views that are disputed and need investigation; of these some concern knowledge only, some the acquisition of things and the performance of acts as well. About those which involve speculative philosophy only we must at a suitable opportunity say what is relevant to that study. [15] But first we must consider in what the good life consists and how it is to be acquired, whether all who receive the epithet 'happy' become so by nature (as we become tall, short, or of different complexions), or by teaching (happiness being a sort of science), or by some sort of discipline—for men acquire many qualities neither by [20] nature nor by teaching but by habituation, bad qualities if they are habituated to the bad, good if to the good. Or do men become happy in none of these ways, but either—like those possessed by nymphs or deities—through a sort of divine influence, being as it were inspired, or through chance? For many declare happiness [25] to be identical with good luck.

That men, then, possess happiness through all or some or one of these causes is evident; for practically all events come under these principles—for all acts arising from intelligence may be included among acts that arise from knowledge. Now to [30] be happy, to live blissfully and



beautifully, must consist mainly in three things, which seem most desirable; for some say practical wisdom is the greatest good, some excellence, and some pleasure. Some also dispute about the magnitude of the contribution made by each of these elements to happiness, some declaring the [1214<sup>b</sup>1] contribution of one to be greater, some that of another—these regarding wisdom as a greater good than excellence, those the opposite, while others regard pleasure as a greater good than either; and some consider the happy life to be compounded of all or of two of these, while others hold it to consist in one of them alone. [5]

2 · First then about these things we must enjoin every one that has the power to live according to his own choice to set up for himself some object for the good life to aim at (whether honour or reputation or wealth or culture), with reference to which he will then do all his acts, since not to have one's life organized in view of [10] some end is a mark of much folly. Then above all we must first define to ourselves without hurry or carelessness in which of our belongings the happy life is lodged, and what are the indispensable conditions of its attainment—for health is not the same as the indispensable conditions of health; and so it is with many other things, [15] so that the good life and its indispensable conditions are not identical. Of such things some are not peculiar to health or even to life, but common—to speak broadly—to all dispositions and actions, e.g. without breathing or being awake or having the power of movement we could enjoy neither good nor evil; but some are [20] peculiar to each kind of thing, and these it is specially important to observe; e.g. the eating of meat and walking after meals are more peculiarly the indispensable conditions of a good physical state than the more general conditions mentioned above. For herein is the cause of the disputes about happy living, its nature and [25] causes; for some take to be elements in happiness what are merely its indispensable conditions.

3 · To examine then all the views held about happiness is superfluous, for children, sick people, and the insane all have views, but no sane person would [30] dispute over them; for such persons need not argument but years in which they may change, or else medical or political correction—for medicine, no less than whipping, is a correction. Similarly we have not to consider the views of the multitude (for they talk without consideration about almost everything, and most about happiness); [1215<sup>a</sup>1] for it is absurd to apply argument to those who need

not argument but experience. But since every study has its special problems, evidently there are such relating to the best life and best existence; it is well to examine these opinions, for a [5] disputant's refutation of what is opposed to his arguments is a demonstration of the argument itself.

Further, it is proper not to neglect these considerations, especially with a view to that at which all inquiry should be directed, viz. the causes that enable us to share in the good and noble life—if any one finds it invidious to call it the blessed [10] life—and with a view to the hope we may have of attaining each good. For if the good life consists in what is due to fortune or nature, it would be something that many cannot hope for, since its acquisition is not in their power, nor attainable by their care or activity; but if it depends on the individual and his personal acts being [15] of a certain character, then the supreme good would be both more general and more divine, more general because more would be able to possess it, more divine because happiness would then be the prize offered to those who make themselves and their acts of a certain character.

[20] 4 · Most of the doubts and difficulties raised will become clear, if we define well what we ought to think happiness to be, whether it consists merely in having a soul of a certain character—as some of the sages and older writers thought—or whether the man must indeed be of a certain character, but it is even more [25] necessary that his acts should be of a certain character.

Now if we make a division of the kinds of life, some do not even pretend to this sort of well-being, being only pursued for the sake of what is necessary, e.g. those concerned with vulgar arts, or with commercial or servile occupations—by vulgar I [30] mean arts pursued only with a view to reputation, by servile those which are sedentary and wage-earning, by commercial those connected with selling in markets and selling in shops. But there are also three goods directed to a happy employment of life, those which we have above called the three greatest of human [35] goods, excellence, wisdom, and pleasure. We thus see that there are three lives which all those choose who have power, viz. the lives of the political man, the [1215<sup>b</sup>1] philosopher, the voluptuary; for of these the philosopher intends to occupy himself with wisdom and contemplation of truth, the political man with noble acts (i.e. those springing from excellence), the voluptuary with bodily pleasures. Therefore [5] each calls a different person happy, as was indeed said before. Anaxagoras of

Clazomenae being asked, 'Who was the happiest of men'? answered, 'None of those you suppose, but one who would appear a strange being to you', because he saw that [10] the questioner thought it impossible for one not great and beautiful or rich to deserve the epithet 'happy', while he himself perhaps thought that the man who lived painlessly and pure of injustice or else engaged in some divine contemplation was really, as far as a man may be, blessed.

[15] **5** · About many other things it is difficult to judge well, but most difficult about that on which judgement seems to all easiest and the knowledge of it in the power of any man—viz. what of all that is found in living is desirable, and what, if attained, would satisfy our desire. For there are many consequences of life that [20] make men fling away life, such as disease, excessive pain, storms, so that it is clear that, if one were given the power of choice, not to be born at all would, as far at least as these reasons go, have been desirable. Further, the life we lead as children is not desirable,<sup>1</sup> for no one in his senses would consent to return again to this. Further, [25] many incidents involving neither pleasure nor pain or involving pleasure but not of a noble kind are such that, as far as they are concerned, non-existence is preferable to life. And generally, if one were to bring together all that all men do and experience but not willingly because not for its own sake, and were to add to this an existence of [30] infinite duration, one would none the more on account of these experiences choose existence rather than non-existence. But further, neither for the pleasure of eating or that of sex, if all the other pleasures were removed that knowing or seeing or any other sense provides men with, would any man value existence, unless he were [35] utterly servile, for it is clear that to the man making this choice there would be no difference between being born a brute and a man; at any rate the ox in Egypt, which they reverence as Apis, in most of such matters has more power than many [1216<sup>a</sup>1] monarchs. We may say the same of the pleasure of sleeping. For what is the difference between sleeping an unbroken sleep from one's first day to one's last, say for a thousand or any number of years, and living the life of a plant? Plants at any [5] rate seem to possess this sort of existence, and similarly children; for children, too, continue having their nature from their first coming into being in their mother's womb, but sleep the entire time. It is clear then from these considerations that men, though they look, fail to see what is well-being, what is the good in life. [10]

And so they tell us that Anaxagoras answered a man who was raising problems of this sort and asking why one should choose rather to be born than not by saying ‘for the sake of viewing the heavens and the whole order of the universe’. He, then, thought the choice of life for the sake of some sort of knowledge to be precious; but [15] those who felicitate Sardanapallus or Smindyrides the Sybarite or any other of those who live the voluptuary’s life, these seem all to place happiness in the feeling of pleasure. But others would rather choose excellent deeds than wisdom or sensual [20] pleasures; at any rate some choose these not only for the sake of reputation, but even when they are not going to win credit by them; but most ‘political’ men are not truly so called; they are not in truth ‘political’, for the ‘political’ man is one who chooses [25] noble acts for their own sake, while most take up the ‘political’ life for the sake of money and greed.

From what has been said, then, it is clear that all connect happiness with one or other of three lives, the ‘political’, the philosophic, and the voluptuary’s. Now among these the nature and quality and sources of the pleasure of the body and [30] sensual enjoyment are clear, so that we have not to inquire what such pleasures are, but whether they tend to happiness or not and how they tend, and whether—supposing it right to attach to the noble life certain pleasures—it is right to attach these, or whether some other sort of participation in these is a necessity, but the [35] pleasures through which men rightly think the happy man to live pleasantly and not merely painlessly are different.

But about these let us inquire later. First let us consider excellence and wisdom, the nature of each, and whether they are parts of the good life either in themselves or through the actions that arise from them, since all—or at least all important thinkers—connect happiness with these. [1216<sup>b</sup>1]

Socrates, then, the elder, thought the knowledge of excellence to be the end, and used to inquire what is justice, what bravery and each of the parts of virtue; and [5] his conduct was reasonable, for he thought all the excellences to be kinds of knowledge, so that to know justice and to be just came simultaneously; for the moment that we have learned geometry or building we are builders and geometers. Therefore he inquired what excellence is, not how or from what it arises. This is [10] correct with regard to theoretical knowledge, for there is no other part of astronomy or physics or geometry except knowing and contemplating the nature of the things which are the subjects of those sciences; though nothing prevents them from being [15] in an incidental way useful to us for much

that we cannot do without. But the end of the productive sciences is different from science and knowledge, e.g. health from medical science, law and order (or something of the sort) from political science. [20] Now to know anything that is noble is itself noble; but regarding excellence, at least, not to know what it is, but to know out of what it arises is most precious. For we do not wish to know what bravery is but to be brave, nor what justice is but to be just, just as we wish to be in health rather than to know what being in health is, and to [25] have our body in good condition rather than to know what good condition is.

6 · About all these matters we must try to get conviction by arguments, using the phenomena as evidence and illustration. It would be best that all men should clearly concur with what we are going to say, but if that is unattainable, then that [30] all should in some way at least concur. And this if converted they will do, for every man has some contribution to make to the truth, and with this as a starting-point we must give some sort of proof about these matters. For by advancing from true but obscure judgements he will arrive at clear ones, always exchanging the usual [35] confused statement for more real knowledge. Now in every inquiry there is a difference between philosophic and unphilosophic argument; therefore we should not think even in political philosophy that the sort of consideration which not only makes the nature of the thing evident but also its cause is superfluous; for such consideration is in every inquiry the truly philosophic method. But this needs much [1217<sup>a</sup>1] caution. For there are some who, through thinking it to be the mark of a philosopher to make no arbitrary statement but always to give a reason, often unawares give reasons foreign to the subject and idle—this they do sometimes from ignorance, [5] sometimes because they are charlatans—by which reasons even men experienced and able to act are trapped by those who neither have nor are capable of having practical and constructive intelligence. And this happens to them from want of culture; for inability in regard to each matter to distinguish reasonings appropriate [10] to the subject from those foreign to it is want of culture. And it is well to criticize separately the explanation and the conclusion both because of what has just been said, viz. that one should attend not merely to what is inferred by argument, but often attend more to the phenomena—whereas now when men are unable to see a flaw in the argument they are compelled to believe what has been said—and [15] because often that which seems to have been shown by argument is true indeed but not for the cause which the argument assigns; for one may

prove truth by means of falsehood, as is clear from the *Analytics*.

7 · After these further preliminary remarks let us start on our discourse from what we have called the first confused judgements, and then<sup>2</sup> seek to discover a [20] clear judgement about the nature of happiness. Now this is admitted to be the greatest and best of human goods—we say human, for there might perhaps be a happiness peculiar to some superior being, e.g. a god; for of the other animals, which [25] are inferior in their nature to men, none have a right to the epithet ‘happy’; for no horse, bird, or fish is happy, nor anything the name of which does not imply some share of a divine element in its nature; but in virtue of some other sort of participation in good things some have a better existence, some a worse.

But we must see later that this is so. At present we say that of goods some are [30] within the range of human action, some not; and this we say because some things—and therefore also some good things—are incapable of change, yet these are perhaps as to their nature the best. Some things, again, are within the range of action, but only to beings superior to us. But since ‘within the range of action’ is an [35] ambiguous phrase—for both that for the sake of which we act and the things we do for its sake have to do with practice and thus we put among things within the range of action both health and wealth and the acts done for the sake of these ends, i.e. health-giving conduct and money-bringing conduct—it is clear that we must regard happiness as the best of what is within the range of action for man.

8 · We must then examine what is the best, and in how many senses we use [1217<sup>b</sup>1] the word. The answer is principally contained in three views. For men say that the good *per se* is the best of all things, the good *per se* being that whose property is to be the original good and the cause by its presence in other things of their being good; [5] both of which attributes belong to the Idea of good (I mean by ‘both’ that of being the original good and also the cause of other things being good by its presence in them); for good is predicated of this Idea most truly (other things being good by participation in and likeness to this); and this is the original good, for the [10] destruction of that which is participated in involves also the destruction of that which participates in the Idea, and is named from its participation in it. But this is the relation of the first to the later, so that the Idea of good is the good *per se*; for this is also (they

say) separable from what participates in it, like all other Ideas. [15]

The discussion, however, of this view belongs necessarily to another inquiry and a more abstract one, for arguments that are at once destructive and general belong to no other science. But if we must speak briefly about these matters, we say first that it is to speak abstractly and idly to assert that there is an Idea whether of [20] good or of anything whatever—this has been considered in many ways both in our popular and in our philosophic discussions. Next, however much there are Ideas and in particular an Idea of good, they are perhaps useless with a view to a good life and [25] to action. For the good has many senses, as numerous as those of being. For being, as we have divided it in other works, signifies now what a thing is, now quality, now quantity, now time, and again some of it consists in being changed and in changing; and the good is found in each of these modes, in substance as mind and God, in [30] quality as justice, in quantity as moderation, in time as opportunity, while as examples of it in change, we have that which teaches and that which is being taught. As then being is not one in all that we have just mentioned, so neither is good; nor is there one science either of being or of the good; not even things named good in the [35] same category are the objects of a single science, e.g. opportunity or moderation; but one science studies one kind of opportunity or moderation, and another another: e.g. opportunity and moderation in regard to food are studied by medicine and gymnastics, in military matters by the art of strategy, and similarly with other sorts [1218<sup>a</sup>1] of action, so that it can hardly be the province of one science to study the good *per se*.

Further, in things having an earlier and a later, there is no common element beyond, and, further, separable from, them, for then there would be something prior to the first; for the common and separable element would be prior, because with its [5] destruction the first would be destroyed as well; e.g. if the double is the first of the multiples, then the universal multiple cannot be separable, for it would be prior to the double<sup>3</sup> . . . if the common element turns out to be the Idea, as it would be if one [10] made the common element separable: for if justice is good, and so also is bravery, there is then, they say, a good *per se* for which they add '*per se*' to the general definition; but what could this mean except that it is eternal and separable? But what is white for many days is no whiter than that which is white for a single day; so the good will not be more good by being eternal. Hence the common good is not [15] identical with the Idea, for the common good belongs to all.

But we should show the nature of the good *per se* in the opposite way to that now used. For now from what is not agreed to possess the good they demonstrate the things admitted to be good, e.g. from numbers they demonstrate that justice and health are goods, for they are arrangements and numbers, and it is assumed that [20] goodness is a property of numbers and units because unity is the good itself. But they ought, from what are admitted to be goods, e.g. health, strength, and temperance, to demonstrate that beauty is present even more in the changeless; for all these things are order and rest; but if so, then the changeless is still more beautiful, for it has these attributes still more. And it is a bold way to demonstrate [25] that unity is the good *per se* to say that numbers have desire; for no one says distinctly how they desire, but the saying is altogether too unqualified. And how can one suppose that there is desire where there is no life? One should consider seriously about this and not assume without reasons what it is not easy to believe even with [30] reasons. And to say that all existing things desire some one good is not true; for each seeks its own special good, the eye vision, the body health, and so on.

There are then these difficulties in the way of there being a good *per se*; [35] further, it would be useless to political philosophy, which, like all others, has its particular good, e.g. as gymnastic has good bodily condition.

[Further, there is the argument written in the discourse—that the Idea itself of good is useful to no art or to all arts in the same way. Further, it is not practicable.]<sup>4</sup> And similarly neither is good as a universal either the good *per se* (for it might [1218<sup>b</sup>1] belong even to a small good) or practicable; for medicine does not consider how to procure an attribute that may be an attribute of *anything*, but how to procure health; and so each of the other arts. But ‘good’ is ambiguous, and there is in it a [5] noble part, and part is practicable but the rest not so. The sort of good that is practicable is an object aimed at, but not the good in things unchanging.

It is clear, then, that neither the Idea of good nor the good as universal is the good *per se* that we are actually seeking; for the one is unchanging and not practical, and the other though changing is still not practical. But the object aimed at as end is best, and the cause of all that comes under it, and first of all goods. This [10] then would be the good *per se*, the end of all human action. And this would be what comes under the master-art of all, which is politics, economics, and wisdom; for these mental habits differ from all others by their being of this nature; whether



they [15] differ from one another must be stated later. And that the end is the cause of all that comes under it, the method of teaching shows; for the teacher first defines the end and thence shows of each of the other things that it is good; for the end aimed at is the cause. E.g. since to be in health is so and so, so and so must needs be what conduces to it; the health-giving is the efficient cause of health and yet<sup>5</sup> only of its [20] actual existence; it is not the cause of health being good. Further, no one demonstrates that health is good (unless he is a sophist and no doctor, but one who produces deceptive arguments from inappropriate considerations), any more than any other principle.

We must now consider, making a fresh start, in how many senses the good as [25] the end of man, the best in the field of action, is the best of all, since this is best.

## BOOK II

1 · After this let us start from a new beginning and speak about what follows from it. All goods are either outside or in the soul, and of these those in the soul are more desirable; this distinction we make even in our popular discussions. For wisdom, excellence, and pleasure are in the soul, and some or all of these seem to all [35] to be the end. But of the contents of the soul some are states or faculties, others activities and movements.

Let this then be assumed, and also that excellence is the best state or condition or faculty of all things that have a use and work. This is clear by induction; for in all [1219<sup>a</sup>1] cases we lay this down: e.g. a garment has an excellence, for it has a work and use, and the best state of the garment is its excellence. Similarly a vessel, house, or anything else has an excellence; therefore so also has the soul, for it has a work. And [5] let us assume that the better state has the better work; and as the states are to one another, so let us assume the corresponding works to be to one another. And the work of anything is its end; it is clear, therefore, from this that the work is better than the state; for the end is best, as being end: for we assumed the best, the final [10] stage, to be the end for the sake of which all else exists. That the work, then, is better than the state or condition is plain.

But ‘work’ has two senses; for some things have a work beyond mere employment, as building has a house and not the act of building, medicine health [15] and not the act of curing and restoring to health; while the work of other things is just their employment, e.g. of vision seeing and of mathematical science contemplation. Hence, necessarily, in those whose work is their employment the employment is more valuable than the state.

Having made these distinctions, we say that the work of a thing is also the work [20] of its excellence, only not in the same sense, e.g. a shoe is the work both of the art of cobbling and of the action of cobbling. If, then, the art of cobbling and the good cobbler have an excellence, their work is a good shoe: and similarly with everything else.

Further, let the work of the soul be to produce living, this<sup>6</sup> consisting in [25] employment and being awake—for slumber is a sort of inactivity and rest. Therefore, since the work must be one and the same both for the

soul and for its excellence, the work of the excellence of the soul would be a good life. This, then, is the complete good, which (as we saw) was happiness. And it is clear from our assumptions (for these were that happiness was the best of things, and ends and the [30] best goods were in the soul; it is itself either a state or an activity . . .),<sup>7</sup> and since the activity is better than the state, and the best activity than the best state, and excellence is the best state, that the activity of the excellence of the soul is the best thing. But happiness, we saw, was the best of things; therefore happiness is the [35] activity of a good soul. But since happiness was something complete, and living is either complete or incomplete and so also excellence—one excellence being a whole, the other a part—and the activity of what is incomplete is itself incomplete, therefore happiness would be the activity of a complete life in accordance with complete excellence.

And that we have rightly stated its genus and definition common opinions [1219b1] prove. For to do well and to live well is held to be identical with being happy, but each of these—living and doing—is an employment, an activity; for the practical life is one of using or employing, e.g. the smith produces a bridle, the good horseman uses it.

We find confirmation also in the common opinion that we cannot ascribe [5] happiness to an existence of a single day, or to a child, or to each of the ages of life; and therefore Solon's advice holds good, never to call a man happy when living, but only when his life is ended. For nothing incomplete is happy, not being whole.

Further, praise is given to excellence because of its actions, but to actions something higher than praise, the encomium. And we crown the actual winners, not [10] those who have the power to win but do not actually win. Further, our judging the character of a man by his acts is a confirmation. Further, why is happiness not praised? Surely because other things are praised owing to this, either by their having reference to it or by their being parts of it. Therefore felicitation, praise, and [15] encomium differ; for encomium is discourse relative to the particular act, praise declares the general nature of the man, but felicitation is for the end. This clears up the difficulty sometimes raised—why for half their lives the good are no better than the bad, for all are alike when asleep; the cause is that sleep is an inactivity, not an activity of the soul. Therefore, even if there is some other part of the soul, e.g. the [20] vegetative, its excellence is not a part of entire excellence, any more than the excellence of the body is; for in sleep the vegetative part is more active, while the perceptive and the appetitive are incomplete in sleep.

But as far as they do to some extent partake of movement, even the visions of the good are better than those of the bad, except so far as they are caused by disease or bodily defect. [25]

After this we must consider the soul. For excellence belongs to the soul and essentially so. But since we are looking for human excellence, let it be assumed that the parts of the soul partaking of reason are two, but that they partake not in the same way, but the one by its natural tendency to command, the other by its natural [30] tendency to obey and listen; if there is a part without reason in some other sense, let it be disregarded. It makes no difference whether the soul is divisible or indivisible, so long as it has different faculties, namely those mentioned above, just as the curved includes the concave and the convex, or, again, the straight and the white, [35] yet the straight is not white except incidentally and is not the same in substance.<sup>8</sup>

We also neglect any other part of the soul that there may be, e.g. the vegetative, for the above-mentioned parts are peculiar to the human soul; therefore the excellences of the nutritive part and that concerned with growth are not those of man. For, if we speak of him *qua* man, he must have the power of reasoning, a governing principle,<sup>9</sup> action; but reason governs not reason, but desire and the [1220<sup>a</sup>1] passions; he must then have these parts. And just as general good condition of the body is compounded of the partial excellences, so also is the excellence of the soul, *qua* end.

But of excellence there are two species, the moral<sup>10</sup> and the intellectual. For we [5] praise not only the just but also the intelligent and the wise. For we assumed that what is praiseworthy is either the excellence or its work, and these are not activities, but have activities. But since the intellectual excellences involve reason, they belong to that rational part of the soul which governs the soul by its possession of reason, while the moral belong to the part which is irrational but by its nature obedient to [10] the part possessing reason; for we do not describe the character of a man by saying that he is wise or clever, but by saying that he is gentle or bold.

After this we must first consider moral excellence, its nature, its parts—for our inquiry has been forced back on this—and how it is produced. We must make our [15] search as all do in other things—they search having something to start with; so here, by means of true but indistinct judgements, we should always try to attain to what is true and distinct. For we are now in the condition of one who describes health as the best condition of the body, or Coriscus as the darkest man in the market-place;

for [20] what either of these is we do not know, but yet for the attainment of knowledge of either it is worth while to be in this condition. First, then, let it be laid down that the best state is produced by the best means, and that with regard to everything the best is done from the excellence of that thing (e.g. the exercises and food are best which [25] produce a good condition of body, and from such a condition men best perform exercises). Further, that every condition is produced and destroyed by some sort of application of the same things, e.g. health from food, exercises, and weather. This is clear from induction. Excellence too, then, is that sort of condition which is [30] produced by the best movements in the soul, and from which are produced the soul's best works and feelings; and by the same things, if they happen in one way, it is produced, but if they happen in another, it is destroyed. The employment of excellence is relative to the same things by which it is increased and destroyed, and it puts us in the best attitude towards them. A proof that both excellence and [35] badness are concerned with the pleasant and the painful is that punishment being cure and operating through opposites, as the cure does in everything else, acts through these.

2 · That moral excellence, then, is concerned with the pleasant and the painful is clear. But since the character, being as its name indicates something that [1220<sup>b</sup>1] grows by habit<sup>11</sup>—and that which is under guidance other than innate is trained to a habit by frequent movement of a particular kind—is the active principle present after this process, but in things inanimate we do not see this (for even if you throw a stone upwards ten thousand times, it will never go upward except by compulsion),—consider, [5] then, character to be this, viz. a quality in accordance with governing reason belonging to the irrational part of the soul which is yet able to obey the reason. Now we have to state in respect of what part of the soul we have character of this or that kind.<sup>12</sup> It will be in respect of the faculties of passion, in virtue of which men are spoken of as subject to passion, and in respect of the habits, in virtue of which men are described, in reference to those passions, either as feeling them in [10] some way or as not feeling them. After this comes the division made in . . .<sup>13</sup> into the passions, faculties, and habits. By passions I mean such as anger, fear, shame, sensual desire—in general, all that is usually followed of itself by sensuous pleasure [15] or pain. Quality does not depend on these—they are merely experienced—but on the faculties. By faculty I mean that in virtue of which men who act from their passions are called after them, e.g. are called irascible, insensible, amorous,

bashful, shameless. And habits are the causes through which these faculties belong to us either in a reasonable way or the opposite, e.g. bravery, temperance, cowardice, [20] intemperance.

3 · After these distinctions we must notice that in everything continuous and divisible there is excess, deficiency and the mean, and these in relation to one another or in relation to us, e.g. in the gymnastic or medical arts, in those of building [25] and navigation, and in any sort of action, alike scientific and non-scientific, skilled and unskilled. For motion is continuous, and action is motion. In all cases the mean in relation to us is the best; for this is as knowledge and reason direct us. And this [30] everywhere also makes the best habit. This is clear both by induction and by reasoning. For opposites destroy one another, and extremes are opposite both to one another and to the mean; for the mean is to either extreme the other extreme, e.g. the equal is greater to the less, but less to the greater. Therefore moral excellence must have to do with the mean and be a sort of mean. We must then notice what sort [35] of mean excellence is and about what sort of means; let each be taken from the list by way of illustration, and studied:

bashfulness  
 cowardice  
 shyness [1231a1]  
 intemperance  
 (irascible) indignation  
 (sensitive)  
 just  
 timidity [5]  
 self-depression  
 habit of dislike  
 sluggishness  
 (incontinent) evils  
 greatness of spirit [10]  
 magnificence  
 (sensitive)

These and similar are the passions that occur in the soul; they receive their names, some from being excesses, some from being defects. For the irascible is one [15] who is angry more than he ought to be, and more quickly, and with more people than he ought; the unfeeling is deficient in regard to persons, occasions, and manner. The man who fears neither

what, nor when, nor as he ought is foolhardy; the man who fears what he ought not, and on the wrong occasions, and in the wrong manner is cowardly. . . . similarly, intemperate . . .<sup>16</sup> one prone to sensual desire and [20] exceeding in all possible ways, while he who is deficient and does not feel desire even so far as is good for him and in accordance with nature, but is as much without feeling as a stone, is insensible. The man who makes profit from any source is greedy of gain; the man who makes it from none, or perhaps few, is a waster. The braggart is one who pretends to more than he possesses, the self-depreciator is one [25] who pretends to less. The man who is more ready than is proper to join in praise is a flatterer; the man who is less ready is grudging. To act in everything so as to give another pleasure is servility, but to give pleasure seldom and reluctantly is stubbornness. [Further, one who can endure no pain, even if it is good for him, is soft; one who can endure all pain alike has no name literally applicable to him, but [30] by metaphor is called hard, patient, or ready of submission.]<sup>17</sup> The vain man is he who thinks himself worthy of more than he is, while the poor-spirited thinks himself worthy of less. Further, the lavish is he who exceeds, the mean is he who is deficient, in every sort of expenditure. Similar are the stingy and the purse-proud; the latter [35] exceeds what is fitting, the former falls short of it. [The rogue aims at gain in any way and from any source; the simple not even from the right source.]<sup>18</sup> A man is envious when he feels pain at the sight of prosperity more often than he ought, for even those who deserve prosperity cause when prosperous pain to the envious; the [1221<sup>b</sup>1] opposite character has not so definite a name: he is one who shows excess in not grieving even at the prosperity of the undeserving, but accepts all, as gluttons accept all food, while his opposite is impatient through envy.

It is superfluous to add to the definition that the particular relations to each [5] thing should not be accidental; for no art, theoretical or productive, uses such additions to its definitions in speech or action; the addition is merely directed against logical quibbles against the arts. Take the above then, as simple definitions, which will be made more accurate when we speak of the opposite habits.

[10] But of these states themselves there are species with names differing according as the excess is in time, in degree, or in the object provoking the state: e.g. one is quick-tempered through feeling anger quicker than one ought, irascible and passionate through feeling it more, bitter through one's tendency to retain one's [15] anger, violent and abusive through the punishments one inflicts from anger . . .<sup>19</sup> Epicures,

gluttons, drunkards are so named from having a tendency contrary to reason to indulgence in one or the other kind of nutriment.

Nor must we forget that some of the faults mentioned cannot be taken to depend on the manner of action, if manner means excess of passion: e.g. the [20] adulterer is not so called from his excessive intercourse with married women; 'excess' is inapplicable here, but the act is simply in itself wicked; the passion and its character are expressed in the same word. Similarly with assault. Hence men dispute the liability of their actions to be called by these names; they say that they had intercourse but did not commit adultery (for they acted ignorantly or by [25] compulsion), or that they gave a blow but committed no assault; and so they defend themselves against all other similar charges.

4 · Having got so far, we must next say that, since there are two parts of the soul, the excellences are divided correspondingly, those of the rational part being [30] the intellectual, whose function is truth, whether about a thing's nature or genesis, while the others belong to the part irrational but appetitive—for not any and every part of the soul, supposing it to be divisible, is appetitive. Necessarily, then, the character must be bad or good by its pursuit or avoidance of certain pleasures and [35] pains. This is clear from our classification of the passions, powers, and states; for the powers and states are powers and states of the passions, and the passions are distinguished by pain and pleasure. So that for these reasons and also because of our previous propositions it follows that all moral excellence has to do with pleasures and pains. For by whatever things a soul tends to become better or worse, it is with regard to and in relation to these things that it finds pleasure. But we say men are [1222<sup>a</sup>1] bad through pleasures and pains, either by the pursuit and avoidance of improper pleasures or pains or by their pursuit in an improper way. Therefore all readily define the excellences as insensibility or immobility as regards pleasures and pains, and vices as constituted by the opposites of these. [5]

5 · But since we have assumed that excellence is that sort of habit from which men have a tendency to do the best actions, and through which they are in the best disposition towards what is best; and best is what is in accordance with right reason, and this is the mean between excess and defect relative to us; it would follow [10] that moral excellence is a mean relative to each individual himself, and is concerned



with certain means in pleasures and pains, in the pleasant and the painful. The mean will sometimes be in pleasures (for there too is excess and defect), sometimes in pains, sometimes in both. For he who is excessive in his feeling of delight exceeds [15] in the pleasant, but he who exceeds in his feeling of pain, in the painful—and this either absolutely or with reference to some standard, e.g. when he differs from the majority of men; but the good man feels as he ought. But since there is a habit in consequence of which its possessor will in some cases admit the excess, in others the defect of the same thing, it follows that as these acts are opposed to one another and [20] to the mean, so the habits will also be opposed to one another and to excellence.

It happens, however, that sometimes all these oppositions will be clearer, sometimes those on the side of excess, sometimes those on the side of defect. And the reason for the difference is that the unlikeness or likeness to the mean is not always [25] of the same kind, but in one case one might change quicker from the excess to the middle habit, sometimes from the defect, and the person further distant seems more opposed; e.g. in regard to the body excess in exercise is healthier than defect, and nearer to the mean, but in food defect is healthier than excess. And so of those states [30] of choice which tend to training now some, now others, will show a greater tendency to health in case of the two acts of choice—now those good at work, now those good at abstemiousness; and he who is opposed to the moderate and the reasonable will be the man who avoids exercise, not both; and in the case of food the self-indulgent [35] man, not the man who starves himself. And the reason is that from the start our nature does not diverge in the same way from the mean as regards all things; we are less inclined to exercise, and more inclined to indulgence. So it is too with regard to the soul. We regard, then, as the habit opposed to the mean, that towards which both ourselves and men in general are more inclined—the other extreme, as though [40] not existent, escapes our notice, being unperceived because of its rarity. Thus we oppose anger to gentleness, and the irascible to the gentle. Yet there is also excess in [1222<sup>b</sup>1] the direction of gentleness and readiness to be reconciled, and the repression of anger when one is struck. But the men prone to this are few, and all incline more to the opposite extreme; there is none of the spirit of reconciliation<sup>20</sup> in anger.

And since we have reached a list of the habits in regard to the several passions, [5] with their excesses and defects, and the opposite habits in virtue of which men are as right reason directs them to be—(what right reason is, and with an eye to what standard we are to fix the mean, must

be considered later)—it is clear that all the [10] moral excellences and vices have to do with excesses and defects of pleasures and pains, and that pleasures and pains arise from the above-mentioned habits and passions. But the best habit is that which is the mean in respect of each class of things. It is clear then that all, or at least some, of the excellences will be connected with means.

[15] **6** · Let us, then, take another starting-point for the succeeding inquiry. Every substance is by nature a sort of principle; therefore each can produce many similar to itself, as man man, animals in general animals, and plants plants. But in addition to this man alone of animals is also the source of certain actions; for no [20] other animal would be said to act. Such principles, which are primary sources of movements, are called principles in the strict sense, and most properly such as have necessary results; God is doubtless a principle of this kind. The strict sense of 'principle' is not to be found among principles without movement, e.g. those of [25] mathematics, though by analogy we use the name there also. For there, too, if the principle should change, practically all that is proved from it would alter; but its consequences do not change themselves, one being destroyed by another, except by destroying the assumption and, by its refutation, proving the truth. But man is the source of a kind of movement, for action is movement. But since, as elsewhere, the [30] source or principle is the cause of all that exists or arises through it, we must take the same view as in demonstrations. For if, supposing the triangle to have its angles equal to two right angles, the quadrilateral must have them equal to four right angles, it is clear that the property of the triangle is the cause of this last. And if the [35] triangle should change, then so must the quadrilateral, having six right angles if the triangle has three, and eight if it has four: but if the former does not change but remains as it was before, so must the quadrilateral.

The necessity of what we are endeavouring to show is clear from the *Analytics*; at present we can neither affirm nor deny anything with precision except just this.

Supposing there were no further cause for the triangle's having the above [40] property, then the triangle would be a sort of principle or cause of all that comes later. So that if anything existent may have the opposite to its actual qualities, so of [1223<sup>a</sup>1] necessity may its principles. For what results from the necessary is necessary; but the results of the contingent might be the opposite of what they are; what depends on men

themselves forms a great portion of contingent matters, and men themselves are the sources of such contingent results. So that it is clear that all the acts of which [5] man is the principle and controller may either happen or not happen, and that their happening or not happening—those at least of whose existence or non-existence he has the control—depends on him. But of what it depends on him to do or not to do, he is himself the cause; and what he is the cause of depends on him. And since [10] excellence and badness and the acts that spring from them are respectively praised or blamed—for we do not give praise or blame for what is due to necessity, or chance, or nature, but only for what we ourselves are causes of; for what another is the cause of, for that he bears the blame or praise—it is clear that excellence and badness have to do with matters where the man himself is the cause and source of his acts. We must then ascertain of what actions he is himself the source and cause. [15] Now, we all admit that of acts that are voluntary and done from the choice of each man he is the cause, but of involuntary acts he is not himself the cause; and all that he does from choice he clearly does voluntarily. It is clear then that excellence and badness have to do with voluntary acts. [20]

7 · We must then ascertain what is the voluntary and the involuntary, and what is choice, since by these excellence and badness are defined. First we must consider the voluntary and involuntary. Of three things it would seem to be one, agreement with either desire, or choice, or thought—that is, the voluntary would [25] agree, the involuntary would be contrary to one of these. But again, desire is divided into three sorts, wish, anger, and sensual appetite. We have, then, to distinguish these, and first to consider the case of agreement with sensual appetite.

Now all that is in agreement with sensual appetite would seem to be voluntary; for all the involuntary seems to be forced, and what is forced is painful, and so is all [30] that men do and suffer from compulsion—as Evenus says, ‘all to which we are compelled is unpleasant’. So that if an act is painful it is forced on us, and if forced it is painful. But all that is contrary to sensual appetite is painful—for such appetite is for the pleasant—and therefore forced and involuntary; what then agrees with [35] sensual appetite is voluntary; for these two are opposites. Further, all wickedness makes one more unjust, and incontinence seems to be wickedness, the incontinent being the sort of man that acts in accordance

with his appetite and contrary to his reason, and shows his incontinence when he acts in accordance with his appetite; but to act unjustly is voluntary, so that the incontinent will act unjustly by acting [1223<sup>b1</sup>] according to his appetite; he will then act voluntarily, and what is done according to appetite is voluntary. Indeed, it would be absurd that those who become incontinent should be more just.

From these considerations, then, the act done from appetite would seem voluntary, but from the following the opposite: what a man does voluntarily he [5] wishes, and what he wishes to do he does voluntarily. But no one wishes what he thinks to be bad; but surely the man who acts incontinently does not do what he wishes, for to act incontinently is to act through appetite contrary to what the man thinks best; whence it results that the same man acts at the same time both voluntarily and involuntarily; but this is impossible. Further, the continent will do a [10] just act, and more so than incontinence; for continence is an excellence, and excellence makes men more just. Now one acts continently whenever he acts against his appetite in accordance with his reason. So that if to act justly is voluntary as to act unjustly is—for both these seem to be voluntary, and if the one is, so must the [15] other be—but action contrary to appetite is involuntary, then the same man will at the same time do the same thing voluntarily and involuntarily.

The same argument may be applied to anger; for there is thought to be a continence and incontinence of anger just as there is of appetite; and what is [20] contrary to our anger is painful, and the repression is forced, so that if the forced is involuntary, all acts done out of anger would be voluntary. Heraclitus, too, seems to be regarding the strength of anger when he says that the restraint of it is painful—‘It is hard’, he says, ‘to fight with anger; for it gives its life for what it [25] desires’. But if it is impossible for a man voluntarily and involuntarily to do the same thing<sup>21</sup> at the same time in regard to<sup>22</sup> the same part of the act, then what is done from wish is more voluntary than that which is done from appetite or anger; and a proof of this is that we do many things voluntarily without anger or desire.

It remains then to consider whether to act from wish and to act voluntarily are [30] identical. But this too seems impossible. For we assumed and all admit that wickedness makes men more unjust, and incontinence seems a kind of wickedness. But the opposite will result from the hypothesis above; for no one wishes what he thinks bad, but does it when he becomes incontinent. If, then, to commit injustice is voluntary, and the voluntary is what agrees with wish, then when a man

becomes [35] incontinent he will be no longer committing injustice, but will be more just than before he became incontinent. But this is impossible. That the voluntary then is not action in accordance with desire, nor the involuntary action in opposition to it, is clear.

8 · But again, that action in accordance with, or in opposition to, choice is not the true description of the voluntary and involuntary is clear from the following considerations: it has been shown that the act in agreement with wish was not [1224<sup>a</sup>1] involuntary, but rather that all that one wishes is voluntary, though it has only been shown that one may do voluntarily what one does not wish. But we do many things from wish suddenly, but no one chooses an act suddenly.

[5] But if, as we saw, the voluntary must be one of these three—action according either to desire, choice, or thought, and it is not two of these, the remaining alternative is that the voluntary consists in action with some kind of thought. Advancing a little further, let us close our delimitation of the voluntary and the [10] involuntary. To act on compulsion or not on compulsion seems connected with these terms; for we say that the enforced is involuntary, and all the involuntary is enforced: so that first we must consider the action done on compulsion, its nature and its relation to the voluntary and the involuntary. Now the enforced and the necessary, force and necessity, seem opposed to the voluntary and to persuasion in [15] the case of acts done. Generally, we speak of enforced action and necessity even in the case of inanimate things; for we say that a stone moves upwards and fire downwards on compulsion and by force; but when they move according to their natural internal tendency, we do not call the act one due to force; nor do we call it voluntary either; there is no name for this antithesis; but when they move contrary [20] to this tendency, then we say they move by force. So, too, among things living and among animals we often see things suffering and acting from force, when something from without moves them contrary to their own internal tendency. Now in the inanimate the moving principle is simple, but in the animated there is more than one principle; for desire and reason do not always agree. And so with the other animals [25] the action on compulsion is simple (just as in the inanimate), for they have not desire and reason opposing one another, but live by desire; but man has both, that is at a certain age, to which we attribute also the power of action; for we do not use this term of the child, nor of the brute, but only of the man who has come to act from

reason.

So the compulsory act seems always painful, and no one acts from force and [30] yet with pleasure. Hence there arises much dispute about the continent and incontinent, for each of them acts with two tendencies mutually opposed, so that (as the expression goes) the continent forcibly drags himself from the pleasant appetites (for he feels pain in dragging himself away against the resistance of [35] desire), while the incontinent forcibly drags himself contrary to his reason. But still the latter seems less to be in pain; for appetite is for the pleasant, and this he follows with delight; so that the incontinent rather acts voluntarily and not from force, [1224<sup>b</sup>1] because he acts without pain. But persuasion is opposed to force and necessity, and the continent goes towards what he is persuaded of, and so proceeds not from force but voluntarily. But appetite leads without persuading, being devoid of reason. We have, then, shown that these alone seem to act from force and involuntarily, and why they seem to, viz. from a certain likeness to the enforced action, in virtue of which we attribute enforced action also to the inanimate. Yet if we add the addition [5] made in our definition, there also the statement becomes untrue. For it is only when something external moves a thing, or brings it to rest against its own internal tendency, that we say this happens by force; otherwise we do not say that it happens by force. But in the continent and the incontinent it is the present internal tendency that leads them, for they have both tendencies. So that neither acts on compulsion [10] nor by force, but, as far at least as the above goes, voluntarily. For the external moving principle, that hinders or moves in opposition to the internal tendency, is what we call necessity, e.g. when we strike someone with the hand of one whose wish and appetite alike resist; but when the principle is from within, there is no force. Further, there is both pleasure and pain in both; for the continent feels pain [15] now in acting against his appetite, but has the pleasure of hope, i.e. that he will be presently benefited, or even the pleasure of being actually at present benefited because he is in health; while the incontinent is pleased at getting through his incontinency what he desires, but has a pain of expectation, thinking that he is doing [20] ill. So that to say that both act from compulsion is not without reason, the one sometimes acting involuntarily owing to his desire, the other owing to his reason; these two, being separated, are thrust out by one another. Whence men apply the language to the soul as a whole, because we see something like the above in the [25] elements of the soul. Now of the parts of the soul this may be said; but the soul as a whole, whether in the continent or the incontinent, acts

voluntarily, and neither acts on compulsion, but one of the elements in them does, since by nature we have both. For reason is in them by nature, because if growth is permitted and not maimed, it [30] will be there; and appetite, because it accompanies and is present in us from birth. But these are practically the two marks by which we define the natural—it is either that which is found with us as soon as we are born, or that which comes to us if growth is allowed to proceed regularly, e.g. grey hair, old age, and so on. So that [35] either acts contrary to nature, and yet, broadly speaking, according to nature, but not the same nature. The puzzles then about the continent and incontinent are these—do both, or one of them, act on compulsion, so that they act involuntarily or else at the same time both on compulsion and voluntarily; that is, if the compulsory is involuntary, both voluntarily and involuntarily? And it is tolerably clear from the [1225<sup>a</sup>1] above how these puzzles are to be met.

In another way, too, men are said to act by force and compulsion without any disagreement between reason and desire in them, viz. when they do what they [5] consider both painful and bad, but they are threatened with whipping, imprisonment, or death, if they do not do it. Such acts they say they did on compulsion. Or shall we deny this, and say that all do the act itself voluntarily? For they had the power to abstain from doing it, and to submit to the suffering. Again perhaps one might say that some such acts were voluntary and some not. For of the acts that a [10] man does without wishing them some he has the power to do or abstain from doing; these he always does voluntarily and not by force; but those in which he has not this power, he does by force in a sense (but not absolutely), because he does not choose the very thing he does, but the purpose for which it is done, since there is a difference, too, in this. For if a man were to murder another so as not to be caught at [15] blind man's buff he would be laughed at if he were to say that he acted by force, and on compulsion; there ought to be some greater and more painful evil that he would suffer if he did not commit the murder. For then he will act on compulsion and by force, or at least not by nature, when he does something evil for the sake of good, or release from a greater evil; then he will at least act involuntarily, for such acts are [20] not subject to his control. Hence, many regard love, anger in some cases, and natural conditions as involuntary, as being too strong for nature; we pardon them as things capable of overpowering nature. A man would more seem to act from force and involuntarily if he acted to escape violent than if to escape gentle pain, and generally if to escape pain than if to get pleasure. For that which depends on [25] him—and all turns on

this—is what his nature is able to bear; what it is not, what is not under the control of his natural desire or reason, that does not depend on him. Therefore those who are inspired and prophesy, though their act is one of thought, we still say have it not in their own power either to say what they said, or to do what [30] they did. And so of acts done through appetite. So that some thoughts and passions do not depend on us, nor the acts<sup>23</sup> following such thoughts and reasonings, but, as Philolaus said, some arguments are too strong for us.

So that if the voluntary and involuntary had to be considered in reference to the presence of force as well as from other points of view, let this be our final [15] distinction. Nothing obscures the idea of the voluntary so much . . . as though they act from force and yet voluntarily.<sup>24</sup>

9 · Since we have finished this subject, and we have found the voluntary not to be defined either by desire or by choice, it remains to define it as that which depends on thought. The voluntary, then, seems opposed to the involuntary, and to [1225<sup>b</sup>1] act with knowledge of the person acted on, instrument and aim—for sometimes one knows the object, e.g. as father, but not that the aim of the act is to kill, not to save, as in the case of Pelias's daughters; or knows the object to be a drink but takes it to be a philtre or wine when it was really hemlock—seems opposed to action in [5] ignorance of the person, instrument, or thing, if, that is, the action is essentially the effect of ignorance. All that is done owing to ignorance, whether of person, instrument, or thing, is involuntary; the opposite therefore is voluntary. All, then, that a man does—it being in his power to abstain from doing it—not in ignorance and owing to himself must needs be voluntary; this is what voluntariness is. But all that he does in ignorance and owing to his ignorance, he does involuntarily. But [10] since science or knowledge is of two sorts, one the possession, the other the use of knowledge, the man who has but does not use knowledge may in a sense be justly called ignorant, but in another sense not justly, e.g. if he had not used his knowledge owing to carelessness. Similarly, one might be blamed for not having the knowledge, if it were something easy or necessary and he does not have it because of [15] carelessness or pleasure or pain. This, then, we must add to our definition.

Such, then, is the completion of our distinction of the voluntary and the involuntary.



10 · Let us next speak about choice, first raising various difficulties about it. For one might doubt to what genus it belongs and in which to place it, and whether [20] the voluntary and the chosen are or are not the same. Now some insist that choice is either opinion or desire, and the inquirer might well think that it is one or the other, for both are found accompanying it. Now that it is not desire is plain; for then it would be either wish, appetite, or anger, for none desires without having experienced [25] one of these feelings. But anger and appetite belong also to the brutes while choice does not; further, even those who are capable of both the former often choose without either anger or appetite; and when they are under the influence of those passions they do not choose but remain unmoved by them. Further, anger and [30] appetite always involve pain, but we often choose without pain. But neither are wish and choice the same; for we often wish for what we know is impossible, e.g. to rule all mankind or to be immortal, but no one chooses such things unless ignorant of the impossibility, nor does he even choose what is possible, generally, if he does not [35] think it in his power to do or to abstain from doing it. So that this is clear, that the object of choice must be one of the things in our own power. Similarly, choice is not an opinion nor, generally, what one thinks; for the object of choice was something in [1226<sup>a</sup>1] one's power and many things may be thought that are not in our power, e.g. that the diagonal is commensurable. Further, choice is not either true or false. Nor yet is choice identical with our opinion about matters of practice which are in our own [5] power, as when we think that we ought to do or not to do something. This argument applies to wish as well as to opinion; for no one chooses an end, but things that contribute to an end, e.g. no one chooses to be in health, but to walk or to sit for the [10] purpose of keeping well; no one chooses to be happy but to make money or run risks for the purpose of being happy. And in general, in choosing we show both what we choose and for what we choose it, the latter being that for which we choose something else, the former that which we choose for something else. But it is the end that we specially *wish for*, and we *think* we ought to be healthy and happy. So that [15] it is clear through this that choice is different both from opinion and from wish; for wish and opinion pertain especially to the end, but choice does not.

It is clear, then, that choice is not wish, or opinion, or judgement simply. But in what does it differ from these? How is it related to the voluntary? The answer to [20] these questions will also make it clear what choice is. Of possible things, then, there are some such that we can

deliberate about them, while about others we cannot. For some things are possible, but the production of them is not in our power, some being [25] due to nature, others to other causes; and about these none would attempt to deliberate except in ignorance. But about others, not only existence and nonexistence is possible, but also human deliberation;<sup>25</sup> these are things the doing or not doing of which is in our own power. Therefore, we do not deliberate about the affairs of the Indians nor how the circle may be squared; for the first are not in *our* [30] power, the second is wholly beyond the power of action; but we do not even deliberate about all things that may be done and that are in our power (by which it is clear that choice is not opinion simply), though the matters of choice and action belong to the class of things in our own power. One might then raise the [35] problem—why do doctors deliberate about matters within their science, but not grammarians? The reason is that error may occur in two ways (either in reasoning or in perception when we are engaged in the very act), and in medicine one may go wrong in both ways, but in grammar one can do so only in respect of the perception [1226<sup>b</sup>1] and action, and if they inquired about this there would be no end to their inquiries. Since then choice is<sup>26</sup> neither opinion nor wish singly nor yet both (for no one chooses suddenly, though he thinks he ought to act, and wishes, suddenly), it must [5] be compounded of both, for both are found in a man choosing. But we must ask—how compounded out of these? The very name is some indication. For choice is not simply picking but picking one thing before another; and this is impossible without consideration and deliberation; therefore choice arises out of deliberate opinion.

[10] Now about the end no one deliberates (this being fixed for all), but about that which tends to it—whether this or that tends to it, and—supposing this or that resolved on—how it is to be brought about. All consider this till they have brought the beginning of the process to a point in their own power. If then, no one chooses [15] without some preparation, without some deliberation whether it is better or worse to do so and so, and if, of the things which contribute to an end, and which may or may not come about, we deliberate about those which are in our power, then it is clear that choice is a deliberate desire for something in one's own power; for we all deliberate about what we choose, but we do not choose all that we deliberate about. I call it deliberate when deliberation is the source and cause of the desire, and the [20] man desires because of the deliberation. Therefore in the other animals choice does not exist, nor in man at every age or in every condition; for there is

not deliberation or judgement on the ground of an act; but it is quite possible that many animals have an opinion whether a thing is to be done or not; only thinking with deliberation is impossible to them. For the deliberating part of the soul is that which observes a [25] cause of some sort; and the object of an action is one of the causes; for we call cause that owing to which a thing comes about; but the purpose of a thing's existence or production is what we specially call its cause, e.g. of walking, the fetching of things, if this is the purpose for which one walks. Therefore, those who have no aim fixed have no inclination to deliberate. So that since, if a man of himself and not through [30] ignorance does or abstains from that which is in his power to do or abstain from, he acts or abstains voluntarily, but we do many such things without deliberation or premeditation, it follows that all that has been chosen is voluntary, but not all the voluntary is chosen, and that all that is according to choice is voluntary, but not all [35] that is voluntary is according to choice.<sup>27</sup> And at the same time it is clear from this that those legislators define well who enact that some states of feeling are to be considered voluntary, some involuntary, and some premeditated; for if they are not thoroughly accurate, at least they approximate to the truth. But about this we will [1227<sup>a</sup>1] speak in our investigation of justice; meanwhile it is clear that choice is not simply wish or simply opinion, but opinion and desire together when following as a conclusion from deliberation. [5]

But since in deliberating one always deliberates for the sake of some end, and he who deliberates has always an aim by reference to which he judges what is expedient, no one deliberates about the end; this is the starting-point and assumption, like the assumptions in theoretical science (we have spoken about this briefly in the beginning of this work and minutely in the *Analytics*). Everyone's inquiry, [10] whether made with or without art, is about what tends to the end, e.g. whether they shall go to war or not, when this is what they are deliberating about. But the cause or object will come first, e.g. wealth, pleasure, or anything else of the sort that [15] happens to be our object. For the man deliberating deliberates if he has considered, from the point of view of the end, what<sup>28</sup> conduces to bringing the end within his [20] own action, or what he at present can do towards the object. But the object or end is always something good by nature, and men deliberate about its partial constituents, e.g. the doctor whether he is to give a drug, or the general where he is to pitch his camp. To them the absolutely best end is good. But contrary to nature and by perversion<sup>29</sup> not the good but the apparent good is the end. And the reason is that some things cannot be used for anything but what their

nature determines, e.g. sight; for one can see nothing but what is visible, nor hear anything but what is [25] audible. But science enables us to do what does not belong to that science; for the same science is not similarly related to health and disease, but naturally to the former, contrary to nature to the latter. And similarly wish is of the good naturally, but of the bad contrary to nature, and by nature one wishes the good, but contrary [30] to nature and through perversion<sup>30</sup> the bad as well.

But further, the corruption and perversion of a thing does not tend to anything at random but to the contrary or the intermediate between it and the contrary. For out of this province one cannot go, since error leads not to anything at random but to the contrary of truth where there is a contrary, and to that contrary which is [35] according to the appropriate science contrary. Therefore, the error and the resulting choice must deviate from the mean towards the opposite—and the opposite of the mean is excess or defect. And the cause is pleasantness or painfulness; for we are so constituted that the pleasant appears good to the soul and the more pleasant better, while the painful appears bad and the more painful worse. So that from this also it is [1227<sup>b</sup>1] clear that excellence and badness have to do with pleasures and pains; for they have to do with objects of choice, and choice has to do with the good and bad or what seems such, and pleasure and pain naturally seem such.

[5] It follows then, since moral excellence is itself a mean and wholly concerned with pleasures and pains, and badness lies in excess or defect and is concerned with the same matters as excellence, that moral excellence is a habit tending to choose the mean in relation to us in things pleasant and painful, in regard to which, [10] according as one is pleased or pained, men are said to have a definite sort of character; for one is not said to have a special sort of character merely for liking what is sweet or what is bitter.

11 · These distinctions having been made, let us say whether excellence makes the choice correct and the end right so that a man chooses for the right end, [15] or whether (as some say) it makes the reason so. But what does this is continence, for this preserves the reason. But excellence and continence differ. We must speak later about them, since those who think that excellence makes the reason right, do so for this cause—namely, that continence is of this nature and continence is one of the things we praise. Now that we have discussed preliminary questions let us state [20] our view.<sup>31</sup> It is possible for the aim to be right,

but for a man to go wrong in what contributes to that aim; and again the aim may be mistaken, while the things leading to it are right; or both may be mistaken. Does then excellence make the aim, or the things that contribute to that aim? We say the aim, because this is not [25] attained by inference or reasoning. Let us assume this as starting-point. For the doctor does not ask whether one ought to be in health or not, but whether one ought to walk or not; nor does the trainer ask whether one ought to be in good condition or not, but whether one should wrestle or not. And similarly no art asks questions about the end; for as in theoretical sciences the assumptions are our starting-points, [30] so in the productive the end is starting-point and assumed. E.g. we reason that since this body is to be made healthy, therefore so and so must be found in it if health is to be had—just as in geometry we argue, if the angles of the triangle are equal to two right angles, then so and so must be the case. The end aimed at is, then, the starting-point of our thought, the end of our thought the starting-point of action. If, then, of all correctness either reason or excellence is the cause, if reason is not the cause, then the end (but not the things contributing to it) must owe its rightness to [35] excellence. But the end is the object of the action; for all choice is of something and for the sake of some object. The object, then, is the mean, and excellence is the cause of this by choosing the object. Still choice is not of this but of the things done for the sake of this. To hit on these things—I mean what ought to be done for the sake of the object—belongs to another faculty; but of the rightness of the end of [1228<sup>a</sup>1] the choice the cause is excellence. And therefore it is from a man's choice that we judge his character—that is from the object for the sake of which he acts, not from the act itself. Similarly, badness brings it about that we choose the opposite object. If, then, a man, having it in his power to do the honourable and abstain from the [5] base, does the opposite, it is clear that this man is not good. Hence, it follows that both excellence and badness are voluntary; for there is no necessity to do what is wicked. Therefore badness is blamable and excellence praiseworthy. For the involuntary if base or bad is not blamable, if good is not praiseworthy, but only the [10] voluntary. Further, we praise and blame all men with regard to their choice rather than their acts (though activity is more desirable than excellence), because men may do bad acts under compulsion, but no one chooses them under compulsion. Further, it is only because it is not easy to see the nature of a man's choice that we [15] are forced to judge of his character by his acts. The activity then is more desirable, but the choice is more praiseworthy. And this both

follows from our assumptions and is in agreement with the phenomena.

## BOOK III

1 · That there are mean states, then, in the excellences, and that these are states of choice, and that the opposite states are vices and what these are, has been stated in its universal form. But let us take them individually and speak of them in [25] order; and first let us speak of bravery. All are practically agreed that the brave man is concerned with fears and that bravery is one of the excellences. We distinguished also in the table foolhardiness and fear as contraries; in a sense they are, indeed, opposed to one another. Clearly, then, those named after these habits [30] will be similarly opposed to one another, i.e. the coward, for he is so called from fearing more than he ought and being less confident than he ought, and the foolhardy man, who is so called for fearing less than he ought and being more confident than he ought. (Hence they have names cognate to those of the qualities, [35] e.g. ‘foolhardy’ is cognate to ‘foolhardiness’.) So that since bravery is the best habit in regard to fear and confidence, and one should be neither like the foolhardy (who are defective in one way, excessive in another) nor like the cowards (of whom the same may be said, only not about the same objects, but inversely, for they are [1228<sup>b</sup>1] defective in confidence and excessive in fear), it is clear that the middle habit between foolhardiness and cowardice is bravery, for this is the best.

The brave man seems to be in general fearless, the coward prone to fear; the [5] latter fears many things and few, great things and small, and intensely and quickly, while his opposite fears either not at all or slightly and reluctantly and seldom, and great things only. The brave man endures even what is very frightening, the coward not even what is slightly frightening. What, then, does the brave man endure? First, [10] is it the things that appear frightening to himself or to another? If the latter, his bravery would be no considerable matter. But if it is the things that he himself fears, then he must find many things frightening—frightening things<sup>32</sup> being things that cause fear to those who find them frightening, great fear if very frightening, slight [15] fear if slightly frightening. Then it follows that the brave man feels much and serious fear; but on the contrary bravery seemed to make a man fearless, fearlessness consisting in fearing few things if any, and in fearing slightly and with reluctance. But perhaps we use ‘frightening’—like ‘pleasant’ and ‘good’—in two

senses. Some things are pleasant or good absolutely, others to a particular person [20] pleasant or good—but absolutely bad and not pleasant, e.g. what is useful to the wicked or pleasant to children as such; and similarly the frightening is either absolutely such or such to a particular person. What, then, a coward as such fears is [25] not frightening to anyone or but slightly so; but what is frightening to the majority of men or to human nature, that we call absolutely frightening. But the brave man shows himself fearless towards these and endures such things, they being to him frightening in one sense but in another not—frightening to him *qua* man, but not frightening to him except slightly so, or not at all, *qua* brave. These things, however, [30] are frightening, for they are so to the majority of men. This is the reason, by the way, why the habit of the brave man is praised; his condition is analogous to that of the strong or healthy. For these are what they are, not because, in the case of the one, no toil, or in the case of the other, no extreme, crushes them, but because they are either unaffected absolutely or affected only to a slight extent by the things that [35] affect the many or the majority. The sick, then, and the weak and the cowardly are affected by the common affections, as well as by others, only more quickly and to a greater extent than the many, . . .<sup>33</sup> and further, by the things that affect the many they are wholly unaffected or but slightly affected.

But it is still questioned whether anything is frightening to the brave man, [1229<sup>a</sup>1] whether he would not be incapable of fear. May we not allow him to be capable of it in the way above mentioned? For bravery consists in following reason, and reason bids one choose the noble. Therefore the man who endures the frightening from any other cause than this is either out of his wits or foolhardy; but the man who does so for the sake of the noble is alone fearless and brave. The coward, then, fears even [5] what he ought not, the foolhardy is confident even when he ought not to be; the brave man both fears and is confident when he ought to be and is in this sense a mean, for he is confident or fears as reason bids him. But reason does not bid a man to endure what is very painful or destructive unless it is noble; now the foolhardy man is confident about such things even if reason does not bid him be so, while the coward is not confident even if it does; the brave man alone is confident about them [10] only if reason bids him.

There are five kinds of courage, so named for a certain analogy between them; for they all endure the same things but not for the same reasons. One is a civic courage, due to the sense of shame; another is military, due to experience and knowledge, not (as Socrates said<sup>34</sup>) of



what is fearful, but of the resources they have [15] to meet what is fearful. The third kind is due to inexperience and ignorance; it is that which makes children and madmen face objects moving towards them and take hold of snakes. Another kind is due to hope, which makes those who have often been fortunate, or those who are drunk, face dangers—for wine makes them sanguine. [20] Another kind is due to irrational feeling, e.g. love or anger; for a man in love is rather foolhardy than timid, and faces many dangers, like him who slew the tyrant in Metapontum or the man of whom stories are told in Crete. Similar is the action of anger or passion, for passion is beside itself. Hence wild boars are thought to be [25] brave though they are not really so, for they behave as such when beside themselves, but at other times are unpredictable like foolhardy men. But still the bravery of passion is above all natural (passion is invincible, and therefore children are excellent fighters); civic courage is the effect of law. But in truth none of these [30] forms is courage, though all are useful for encouragement in danger.

So far we have spoken of the frightening generally; now it is best to distinguish further. In general, then, whatever is productive of fear is called frightening, and this is all that causes destructive pain. For those who expect some other pain may [35] perhaps have another pain and other emotions but not fear, e.g. if a man foresees that he will suffer the pain of envy or of jealousy or of shame. But fear only occurs in connexion with the expectation of pains whose nature is to be destructive to life. Therefore men who are very effeminate as to some things are brave, and some who [1229<sup>b</sup>1] are hard and enduring are cowards. Indeed, it is thought practically the special mark of bravery to take up a certain attitude towards death and the pain of it. For if a man were so constituted as to be patient as reason requires towards heat and cold [5] and similar not dangerous pains, but weak and timid about death, not for any other feeling, but just because it means destruction, while another was soft in regard to these but unaffected in regard to death, the former would seem cowardly, the latter [10] brave; for we speak of danger also only in regard to such objects of fear as bring near to us that which will cause such destruction; when this seems close, then we speak of danger.

The objects of fear, then, in regard to which we call a man brave are, as we have said, those which appear capable of causing destructive pain, but only when they appear near and not far off, and are of such magnitude, real or apparent, as is [15] not out of proportion to man, for some things must appear frightening and must perturb any man. For just as things hot and cold and certain other powers are too [20] strong for us

and the conditions of the human body, so it may be with regard to the emotions of the soul.

The cowardly, then, and the foolhardy are misled by their habits; for to the coward what is not frightening seems frightening, and what is slightly frightening greatly so, while in the opposite way, to the foolhardy man the frightening seems [25] safe and the very frightening but slightly so; but the brave man thinks things what they truly are. Therefore, if a man faces the frightening through ignorance (e.g. if a man faces in the transport of madness the attack of a thunderbolt), he is not brave nor yet if, knowing the magnitude of the danger, he faces it through passion—as the Celts take up their arms to go to meet the waves; in general, all the bravery of [30] foreigners involves passion. But some face danger also for other pleasures—for passion is not without a certain pleasure, involving as it does the hope of vengeance. But still, whether a man faces death for this or some other pleasure or to flee from greater evils, he would not justly be called brave. For if dying were pleasant, the [35] profligate would have often died because of his incontinence, just as now—since what causes death is pleasant though not death itself—many knowingly incur death through their incontinence, but none of them would be thought brave even if they do it with perfect readiness to die. Nor is a man brave if he seeks death to avoid trouble, [1230<sup>a</sup>1] as many do; to use Agathon's words: 'Bad men too weak for toil are in love with death,' And so the poets narrate that Chiron, because of the pain of his wound, prayed for death and release from his immortality. Similarly, all who face dangers [5] owing to experience are not really brave; this is what, perhaps, most soldiers do. For the truth is the exact opposite of what Socrates thought; he held that bravery was knowledge. But those who know how to ascend masts are confident not because they [10] know what is frightening but because they know how to help themselves in dangers. Nor is all that makes men fight more boldly courage; for then, as Theognis puts it, strength and wealth would be bravery—'every man' (he says) 'is daunted by poverty'. Obviously some, though cowards, face dangers because of their experience, because they do not think them dangers, as they know how to help themselves; [15] and a proof of this is that, when they think they can get no help and the danger is close at hand, they no longer face it. But of all brave men of this sort, it is those who face danger because of shame who would most seem to be brave, as Homer says [20] Hector faced the danger from Achilles—'and shame seized Hector'; and, again, 'Polydamas will be the first to taunt me'.<sup>35</sup> Such bravery is civic. But the true bravery is neither this nor any of the

others, but like them, as is also the bravery of brutes which from passion run to meet the blow. For a man ought to hold his ground though frightened, not because he will incur disrepute, nor through anger, nor [25] because he does not expect to be killed or has powers by which to protect himself; for in that case he will not even think that there is anything to be feared. But since all excellence implies choice—we have said before what this means and that it makes a man choose everything for the sake of some end, and that the end is the noble—it is [30] clear that bravery, because it is an excellence, will make a man face what is frightening for some end, so that he does it neither through ignorance—for his excellence rather makes him judge correctly—nor for pleasure, but because the act is noble; since, if it is not noble but frantic, he does not face the danger, for that would be disgraceful. In regard, then, to what things bravery is a mean state, between what, and why, and the meaning of the frightening, we have now spoken [35] tolerably adequately for our present purpose.

2 · After this we must try to draw certain distinctions regarding profligacy and temperance. ‘Profligate’ has many senses. A man is profligate when he has not been corrected or cured (just as what has not been cut is uncut), and of such men, some are capable, others incapable of correction; just as the uncut includes both [1230<sup>b</sup>1] what cannot be cut and what can be but has not been cut; and so with ‘profligate’. For it is both that which by its nature refuses correction, and that which is of a nature to accept but has not yet received correction for the faults in regard to which [5] the temperate man acts rightly—e.g. children. For we give them the same name as the profligate, but because of this latter kind of profligacy. And, further, it is in different senses that we give the name to those hard to cure and to those whom it is quite impossible to cure through correction. Profligacy, then, having many senses, it is clear that it has to do with certain pleasures and pains, and that the forms differ [10] from one another and from other states by the kind of attitude towards these; we have already stated how, in the use of the word ‘profligacy’, we apply it to various states by analogy. As to those who from insensibility are unmoved by these same pleasures, some call them insensible, while others describe them as such by other [15] names; but this state is not very familiar or common because all rather err in the opposite direction, and it is congenital to all to be overcome by and to be sensible to such pleasures. It is the state chiefly of such as the rustics introduced on the stage by comic writers, who keep aloof from even moderate and

necessary pleasures. [20]

But since temperance has to do with pleasures, it must also have to do with certain appetites; we must, then, ascertain which. For the temperate man does not exhibit his temperance in regard to all appetites and all pleasures, but about the objects, as it seems, of two senses, taste and touch, or rather really about those of [25] touch alone. For his temperance is shown not in regard to visual pleasure in the beautiful (so long as it is unaccompanied by sexual appetite) or visual pain at the ugly; nor, again, in regard to the pleasure or pain of the ear at harmony or discord; nor, again, in regard to olfactory pleasure or pain at pleasant or disagreeable odours. Nor is a man called profligate for feeling or want of feeling in regard to such [30] matters. For instance, if one sees a beautiful statue, or horse, or human being, or hears singing, without any accompanying wish for eating, drinking, or sexual indulgence, but only with the wish to see the beautiful and to hear the singers, he would not be thought profligate any more than those who were charmed by the [35] Sirens. Temperance and profligacy have to do with those two senses whose objects are alone felt by and give pleasure and pain to brutes as well; and these are the senses of taste and touch, the brutes seeming insensible to the pleasures of practically all the other senses alike, e.g. harmony or beauty; for they obviously [1231<sup>a</sup>1] have no feeling worth mentioning at the mere sight of the beautiful or the hearing of the harmonious, except, perhaps, in some marvellous instances. And with regard to [5] pleasant and disagreeable odours it is the same, though all their senses are sharper than ours. They do, indeed, feel pleasure at certain odours; but these gladden them accidentally and not of their own nature. By those enjoyed not of their own nature I mean those that give us pleasure owing to expectation and memory, e.g. the pleasure from the scent of foods and drinks; for these we enjoy because of a different [10] pleasure, that of eating or drinking; the odours enjoyed for their own nature are such as those of flowers (therefore Stratonicus neatly remarked that these smell beautifully, food, etc., pleasantly). Indeed, the brutes are not excited over every pleasure connected with taste, e.g. not over those which are felt in the tip of the tongue, but only over those that are felt in the gullet, the sensation being one of [15] touch rather than of taste. Therefore gluttons pray not for a long tongue but for the gullet of a crane, as did Philoxenus, the son of Eryxis. Therefore, broadly, we should regard profligacy as concerned with objects of touch. Similarly it is with such pleasures that the profligate man is concerned. For drunkenness, gluttony, lecherousness, [20] gormandizing, and all such things are concerned with

the above-mentioned senses; and these are the parts into which we divide profligacy. But in regard to the pleasures of sight, hearing, and smell, no one is called profligate if he is in excess, but we blame without considering disgraceful such faults, and all in [25] regard to which we do not speak of men as continent; the incontinent are neither profligate nor temperate.

The man, then, so constituted as to be deficient in the pleasures in which all must in general partake and rejoice is insensible (or whatever else we ought to call him); the man in excess is profligate. For all naturally take delight in these objects [30] and conceive appetites for them, and neither are nor are called profligate; for they neither exceed by rejoicing more than is right when they get them, nor by feeling greater pain than they ought when they miss them; nor are they insensible, for they are not deficient in the feeling of joy or pain, but rather in excess.

[35] But since there is excess and defect in regard to these things, there is clearly also a mean, and this state is the best and opposed to both of the others; so that if the best state about the objects with which the profligate is concerned is temperance, temperance would be the mean state in regard to the above-mentioned sensible pleasures, the mean between profligacy and insensibility, the excess being profligacy [1231<sup>b1</sup>] and the defect either nameless or expressed by the names we have suggested. More accurate distinctions about the class of pleasures will be drawn in what is said later about continence and incontinence.

[5] **3** · In the same way we must ascertain what is gentleness and irascibility. For we see that the gentle is concerned with the pain that arises from anger, being characterized by a certain attitude towards this. We have given in our list as opposed to the passionate, irascible, and savage—all such being names for the same [10] state—the slavish and the stupid. For these are pretty much the names we apply to those who are not moved to anger even when they ought, but take insults easily and are tolerant of contempt—for slowness to anger is opposed to quickness, violence to quietness, long persistence in that feeling of pain which we call anger to short. And [15] since there is here, as we have said there is elsewhere, excess and defect—for the irascible is one that feels anger more quickly, to a greater degree, and for a longer time, and when he ought not, and at what he ought not, and frequently, while the slavish is the opposite—it is clear that there is a mean to this inequality. Since, then, [20] both the above-mentioned habits are wrong, it is clear that the

mean state between them is good; for he is neither too soon nor too late, and does not feel anger when he ought not, nor feel no anger when he ought. So that since in regard to these emotions the best condition is gentleness, gentleness would be a mean state, and the gentle a [25] mean between the irascible and the slavish.

4 · Also magnanimity, magnificence, and liberality are mean states—liberality being shown in the acquisition or expenditure of wealth. For the man who is more pleased than he ought to be with every acquisition and more pained than he [30] ought to be at every expenditure is illiberal; he who feels less of both than he ought is lavish; he who feels both as he ought is liberal. (By ‘as he ought’, both in this and in the other cases, I mean ‘as right reason directs’.) But since the two former show their nature respectively by excess and defect—and where there are extremes, there is also a mean and that is best, a single best for each kind of action—liberality must [35] be the mean between lavishness and meanness in regard to the acquisition and expenditure of wealth. I take wealth and the art of wealth in two senses; the art in one sense being the proper use of one’s property (say of a shoe or a coat), in the other [1232<sup>a</sup>1] an accidental mode of using it—not the use of a shoe for a weight, but, say, the selling of it or letting it out for money; for here too the shoe is used. Now the lover of money is a man eager for actual money, which is a sign of possession taking the [5] place of the accidental use of other possessions. But the illiberal man may even be lavish in the accidental pursuit of wealth, for it is in the natural pursuit of it that he aims at increase. The lavish runs short of necessities; but the liberal man gives his superfluities. There are also species of these genera which exceed or fall short as [10] regards parts of the subject-matter of liberality, e.g. the sparing, the skinflint, the grasper at disgraceful gain, are all illiberal; the sparing is characterized by his refusal to spend, the grasper at disgraceful gain by his readiness to accept anything, the skinflint by his strong feeling over small amounts, while the man who has the sort of injustice that involves meanness is a false reckoner and cheat. And similarly [15] one class of spendthrift is a waster by his disorderly expenditure, the other a fool who cannot bear the pain of calculation.

5 · As to magnanimity we must define its specific nature from the qualities that we ascribe to the magnanimous. For just as with other things, in virtue [20] of their nearness and likeness up to a certain point,

their divergence beyond that point escapes notice, so it is with magnanimity. Therefore, sometimes men really opposite lay claim to the same character, e.g. the lavish to that of the liberal, the self-willed to that of the dignified, the foolhardy to that of the brave. For they are [25] concerned with the same things, and are up to a certain point contiguous; thus the brave man and the foolhardy man are alike ready to face danger—but the former in one way, the latter in another; and these ways differ greatly. Now, we assert that the magnanimous man, as is indicated by the name we apply to him, is characterized by [30] a certain greatness of soul and faculty; and so he seems like the dignified and the magnificent man, since<sup>36</sup> magnanimity seems to accompany all the excellences. For to distinguish correctly great goods from small is laudable. Now, those goods are thought great which are pursued by the man of the best habit in regard to what [35] seem to be pleasures;<sup>37</sup> and magnanimity is the best habit. But every special excellence correctly distinguishes the greater from the less among its objects, as the wise man and excellence would direct, so that all the excellences seem to go with this one of magnanimity, or this with all the excellences.

Further, it seems characteristic of the magnanimous man to be disdainful; [1232<sup>b</sup>1] each excellence makes one disdainful of what is esteemed great contrary to reason (e.g. bravery disdains dangers of this kind—for it considers it disgraceful to hold<sup>38</sup> them great; and numbers are not always fearful: so the temperate disdains many great pleasures, and the liberal wealth). But this characteristic seems to belong to [5] the magnanimous man because he cares about few things only, and those great, and not because someone else thinks them so. The magnanimous man would consider rather what one good man thinks than many ordinary men, as Antiphon after his condemnation said to Agathon when he praised his defence of himself. Contempt seems particularly the special characteristic of the magnanimous man; and, again, [10] as regards honour, life, and wealth—about which mankind seems to care—he values none of them except honour. He would be pained if denied honour, and if ruled by one undeserving. He delights most of all when he obtains honour.

In this way he would seem to contradict himself; for to be<sup>39</sup> concerned above all [15] with honour, and yet to disdain the multitude and<sup>40</sup> reputation, are inconsistent. So we must first distinguish. For honour, great or small, is of two kinds; for it may be given by a crowd of ordinary men or by those worthy of consideration; and, again, there is a difference according to the ground on which honour is given. For it is

[20] made great not merely by the number of those who give the honour or by their quality, but also by its being precious; but in reality, power and all other goods are precious and worthy of pursuit only if they are truly great, so that there is no excellence without greatness; therefore every excellence, as we have said, makes a man magnanimous in regard to the object with which that excellence is concerned. [25] But still there is a single excellence, magnanimity, alongside of the other excellences, and he who has this must be called in a special sense magnanimous. But since some goods are precious and some as we distinguished earlier, and of such goods some are in truth great and some small, and of these some men are worthy [30] and think themselves so, among these we must look for the magnanimous man. There must be four different kinds of men. For a man may be worthy of great goods and think himself worthy of them, and again there may be small goods and a man worthy of them and thinking himself worthy; and we may have the opposites in regard to either kind of goods; for there may be a man worthy of small who thinks himself worthy of great and esteemed goods; and, again, one worthy of great but [35] thinking himself worthy only of small. He then who is worthy of the small but thinks himself worthy of the great is blameable; for it is stupid and not noble that he should obtain out of proportion to his worth: the man also is blameable who being worthy of great goods, because he possesses the gifts that make a man worthy, does not think himself worthy to share in them. There remains then the opposite of these two—the [1233<sup>a</sup>1] man who is worthy of great goods and thinks himself worthy of them, such being his disposition; he is the mean between the other two and is praiseworthy. Since, then, in respect of the choice and use of honour and the other esteemed goods, the best [5] condition is magnanimity, and we define the magnanimous man as being this, and not as being concerned with things useful; and since this mean is the most praiseworthy state, it is clear that magnanimity is a mean. But of the opposites, as shown in our list, the quality consisting in thinking oneself worthy of great goods [10] when not worthy is vanity—for we give the name of vain to those who think themselves worthy of great things though they are not; but the quality of not thinking oneself worthy of great things though one is, we call mean-spiritedness—for it is held to be the mark of the mean-spirited not to think himself worthy of anything great though he possesses that for which he would justly be deemed worthy of it; hence, it follows that magnanimity is a mean between vanity and [15] mean-spiritedness. The fourth of the sorts of men we have distinguished is neither wholly blameable nor yet magnanimous, not



having to do with anything that possesses greatness, for he neither is worthy nor thinks himself worthy of great goods; therefore, he is not opposite to the magnanimous man; yet to be worthy and think oneself worthy of small goods might seem opposite to being worthy and [20] thinking oneself worthy of great ones. But such a man is not opposite to the magnanimous man, for he is not to be blamed (his habit being what reason directs); he is, in fact, similar in nature to the magnanimous man; for both think themselves worthy of what they really are worthy of. He might become magnanimous, for of whatever he is worthy of he will think himself worthy. But the mean-spirited man [25] who, possessed of great and honourable qualities, does not think himself worthy of great goods—what would he do if he deserved only small? Either<sup>41</sup> he would think himself worthy of great goods and thus be vain, or else of still smaller than he has. Therefore, no one would call a man mean-spirited because, being an alien in a city, he does not claim to govern but submits, but only one who does not, being well born and thinking power a great thing. [30]

6 · The magnificent man is not concerned with any and every action or choice, but with expenditure—unless we use the name metaphorically; without expense there cannot be magnificence. It is the fitting in ornament, but ornament is [35] not to be got out of ordinary expenditure, but consists in surpassing the merely necessary. The man, then, who tends to choose in great expenditure the fitting magnitude, and desires this sort of mean, and with a view to this sort of pleasure, is magnificent; the man whose inclination is to something larger than necessary but [1233<sup>b</sup>1] out of harmony, has no name, though he is near to those called by some tasteless and showy: e.g. if a rich man, spending money on the marriage of a favourite, thinks it sufficient to make such arrangements as one makes to entertain those who drink to the Good Genius, he is shabby; while one who receives guests of this sort in the way [5] suited to a marriage feast resembles the showy man, if he does it neither for the sake of reputation nor to gain power; but he who entertains suitably and as reason directs, is magnificent; for what looks well is the suitable; nothing unsuitable is fitting. And what one does should be fitting. For in what is fitting is involved suitability both to the object<sup>42</sup> (e.g. one thing is fitting for a servant's, another for a [10] favourite's wedding) and to the entertainer both in extent and kind, e.g. people thought that the mission conducted by Themistocles to the Olympian games was not fitting to him because of his previous low station, but would have been to Cimon. But

the man who is indifferent to questions of suitability is in none of the above classes.

[15] Similarly with liberality; for a man may be neither liberal nor illiberal.

7 · In general of the other blameable or praiseworthy qualities of character some are excesses, others defects, others means, but of feelings, e.g. the envious man and the man who rejoices over another's misfortunes. For, to consider the habits to [20] which they owe their names, envy is pain felt at deserved good fortune, while the feeling of the man who rejoices at misfortunes has itself no name,<sup>43</sup> but such a man shows his nature by<sup>44</sup> rejoicing over undeserved ill fortune. Between them is the man inclined to righteous indignation, the name given by the ancients to pain felt at [25] either good or bad fortune if undeserved, or to joy felt at them if deserved. Hence they make righteous indignation (νέμεσις) a god. Shame is a mean between shamelessness and shyness; for the man who thinks of no one's opinion is shameless, he who thinks of everyone's alike is shy, he who thinks only of that of apparently [30] good men is modest. Friendliness is a mean between animosity and flattery; for the man who readily accommodates himself in all respects to another's desires is a flatterer; the man who opposes every desire is prone to enmity; the man who neither accommodates himself to nor resists everyone's pleasure, but only accommodates himself to what seems to be best, is friendly. Dignity is a mean between self-will and [35] too great obligingness; for the contemptuous man who lives with no consideration for another is self-willed; the man who adapts his whole life to another and is submissive to everybody is too obliging; but he who acts thus in certain cases but not in others, and only to those worthy, is dignified. The sincere and simple, or, as he is [1234<sup>a</sup>1] called, straightforward man, is a mean between the dissembler and the boaster. For the man who knowingly and falsely depreciates himself is a dissembler; the man who exalts himself is a boaster; the man who represents himself as he is, is sincere, and in the Homeric phrase honest; in general the one loves truth, the other a lie. Wittiness also is a mean, the witty man being a mean between the rustic and the [5] buffoon. For just as the squeamish differs from the omnivorous in that the one takes little or nothing and that with reluctance, while the other accepts everything readily, so is the rustic related to the vulgar buffoon; the one accepts nothing comic without difficulty, the other takes all easily and with pleasure. Neither attitude is

[10] right; one ought to accept some things and not others, as reason directs—and the man who does this is witty. The proof is the usual one; wittiness of this kind, supposing we do not use the word in some transferred sense, is the best habit, and the mean is praiseworthy, and the extremes blameable. But wit being of two kinds—one being delight in the comic, even when directed against one's self, if it be [15] really comic, like a jest, the other being the faculty of producing such things—the two sorts differ from one another but both are means. For the man who can<sup>45</sup> produce what a good judge will be pleased at, even if the joke is against himself, will [20] be midway between the vulgar and the frigid man; this definition is better than that which merely requires the thing said to be not painful to the person mocked, no matter what sort of man he is; one ought rather to please the man who is in the mean, for he is a good judge.

All these mean states are praiseworthy without being excellences, nor are their opposites vices—for they do not involve choice. All of them occur in the [25] classifications of affections, for each is an affection. But since they are natural, they tend to the natural excellences; for, as will be said later, each excellence is found both naturally and also otherwise, viz. as including thought. Envy then tends to [30] injustice (for the acts arising from it affect another), righteous indignation to justice, shame to temperance—whence some even put temperance into this genus. The sincere and the false are respectively sensible and foolish.

But the mean is more opposed to the extremes than these to one another, because the mean is found with neither, but the extremes often with one another, [1234<sup>b</sup>1] and sometimes the same people are at once cowardly and foolhardy, or lavish in some ways, illiberal in others, and in general are lacking in uniformity in a bad sense—for if they lack uniformity in a good sense, men of the mean type are produced; since, in a way, both extremes are present in the mean. [5]

The opposition between the mean and the extremes does not seem to be alike in both cases; sometimes the opposition is that of the excessive extreme, sometimes that of the defective, and the causes are the two first given—rarity, e.g. of those insensible to pleasures, and the fact that the error to which we are most prone seems the more opposed to the mean. There is a third reason, namely, that the more like [10] seems less opposite, e.g. foolhardiness to bravery, lavishness to liberality.

We have, then, spoken sufficiently about the other praiseworthy excellences; we must now speak of justice.

## BOOK VII

1 · Friendship, what it is and of what nature, who is a friend, and whether [20] friendship has one or many senses (and if many, how many), and, further, how we should treat a friend, and what is justice in friendship—all this must be examined not less than any of the things that are noble and desirable in character. For it is thought to be the special business of the political art to produce friendship, and men say that excellence is useful because of this, for those who are unjustly treated by [25] one another cannot be friends to one another. Further, all say that justice and injustice are specially exhibited towards friends; the same man seems both good and a friend, and friendship seems a sort of moral habit; and if one wishes to make men not wrong one another, one should<sup>46</sup> make them friends, for genuine friends do not [30] act unjustly. But neither will men act unjustly if they are just; therefore justice and friendship are either the same or not far different.

Further, men believe a friend to be among the greatest of goods, and friendlessness and solitude to be most terrible, because all life and voluntary [1235<sup>a</sup>1] association is with friends; for we spend our days with our family, kinsmen, or comrades, children, parents, or wife. The private justice practised to friends depends on ourselves alone, while justice towards all others is determined by the laws, and does not depend on us.

Many questions are raised about friendship. There is the view of those who [5] include the external world and give the term an extended meaning; for some think that like is friend to like, whence the saying ‘how God ever draws like to like’; or the saying ‘crow to crow’; or ‘thief knows thief, and wolf wolf. The physicists even [10] systematize the whole of nature on the principle that like goes to like—whence Empedocles said that the dog sat on the tile because it was most like it. Some, then, describe a friend thus, but others say that opposites are friends; for they say the [15] loved and desired is in every case a friend, but the dry does not desire the dry but the moist—whence the sayings, ‘Earth loves the rain’, and ‘in all things change is pleasant’; but change is change to an opposite. And like hates like, for ‘potter is jealous of potter’, and animals nourished from the same source are enemies. Such, [20] then, is the discrepancy between these views; for some think the like a friend, and the opposite an enemy—‘the less is ever the enemy of the more, and begins a day of hate’; and, further, the places of contraries are

separate, but friendship seems to [25] bring together. But others think opposites are friends, and Heraclitus blames the poet who wrote 'may strife perish from among gods and men'; for (says he) there could not be harmony without the low and the high note, nor living things without male and female, two opposites. There are, then, these two views about friendship; [30] and they are too general and far removed. There are other views that come nearer to and are more suitable to the phenomena. Some think that bad men cannot be friends but only the good; while others think it strange that mothers should not love their own children. (Even among the brutes we find such friendship; at least they choose to die for their children.) Some, again, think that we only regard the useful [35] as a friend, their proof being that all pursue the useful, but the useless, even in themselves, they throw away (as old Socrates said, citing the case of our spittle, hairs, and nails), and that we cast off useless parts, and in the end at death our very body, the corpse being useless; but those who have a use for it keep it, as in Egypt. [1235<sup>b</sup>1] Now all these things seem opposed to one another; for the like is useless to the like, and contrariety is furthest removed from likeness, and the contrary is not useless to [5] its contrary, for contraries destroy one another. Further, some think it easy to acquire a friend, others a very rare thing to recognize one, and impossible without misfortune; for all wish to seem friends to the prosperous. But others would have us distrust even those who remain with us in misfortune, alleging that they are deceiving us and making pretence, that by giving their company to us when we are [10] in misfortune they may obtain our friendship when we are again prosperous.

2 · We must, then, find a method that will best explain the views held on these topics, and also put an end to difficulties and contradictions. And this will happen if the contrary views are seen to be held with some show of reason; such a [15] view will be most in harmony with the phenomena; and both the contradictory statements will in the end stand, if what is said is true in one sense but untrue in another.

Another puzzle is whether the good or the pleasant is the object of love. For if we love what we *desire*—and love is of this kind, for 'none is a lover but one who ever [20] loves'—and if desire is for the pleasant, in this way the object of love would be the pleasant; but if it is what we *wish for*, then it is the good—the good and the pleasant being different.

About all these and the other cognate questions we must attempt to gain clear distinctions, starting from the following principle. The desired

and the wished for is [25] either the good or the apparent good. Now this is why the pleasant is desired, for it is an apparent good; for some think it such, and to some it appears such, though they do not think so. For appearance and opinion do not reside in the same part of the soul. It is clear, then, that we love both the good and the pleasant.

This being settled, we must make another assumption. Of the good some is [30] absolutely good, some good to a particular man, though not absolutely; and the same things are at once absolutely good and absolutely pleasant. For we say that what is advantageous to a body in health is absolutely good for a body, but not what is good for a sick body, such as drugs and the knife. Similarly, things absolutely [35] pleasant to a body are those pleasant to a healthy and unaffected body, e.g. seeing in light, not in darkness, though the opposite is the case to one with ophthalmia. And the pleasanter wine is not that which is pleasant to one whose tongue has been spoilt by inebriety (for they<sup>47</sup> add vinegar to it), but that which is pleasant to sensation [1236<sup>a</sup>1] unspoiled. So with the soul; what is pleasant not to children or brutes, but to the adult, is really pleasant; at least, when we remember both we choose the latter. And [5] as the child or brute is to the adult man, so are the bad and foolish to the good and sensible. To these, that which suits their habit is pleasant, and that is the good and noble.

Since, then, ‘good’ has many meanings—for one thing we call good because its nature is such, and another because it is profitable and useful—and further, the pleasant is in part absolutely pleasant and absolutely good, and in part pleasant to a [10] particular individual and apparently good; just as in the case of inanimate things we may choose and love a thing for either of these reasons, so in the case of a man loving one man because of his character or because of excellence, another because he is profitable and useful, another because he is pleasant, and for pleasure. So a man [15] becomes a friend when he is loved and returns that love, and this is recognized by the two men in question.

There must, then, be three kinds of friendship, not all being so named for one thing or as species of one genus, nor yet having the same name quite by mere accident. For all the senses are related to one which is the primary, just as is the case with the word ‘medical’; for we speak of a medical soul, body, instrument, or act, [20] but properly the name belongs to that primarily so called. The primary is that of which the definition is contained in the definition of all;<sup>48</sup> e.g. a medical instrument is one that a medical man would use, but the definition of the contained is not implied in that of ‘medical man’. Everywhere, then, we seek for the

primary. But because the universal is primary, they also take the primary to be universal, and this [25] is an error. And so they are not able to do justice to all the phenomena of friendship; for since one definition will not suit all, they think there are no other friendships; but the others are friendships, only not similarly so. But they, finding the primary friendship will not suit, assuming it would be universal if really primary, deny that the other friendships even are friendships; whereas there are many species of [30] friendship; this was part of what we have already said, since we have distinguished the three senses of friendship—one due to excellence, another to usefulness, a third to pleasantness.

Of these the friendship based on usefulness is that of the majority; men love [35] one another because of their usefulness and to the extent of this; so we have the proverb ‘Glaucus, a helper is a friend so long as<sup>49</sup> he fights’, and ‘the Athenians no longer know the Megarians’. But the friendship based on pleasure is that of the young, for they are sensitive to pleasure; therefore also their friendship easily changes; for with a change in their characters as they grow up there is also a change [1236<sup>b</sup>1] in their pleasures. But the friendship based on excellence is that of the best men.

It is clear from this that the primary friendship, that of good men, is a mutual returning of love and choice. For what is loved is dear to him who loves it, but a man [5] loving in return is dear to the man loved. This friendship, then, is peculiar to man, for he alone perceives another’s choice. But the other friendships are found also among the brutes where utility is in some degree present, both between tame animals and men, and between animals themselves, as in the case mentioned by Herodotus of the friendship between the sandpiper and the crocodile, and the coming together and parting of birds that soothsayers speak of. The bad may be [10] friends to one another on the ground both of usefulness and of pleasure; but some deny them to be friends, because there is not the primary friendship between them; for a bad man will injure a bad man, and those who are injured by one another do not love one another; but in fact they do love, only not with the primary friendship. [15] Nothing prevents their loving with the other kinds; for owing to pleasure they put up with each other’s injury, so long as<sup>50</sup> they are incontinent. But those whose love is based on pleasure do not seem to be friends, when we look carefully, because their friendship is not of the primary kind, being unstable, while that is stable; it is, however, as has been said, a friendship, only not the primary kind but derived from [20] it. To speak, then, of friendship in the primary sense only is to do violence to the

phenomena, and makes one assert paradoxes; but it is impossible for all friendships to come under one definition. The only alternative left is that in a sense there is only one friendship, the primary; but in a sense all kinds are friendship, not as possessing a common name accidentally without being specially related to one another, nor yet [25] as falling under one species, but rather as in relation to one and the same thing.

But since the same thing is at the same time absolutely good and absolutely pleasant (if nothing interferes), and the genuine friend is absolutely the friend in the primary sense, and such is the man desirable for himself (and he must be such; for the man to whom<sup>51</sup> one wishes good to happen for himself, one must also desire to [30] exist), the genuine friend is also absolutely pleasant; hence any sort of friend is thought pleasant. Again, one ought rather to distinguish further, for the subject needs reflection. Do<sup>52</sup> we love what is good for ourselves or what is good absolutely? and is actual loving attended with pleasure, so that the loved object is pleasant, or [35] not? For the two must be harmonized. For what is not absolutely good, but perhaps<sup>53</sup> bad, is something to avoid, and what is not good for one's self is nothing to one; but what is sought is that the absolutely good should be good in the further sense of being good to the individual. For the absolutely good is absolutely desirable, [1237<sup>a</sup>1] but for each individual his own; and these must agree. Excellence brings about this agreement, and the political art exists to make them agree for those to whom as yet they do not. . . .<sup>54</sup> And one who is a human being is ready and on the road for this (for by nature that which is absolutely good is good to him), and man rather than [5] woman, and the gifted rather than the ungifted; but the road is through pleasure; what is noble must be pleasant. But when these two disagree a man cannot yet be perfectly good, for incontinence may arise; for it is in the disagreement of the good with the pleasant in the passions that incontinence occurs.

So that since the primary friendship is grounded on excellence, friends of this [10] sort will be themselves absolutely good, and this not because they are useful, but in another way. For good to the individual and the absolutely good are two, and as with the profitable so with habits. For the absolutely profitable differs from what is [15] profitable to an individual, as<sup>55</sup> taking exercise does from taking drugs. So that the habit called human excellence is of two kinds, for we will assume man to be one of the things excellent by nature; for the excellence of the naturally excellent is an absolute good, but the excellence of that which is not thus good only to it. Similarly, then, with the pleasant. For here one must pause and examine whether friendship can exist without pleasure,



how such a friendship differs from other friendship, and [20] on which of the two—goodness or pleasure—the loving depends, whether one loves a man because he is good even if not pleasant, and in any case not for his pleasantness. Now, loving having two senses, does actual love seem to involve pleasure because activity is good? It is clear that just as in science what we have recently contemplated and learnt is most perceptible because of its pleasantness, so [25] also is the recognition of the familiar, and the same account applies to both. Naturally, at least, the absolutely good is absolutely pleasant, and pleasant to those to whom it is good. From which it at once follows that like takes pleasure in like, and that nothing is so pleasant to man as man; and if this is so even before they are perfect, it is clear it must be so when they are perfect; and the good man is perfect. [30] But if active loving is a mutual choice with pleasure in each other's acquaintance, it is clear that in general the primary friendship is a reciprocal choice of the absolutely good and pleasant because it is good and pleasant; and this friendship is the habit from which such choice springs. For its function is an activity, and this is not [35] external, but in the one who feels love. But the function of every faculty is external; for it is in something different or in one's self *qua* different. Therefore to love is to feel pleasure, but not to be loved; for to be loved is the activity of what is lovable, but to love is the activity of friendship also; and the one is found only in the animate, the other also in the inanimate, for even inanimate things are loved. But since active [1237<sup>b</sup>1] loving is to treat the loved<sup>56</sup> *qua* loved, and the friend is loved by the friend *qua* friend and not *qua* musician or doctor, the pleasure coming from him merely as being himself is the pleasure of friendship; for he loves the object as himself and not for being someone else. So that if he does not rejoice in him for being good the [5] primary friendship does not exist, nor should any of his incidental qualities hinder more than his goodness gives pleasure. For if<sup>57</sup> a man has an unpleasant odour he is left. For he must be content with goodwill without actual association.<sup>58</sup> This then is primary friendship, and all admit it to be friendship. It is through it that the other friendships seem friendships to some, but are doubted to be such by others. For [10] friendship seems something stable, and this alone is stable. For a formed decision is stable, and where we do not act quickly or easily, we get the decision right. There is no stable friendship without confidence, but confidence needs time. One must then [15] make trial, as Theognis says, 'You cannot know the mind of man or woman till you have tried them as you might cattle'. Nor is a friend made except through time; they do indeed wish to be friends, and such a state easily

passes muster as friendship. For when men are eager to be friends, by performing every friendly service to one another they think they not merely wish to be, but are friends. But it happens with [20] friendship as with other things; as man is not in health merely because he wishes to be so, neither are men at once friends as soon as they wish to be friends. The proof is that men in this condition, without having made trial of one another, are easily made enemies; wherever each has allowed the other to test him, they are not easily [25] made enemies; but where they have not, they will be persuaded whenever those who try to break up the friendship produce evidence. It is clear at the same time that this friendship does not exist between the bad, for the bad man feels distrust and is malignant to all, measuring others by himself. Therefore the good are more easily deceived unless experience has taught them distrust. But the bad prefer natural [30] goods to a friend and none of them loves a man so much as things; therefore they are not friends. The proverbial ‘community among friends’ is not found among them; the friend is made a part of things, not things regarded as part of the friend. The primary friendship then is not found towards many, for it is hard to test many men, [35] for one would have to live with each. Nor should one choose a friend like a garment. Yet in all things it seems the mark of a sensible man to choose the better of two alternatives; and if one has used the worse garment for a long time and not the better, the better is to be chosen, but not in place of an old friend one of whom you do not know whether he is better. For a friend is not to be had without trial nor in a [1238<sup>a</sup>1] single day, but there is need of time and so ‘the bushel of salt’ has become proverbial. He must also be not merely good absolutely but good for you, if the friend is to be a friend to you. For a man is good absolutely by being good, but a [5] friend by being good for another, and absolutely good and a friend when these two attributes are combined so that what is absolutely good is good for the other, or<sup>59</sup> else not absolutely good for the good man, but good to another in the sense of useful. But the need of active loving also prevents one from being at the same time a friend to many; for one cannot be active towards many at the same time. [10]

From these facts then it is clear that it is correctly said that friendship is a stable thing, just as happiness is a thing sufficient in itself. It has been rightly said, ‘for nature is stable but not wealth’, but it is still better to say ‘excellence’ than ‘nature’; and Time is said to show the friend, and bad fortune rather than good [15] fortune. For then it is clear that the goods of friends are common (for friends alone instead of things naturally good and evil—which are the matters with which good and bad fortune are

concerned—choose a man rather than the existence of some of those things and the non-existence of others). But misfortune shows those who are not really friends, but friends only for some utility. But time reveals both sorts; for [20] even the useful man does not show his usefulness quickly, as the pleasant man does his pleasantness; yet the absolutely pleasant is not quick to show himself either. For men are like wines and meats; the pleasantness of them shows itself quickly, but if it continues longer it is unpleasant and not sweet, and so it is with men. For the [25] absolutely pleasant must be determined as such by the end it realizes and the time for which it continues pleasant. Even the vulgar would admit this, judging not<sup>60</sup> merely according to results but in the way in which, speaking of a drink, they call it sweeter. For this is unpleasant not<sup>61</sup> for the result but from not being continuous, though it deceives us at the start.

[30] The first friendship then—by reason of which the others get the name—is that based on excellence and due to the pleasure of excellence, as has been said before; the other kinds occur also in children, brutes, and bad men; whence the sayings, ‘like is pleased with like’ and ‘bad adheres to bad from pleasure’. For the bad may [35] be pleasant to one another, not *qua* bad or *qua* neither good nor bad, but (say) as both being musicians, or the one fond of music and the other a musician, and inasmuch as all have some good in them, and in this way they harmonize with one another. Further, they might be useful and profitable to one another, not absolutely [1238<sup>b</sup>1] but in relation to their choice, or in virtue of some neutral characteristic. Also a good man may be a friend to a bad, the bad being of use to the good in relation to the good man’s existing choice, the good to the incontinent in relation to his existing [5] choice, and to the bad in relation to his natural choice. And he will wish for his friend what is good, the absolutely good absolutely, and conditionally what is good for the friend, so far as poverty or illness is of advantage to him—and these for the sake of absolute goods; taking a medicine is an instance, for that no one wishes,<sup>62</sup> but wishes only for some particular purpose. Further, a good man and a bad man may [10] be friends in the way in which those not good might be friends to one another. A man might be pleasant, not as bad but as partaking in some common property, e.g. as being musical, or again, so far as there is something good in all (for which reason some might be glad to associate even with the good), or in so far as they suit each individual; for all have something of the good.

[15] 3 · These then are three kinds of friendship; and in all of them the word friendship implies a kind of equality. For even those who are friends through excellence are mutually friends by a sort of equality of excellence.

But another variety is the friendship of superiority to inferiority, e.g. as the excellence of a god is superior to that of a man (for this is another kind of [20] friendship)—and in general that of ruler to subject; just as justice in this case is different, for here it is a proportional equality, not numerical equality. Into this class falls the relation of father to son and of benefactor to beneficiary; and there are varieties of these again, e.g. there is a difference between the relation of father [25] to son, and of husband to wife, the latter being that of ruler to subject, the former that of benefactor to beneficiary. In these varieties there is not at all, or at least not in equal degree, the return of love for love. For it would be ridiculous to accuse a god because the love one receives in return from him is not equal to the love given him, or for the subject to make the same complaint against his ruler. For the part of a ruler is to receive not to give love, or at least to give love in a different way. And the [30] pleasure<sup>63</sup> of the man who needs nothing over his own possessions or child, and that of him who lacks over what comes to him, are not the same. Similarly also with those who are friends through use or pleasure, some are on an equal footing with each other, in others there is the relation of superiority and inferiority. Therefore those who think themselves to be on the former footing find fault if the other is not equally useful to and a benefactor of them; and similarly with regard to pleasure. [35] This is obvious in the case of lover and beloved; for this is frequently a cause of strife between them. The lover does not perceive that the passion in each has not the same reason; therefore . . .<sup>64</sup> a lover would not say such things. But they think that there is the same reason for the passion of each.

4 · There being, then, as has been said, three kinds of friendship—based on [1239<sup>a</sup>1] excellence, utility, and pleasantness—these again are subdivided each into two, one kind based on equality, the other on superiority. Both are friendships, but only those between whom there is equality are friends; it would be absurd for a man to be the [5] friend of a child, yet certainly he loves and is loved by him. Sometimes the superior ought to be loved, but if he loves, he is reproached for loving one undeserving; for measurement is made by the worth of the friends and a sort of equality. Some then, owing to inferiority in age, do not deserve to

receive an equal love, and others because of excellence or birth or some other such superiority possessed by the other [10] person. The superior ought to<sup>65</sup> claim either not to return the love or not to return it in the same measure, whether in the friendship of utility, pleasure, or excellence. Where the superiority is small, disputes naturally arise; for the small is in some cases of no account, e.g. in weighing wood, though not in weighing gold. But men [15] judge wrongly what is small; for their own good by its nearness seems great, that of another by its distance small. But when the difference is excessive, then not even those affected seek to make out that their love should be returned or equally returned, e.g. as if a man were to claim this from a god. It is clear then that men are friends when on an equality with each other, but we may have return of love without [20] their being friends. And it is clear why men seek the friendship of superiority rather than that of equality; for in the former they obtain both love and superiority. Therefore with some the flatterer is more valued than the friend, for he procures the appearance of both love and superiority for the object of his flattery. The ambitious [25] are especially of this kind; for to be an object of admiration involves superiority. By nature some grow up loving, and others ambitious; the former is one who delights rather in loving than in being loved, the other tends to be fond of honour. He, then, who delights in being loved and admired really loves superiority; the other, the [30] loving, is fond of the pleasure of loving. This by his mere activity of loving he must have;<sup>66</sup> for to be loved is an accident; one may be loved without knowing it, but not love. Loving, rather than being loved, depends on lovingness; being loved rather depends on the nature of the object of love. And here is a proof. The friend would [35] choose, if both were not possible, rather to know than to be known, as we see women do when allowing others to adopt their children, e.g. Antiphon's Andromache. For wishing to be known seems to be felt on one's own account and in order to get, not to do, some good; but wishing to know is felt in order that one may do and love. [1239<sup>b</sup>1] Therefore we praise those who persist in their love towards the dead; for they know but are not known. That, then, there are several sorts of friendship, that they are three in number, and what are the differences between being loved and having love [5] returned, and between friends on an equality and friends in a relation of superiority and inferiority, has now been stated.

5 · But since 'friendly' is also used more universally, as was indeed said at the beginning, by those who take in extraneous considerations—

some saying that the like is friendly, and some the contrary,—we must speak also of the relation of [10] these friendships to those previously mentioned. The like is brought both under the pleasant and under the good, for the good is simple, but the bad various in form; and the good man is ever like himself and does not change in character; but the bad and the foolish are quite different in the evening from what they were in the morning. Therefore unless the bad come to some agreement, they are not friends to one [15] another but are parted; but unstable friendship is not friendship. So thus the like is friendly, because the good is like; but it may also be friendly because of pleasure; for those like one another have the same pleasures, and everything too is by nature pleasant to itself. Therefore the voices, habits, and company of those of the same [20] species are pleasantest to each side, even in the animals other than man; and in this way it is possible for even the bad to love one another: ‘pleasure glues the bad to the bad’.

But opposites are friendly through usefulness; for the like is useless to itself; [25] therefore master needs slave, and slave master; man and woman need one another, and the opposite is pleasant and desired *qua* useful, not as included in the end but as contributing towards it. For when a thing has obtained what it desires, it has reached its end and no longer desires the opposite, e.g. heat does not desire cold, nor [30] dryness moisture. Yet in a sense the love of the contrary is love of the good; for the opposites desire one another because of the mean; they desire one another like tallies because thus out of the two arises a single mean. Further, the love is accidentally of the opposite, but *per se* of the mean, for opposites desire not one another but the [35] mean. For if over-chilled they return to the mean by being warmed, and if over-warmed by being chilled. And so with everything else. Otherwise they are ever desiring, never in the mean states; but that which is in the mean delights without desire in what is naturally pleasant, while the others delight in all that puts them out of their natural condition. This kind of relation then is found also among inanimate [1240<sup>a</sup>1] things; but love occurs when the relation is found among the living. Therefore some delight in what is unlike themselves, the austere in the witty, the energetic in the lazy; for they reduce each other to the mean state. Accidentally, then, as has been said, opposites are friendly, because of the good.

[5] The number then of kinds of friendship, and the different senses in which we speak of ‘friends’ and of persons as ‘loving’ and ‘loved’, both where this constitutes friendship and where it does not, have now been stated.

6 · The question whether a man is a friend to himself or not requires much inquiry. For some think that every man is above all a friend to himself; and they use this friendship as a canon by which to test his friendship to all other friends. If we [10] look to argument and to the properties usually thought characteristic of friends, then the two kinds of friendship are in some of these respects opposed to one another, but in others alike. For this friendship—that to oneself—is, in a way, friendship by analogy, not absolutely. For loving and being loved require two separate individuals. Therefore a man is a friend to himself rather in the sense in [15] which we have described the incontinent and continent as willing or unwilling, namely in the sense that the parts of his soul are in a certain relation to each other; and all problems of this sort have a similar explanation, e.g. whether a man can be a friend or enemy to himself, and whether a man can wrong himself. For all these relations require two separate individuals; so far then as the soul is two, these [20] relations can in a sense belong to it; so far as these two are not separate, the relations cannot belong to it.

By a man's attitude to himself the other modes of friendship, under which we are accustomed to consider friendship in this discourse, are determined. For a man seems to us a friend, who wishes the good or what he thinks to be such to someone, not on his own account but for the sake of that other; or, in another way, if he wishes [25] for another man existence—even if he is not bestowing goods<sup>67</sup>—on that other's account and not on his own, he would seem most of all to be a friend to him. And in yet another manner he would be a friend to him whom he wishes to live with merely for the sake of his company and for no other reason; thus fathers wish the existence of their sons, but prefer to live with others. Now these various ways of friendship are [30] discordant with one another. For some think they are not loved, unless the other wishes them this or that good, some unless their existence or their society is desired. Further, to sorrow with the sorrowing, for no other reason than their sorrow, we shall regard as love (e.g. slaves grieve with their masters because their masters when in trouble are cruel to them, not for the sake of the masters themselves)—as [35] mothers feel towards their children, and birds that share one another's pains. For the friend wants, if possible, not merely to feel pain along with his friend, but to feel the same pain, e.g. to feel thirsty when he is thirsty, if that could be, as closely as possible. The same words are applicable to joy, which, if felt for no other reason than that the other feels joy, is a sign of friendship. Further, we say about friendship [1240<sup>b</sup>1] such things as that friendship is equality,

and true friends a single soul. All such phrases point back to the single individual; for a man wishes good to himself<sup>68</sup> in this fashion; for no one benefits himself for some further reason . . .<sup>69</sup> for he who shows [5] that he loves seems to want to be loved, not to love. And wishing the existence above all of the friend, living with him, sharing his joy and his grief, unity of soul with the friend, the impossibility of even living without one another, and the dying together [10] are characteristic of a single individual. (For such is the condition of the individual and he perhaps takes pleasure in his own company.) All these characters we find in the relation of the good man to himself. In the bad man, e.g. the incontinent, there is variance, and for this reason it seems possible for a man to be at enmity with [15] himself; but so far as he is single and indivisible, he is an object of desire to himself. Such is the good man, the man whose friendship is based on excellence, for the wicked man is not one but many, in the same day other than himself and fickle. So that a man's friendship for himself is at bottom friendship towards the good; for because a man is in a sense like himself, single, and good for himself, so far he is a [20] friend and object of desire to himself. And this is natural to man; but the bad man is unnatural. The good man never finds fault with himself at the moment of his act, like the incontinent, nor the later with the earlier man, like the penitent, nor the earlier with the later, like the liar. Generally, if it is necessary to distinguish as the [25] sophists do, he is related to himself as Coriscus to good Coriscus. For it is clear that some identical portion of them is good; for when they blame themselves, they kill themselves. But every one seems good to himself. But the man that is good absolutely, seeks to be a friend to himself, as has been said, since he has within him [30] two parts which by nature desire to be friends and which it is impossible to tear apart. Therefore in the case of man each is thought to be the friend of himself; but not so with the other animals; e.g. the horse is himself to himself . . .<sup>70</sup> therefore not a friend. Nor are children, till they have attained the power of choice; for already then the mind is at variance with the appetite. One's friendship to oneself resembles the [35] friendship arising from kinship; for neither bond can be dissolved by one's own power; but even if they quarrel, the kinsmen remain kinsmen; and so the man remains one so long as he lives.

The various senses then of loving, and how all friendships reduce to the primary kind, is clear from what has been said.



feeling and kindly feeling; for some identify these, and others think they cannot exist apart. Now kindly feeling is not altogether different from friendship, nor yet the same; for when we distinguish friendship according to its three sorts, kindly feeling is found neither [5] in the friendship of usefulness nor in that of pleasure. For if one wishes well to the other because that is useful to oneself, one would be so wishing not for the object's sake, but for his own; but goodwill seems like. . .<sup>71</sup> to be not goodwill for him who feels the goodwill, but for him towards whom it is felt. Now if goodwill existed in the friendship towards the pleasant, then men would feel goodwill towards things [10] inanimate. So that it is clear that goodwill is concerned with the friendship that depends on character; but goodwill shows itself in merely wishing, friendship in also doing what one wishes. For goodwill is the beginning of friendship; every friend has goodwill, but not all who have goodwill are friends. He who has goodwill only is like a man at the beginning, and therefore it is the beginning of friendship, not friendship itself . . .<sup>72</sup>

[15] For friends seem to agree in feeling, and those who agree in feeling seem to be friends. Friendly agreement is not about all things, but only about things that may be done by those in agreement and about what relates to their common life. Nor is it agreement merely in thought or merely in desire, for it is possible to know one thing and desire the opposite,<sup>73</sup> as in the incontinent the motives disagree, nor if<sup>74</sup> a man [20] agrees with another in choice, does he necessarily agree in desire. Agreement is only found in the case of good men; at least, bad men when they choose and desire the same things<sup>75</sup> harm one another. Agreement, like friendship, does not appear to have a single meaning; but still in its primary and natural form it is good; and so the bad cannot agree; the agreement of the bad, when they choose and desire the same [25] things, is something different. And the two parties must so desire the same thing that it is possible for both to get what they desire; for if they desire that which cannot belong to both, they will quarrel; but those in agreement will not quarrel. [30] There is agreement when the two parties make the same choice as to who is to rule, who to be ruled, meaning by 'the same', not that each one should choose himself, but that both should choose the same person. Agreement is the friendship of fellow citizens. So much then about agreement and goodwill.

8 · It is disputed why benefactors are more fond of the benefited than the [35] benefited of their benefactors. The opposite seems to be just.

One might suppose it happens from consideration of utility and what is profitable to oneself; for the benefactor has a debt due to him, while the benefited has to repay a debt. This, however, is not all; the reason is partly the general natural principle—activity is more desirable. There is the same relation between the effect and the activity, the [1241<sup>b1</sup>] benefited being as it were an effect or creation of the benefactor. Hence in animals their strong feeling for their children both in begetting them and in preserving them afterwards. And so fathers love their children—and still more mothers—more than [5] they are loved by them. And these again love their own children more than their parents, because nothing is so good as activity; in fact, mothers love more than fathers because they think the children to be more their own creation; for the amount of work is measured by the difficulty, and the mother suffers more in birth. So much then for friendship towards oneself and among more than one. [10]

9 · But justice seems to be a sort of equality and friendship also involves equality, if the saying is not wrong that ‘love is equality’. Now constitutions are all of them a particular form of justice; for a constitution is a partnership, and every partnership rests on justice, so that whatever be the number of species of friendship, [15] there are the same of justice and partnership; these all border on one another, and the species of one have differences akin to those of the other. But since there is the same relation between soul and body, artisan and tool, and master and slave, between each of these pairs there is no partnership; for they are not two, but the first term in each is one, and the second a part of this one. Nor is the good to be divided [20] between the two, but that of both belongs to the one for the sake of which the pair exists. For the body is the soul’s natural tool, while the slave is as it were a part and detachable tool of the master, the tool being a sort of inanimate slave.

[25] The other partnerships are a part of the civic partnership, e.g. those of the phratries and priestly colleges<sup>76</sup> or pecuniary partnerships.<sup>77</sup> All constitutions are found together in the household, both the true and the corrupt forms, for the same thing is true in constitutions as of harmonies. The government of the children by the [30] father is royal, the relation of husband and wife aristocratic, the relation of brothers that of a commonwealth; the corruptions of these three are tyranny, oligarchy, and democracy. The forms of justice then are also so many in number.

But since equality is either numerical or proportional, there will be various species of justice, friendship, and partnership; on numerical

equality rests the [35] democratic partnership, and the friendship of comrades—both being measured by the same standard, on proportional the aristocratic<sup>78</sup> and the royal. For the same thing is not just for the superior and the inferior; what is proportional is just. Such is the friendship between father and child; and the same sort of thing may be seen in partnerships.

[1242<sup>a</sup>1] **10** · We speak of friendships of kinsmen, comrades, partners, the so-called ‘civic friendship’. That of kinsmen has more than one species, that of brothers and that of father and sons. There is the friendship based on proportion, as that of the father to his children, and that based on mere number, e.g. that of brothers, for this [5] latter resembles the friendship of comrades; for here too age gives certain privileges. Civic friendship has been established mainly in accordance with utility; for men seem to have come together because each is not sufficient for himself, though they would have come together anyhow for the sake of living in company. Only the civic [10] friendship and its parallel corruption are not merely friendships, but the partnership is that of friends; other friendships rest on the relation of superiority. The justice belonging to the friendship of those useful to one another is pre-eminently justice, for it is civic or political justice. The concurrence of the saw and the art that uses it is of another sort; for it is not for some end common to both—it is like instrument [15] and soul—but for the sake of the user. It is true that the tool itself<sup>79</sup> receives attention, and it is just that it should receive it, for its function, that is; for it exists for the sake of its function. . . .<sup>80</sup> And the essence of a gimlet is twofold, but more properly it is its activity, namely boring holes. In this class come the body and a slave, as has been said before.

To inquire, then, how to behave to a friend is to look for a particular kind of [20] justice, for generally all justice is in relation to a friend. For justice involves a number of individuals who are partners, and the friend is a partner either in family or in one’s scheme of life. For man is not merely a political but also a household-maintaining animal, and his unions are not, like those of the other animals, confined to certain times, and formed with any chance partner, whether male or female; but [25] . . .<sup>81</sup> man has a tendency to partnership with those to whom he is by nature akin. There would, then, be partnership and a kind of justice, even if there were no state; and the household is a kind of friendship; the relation, indeed, of master and servant is that of an art and its tools, a

soul and its body; and these are not friendships, nor forms of justice, but something similar to justice; just as health is not justice, but [30] something similar. But the friendship of man and wife is a friendship based on utility, a partnership; that of father and son is the same as that of god to man, of the benefactor to the benefited, and in general of the natural ruler to the natural subject. That of brothers to one another is eminently that of comrades, inasmuch as [35] it involves equality<sup>82</sup>—‘for I was not declared a bastard brother to him; but the same Zeus, my king, was called the father of both of us’.<sup>83</sup> For this is the language of men that seek equality. Therefore in the household first we have the sources and springs [1242<sup>b</sup>1] of friendship, of political organization, and of justice.

But since there are three sorts of friendship, based on excellence, utility, and pleasantness respectively, and two varieties of each of these—for each of them may imply either superiority or equality—and the justice involved in these is clear from [5] the debates that have been held on it, in a friendship between superior and inferior the claim for proportion takes different forms, the superior’s claim being one for inverse proportion, i.e. as he is to the inferior, so should what he receives from the inferior be to what the inferior receives from him, he being in the position of ruler to subject; if he cannot get that, he demands at least numerical equality. For so it is in [10] the other associations, the two members enjoying an equality sometimes of number, sometimes of ratio. For if they contributed numerically equal sums of money, they divide an equal amount, and by an equal number; if not equal sums, then they divide proportionally. But the inferior inverts this proportion and joins crosswise. But in [15] this way the superior would seem to come off the worse, and friendship and partnership to be a gratuitous burden. Equality must then be restored and proportion created by some other means; and this means is honour, which by nature belongs to a ruler or god in relation to a subject. The profit and the honour must be [20] equated.

But civic friendship is that resting on equality; it is based on utility; and just as cities are friends to one another, so in the like way are citizens. ‘The Athenians no longer know the Megarians’; nor do citizens one another, when they are no longer [25] useful to one another, and the friendship is merely a temporary one for a particular exchange of goods. There is here, too, the relation of ruler and subject which is neither the natural relation, nor that involved in kingship, but each is ruler and ruled in turn; nor is it either’s purpose to act with the free beneficence of a god, but that he may share equally in the good and in the burdensome service. Civic [30] friendship, then, claims to be one based on equality. But of the

friendship of utility there are two kinds, the strictly legal and the moral. Civic friendship looks to equality and to the object as sellers and buyers do; hence the proverb 'a fixed wage for a friend'. When, then, this civic friendship proceeds by contract, it is of the legal [35] kind; but when each of the two parties leaves the return for his services to be fixed by the other, we have the moral friendship, that of comrades. Therefore recrimination is very frequent in this sort of friendship; and the reason is that it is unnatural; for friendships based on utility and based on excellence are different; but these wish to have both together, associating together really for the sake of utility, but [1243<sup>a</sup>1] representing their friendship as moral, like that of good men; pretending to trust one another they make out their friendship to be not merely legal. For in general there are more recriminations in the useful friendship than in either of the other two (for excellence is not given to recrimination, and pleasant friends having got what they wanted, and given what they had, are done with it; but useful friends do not dissolve [5] their association at once, if their relations are not merely legal but those of comrades); still the legal form of useful friendship is free from recrimination. The legal association is dissolved by a money-payment (for it measures equality in money), but the moral is dissolved by voluntary consent. Therefore in some countries the law forbids lawsuits for voluntary transactions between those who [10] associate thus as friends, and rightly; for good men do not have bonds of justice with one another; and such as these have dealings with one another as good and trustworthy men. In this kind of friendship it is uncertain how either will recriminate on the other, seeing that they trust each other not in a limited legal way but on the basis of their characters.

It is a further problem on which of two grounds we are to determine what is [15] just, whether by looking to the amount of service rendered, or to what was its character for the recipient; for, to borrow the language of Theognis, the service may be 'Small to thee, O goddess, but great to me'. Or the opposite may happen, as in the [20] saying, 'this is sport to you but death to me'. Hence, as we have said, come recriminations. For the benefactor claims a return on the ground of having done a great service, because he has done it at the request of the other, or with some other plea of the great value of the benefit to the other's interest, saying nothing about what it was to himself; while the recipient insists on its value to the benefactor, not [25] on its value to himself. Sometimes the receiver inverts the position, insisting how little the benefit has turned out to him, while the doer insists on its great magnitude to *him*, e.g. if at

considerable risk one has benefited another to the extent of a drachma, the one insists on the greatness of the risk, the other on the smallness of the money, just as in the repayment of money—for there the dispute is on this [30] point—the one claims the value of it when it was lent, the other concedes only the value of it now when it is returned, unless they have made an explicit provision in the contract. Civic friendship, then, looks to the agreement and the thing, moral friendship to the choice; here then we have a truer justice, and a friendly justice. The reason for the quarrel is that moral friendship is more noble, but useful [35] friendship more necessary; men start, then, by proposing to be moral friends, i.e. friends through excellence; but as soon as some private interest arises, they show clearly they were not so. For the multitude aim at the noble only when they have [1243<sup>b</sup>1] plenty of everything else; and at noble friendship similarly. So that it is clear what distinctions should be drawn in these matters. If the two are moral friends, we must look to see if the choice of each is equal; and then nothing more should be claimed by either from the other. But if their friendship is of the useful or civic kind, we must consider what would have been profitable lines for an agreement. And if one declares that they are friends on one basis, but the other on the other, it is not [5] honourable, if one ought to *do* something in return, merely to use fine language; and so too, in the other cases; but since they have not declared their friendship a moral friendship, someone must be made judge, so that neither cheats the other by a false pretence; and so each must put up with his luck. But that moral friendship is based on choice is clear, since even if after receiving great benefits one does not repay [10] them through inability, but repays only to the extent of his ability, he acts honourably; and a god is satisfied at getting sacrifices as good as our power allows. But a seller of goods will not be satisfied if the buyer says he cannot pay more; nor will a lender of money.

Recriminations are common in dissimilar friendships, where action and [15] reaction are not in the same straight line; and it is not easy to see what is just. For it is hard to measure by just this one unit different directions; we find this in the relation of lovers, for there the one pursues the other as a pleasant person, in order to live with him, while the latter seeks the other at times for his utility. When the love is over, one changes as the other changes. Then they calculate the *quid pro quo*;<sup>84</sup> [20] thus Python and Pammenes quarrelled; and so do teacher and pupil (for knowledge and money have no common measure), and so Herodicus the doctor quarrelled with a patient who paid him only a small fee; such too was the case of the king and the lyre-player; the former regarded his

associate as pleasant, the latter his as useful; and so the king, when he had to pay, chose to regard himself as an associate of the [25] pleasant kind, and said that just as the player had given him pleasure by singing, so he had given the player pleasure by his promise. But it is clear here too how one should decide; the measurement must be by one measure, only here not by a term but by a ratio; we must measure by proportion, just as one measures in the [30] associations of citizens. For how is a cobbler to have dealings with a farmer unless one equates the work of the two by proportion? So to all whose exchanges are not of the same for the same, proportion is the measure, e.g. if the one complains that he has given wisdom, and the other that he has given money, we must measure first the ratio of wisdom to wealth, and then what has been given for each. For if the one gives half of the lesser, and the other does not give even a small fraction of the [35] greater object, it is clear that the latter does injustice. Here, too, there may be a dispute at the start, if one party pretends they have come together for use, and the other denies this and alleges that they have met from some other kind of friendship.

11 · As regards the good man who is loved for his excellence, we must [1244<sup>a</sup>]1 consider whether we ought to render useful services and help to him, or to one who makes a return and has power. This is the same problem as whether we ought rather to benefit a friend or a virtuous man. For if the friend is also good, there is perhaps [5] no great difficulty, if one does not exaggerate the one quality and minimize the other, making him very much of a friend, but not much of a good man. But in other cases many problems arise, e.g. if the one has been but will no longer remain so, and the other will be but is not yet what he is going to be, or the one was but is not, and the other is but has not been and will not be . . .<sup>85</sup> But the other is a harder question. [10] For perhaps Euripides is right in saying, ‘A word is your just pay for a word, but a deed for him who has given deeds’.<sup>86</sup> And one must not do everything for one’s father, but there are some things also one should do for one’s mother, though a father is the better of the two. For, indeed, even to Zeus we do not sacrifice all [15] things, nor does he have all honours but only some. Perhaps, then, there are things which should be rendered to the useful friend and others to the good one; e.g. because a man gives you food and what is necessary, you need not give him your society; nor, therefore, need you give the man to whom you grant your society that which not he but the useful friend gives. Those who doing this give all to the object of their love, when they ought not, are worthless.

[20] And the various definitions of friendship that we give in our discourses all belong to friendship in some sense, but not to the same friendship. To the useful friend applies the fact that one wishes what is good for him, and to a benefactor, and in fact to any kind of friend<sup>87</sup>—for this definition does not distinguish the class of friendship; to another we should wish existence, of another we should wish the society, to the friend on the basis of pleasure sympathy in joy and grief is the proper [25] gift. All these definitions are appropriate to some friendship, but none to a single unique thing, friendship. Hence there are many definitions, and each appears to belong to a single thing, viz. friendship, though really it does not, e.g. the purpose to maintain the friend's existence. For the superior friend and benefactor wishes<sup>88</sup> the existence of that which he has made, and to him who has given one existence one [30] ought to give it in return, but not necessarily one's society; that gift is for the pleasant friend.

Some friends wrong one another; they love rather the things than the possessor of them; and so they love the persons much as they choose wine because it is pleasant, or wealth because it is useful; for wealth is more useful than its owner. Therefore he should not be indignant, as if he had preferred his wealth to him as to [35] something inferior. But the other side complain in turn; for they now look to find in him a good man, when before they looked for one pleasant or useful.

[1244<sup>b</sup>1] **12** · We must also consider about independence and friendship, and the relations they have to one another. For one might doubt whether, if a man be in all respects independent, he will have a friend, if one seeks a friend from want and the [5] good man is perfectly independent.<sup>89</sup> If the possessor of excellence is happy, why should he need a friend? For the independent man neither needs useful people nor people to cheer him, nor society; his own society is enough for him. This is most plain in the case of a god; for it is clear that, needing nothing, he will not need a friend, nor have one, supposing that he does not need one.<sup>90</sup> So that the happiest [10] man will least need a friend, and only as far as it is impossible for him to be independent. Therefore the man who lives the best life must have fewest friends, and they must always be becoming fewer, and he must show no eagerness for men to become his friends, but despise not merely the useful but even men desirable for society. But surely this makes it all the clearer that the friend is not for use or help, [15] but that the friend through excellence<sup>91</sup> is the only



friend. For when we need nothing, then we all seek others to share our enjoyment, those whom we may benefit rather than those who will benefit us. And we judge better when independent than when in want, and most of all we then seek friends worthy to be lived with. But as to [20] this problem, we must see if we have not been partially right, and partially missed the truth owing to our illustration. It will be clear if we ascertain what is life in its active sense and as end. Clearly, it is perception and knowledge, and therefore life in society is perception and knowledge in common. And self-perception and [25] self-knowledge is most desirable to every one, and hence the desire of living is congenital in all; for living must be regarded as a kind of knowledge. If then we were to cut off and abstract mere knowledge and its opposite<sup>92</sup>—this passes unnoticed in [30] the argument as we have given it, but in fact need not remain unnoticed—there would be no difference between this and another's knowing instead of oneself; and this is like another's living instead of oneself. Now naturally the perception and knowledge of oneself is more desirable. For we must take two things into consideration, that life is desirable and also that the good is, and thence that it is [35] desirable that such a nature should belong to oneself<sup>93</sup> as belongs to them. If, then, of such a pair of corresponding series there is always one series of the desirable, and [1245<sup>a</sup>1] the known and the perceived are in general constituted by their participation in the nature of the determined; so that to wish to perceive one's self is to wish oneself to be of a certain definite character,—since, then, we are not in ourselves possessed of [5] each of such characters, but only by participation in these qualities in perceiving and knowing—for the perceiver becomes perceived in that way and in that respect in which he first perceives, and according to the way in which and the object which he perceives; and the knower becomes known in the same way—therefore it is for this reason that one always desires to live, because one always desires to know; and this is because he himself wishes to be the object known. The choice to live with [10] others might seem, from a certain point of view, silly—(first, in the case of things common also to the other animals, e.g. eating together, drinking together; for what is the difference between doing these things in the neighbourhood of others or apart from them, if you take away speech? But even to share in speech of a casual kind [15] does not make the case different. Further, for friends who are self-dependent neither teaching nor learning is possible; for if one learns, he is not as he should be: and if he teaches, his friend is not; and likeness is friendship)—but surely it is obviously so, and all of us find greater pleasure in sharing good things

with friends [20] as far as these come to each—I mean the greatest good one can share; but to some it falls to share in bodily delights, to others in artistic contemplation, to others in philosophy. And the friend must be present too; whence the proverb, ‘distant friends are a burden’, so that men must not be at a distance from one another when there is [25] friendship between them. Hence sensuous love seems like friendship; for the lover aims at the society of his beloved, but not as ideally he ought, but in a merely sensuous way.

The argument, then, says what we have before mentioned, raising difficulties; but the facts are as we saw later, so that it is clear that the objector is in a way misleading us. We must see the truth from what follows: a friend wants to be, in the [30] words of the proverb, ‘another Heracles’, ‘a second self; but he is severed from his friend, and it is hard to find in two people the characteristics of a single individual. But though a friend is by nature what is most akin to his friend, one man is like another in body, and another like him in soul, and one like him in one part of the body or soul, and another like him in another. But none the less does a friend wish to [35] be as it were a separate self. Therefore, to perceive a friend must be in a way to perceive one’s self and to know a friend to know one’s self. So that even the vulgar forms of pleasure and life in the society of a friend are naturally pleasant (for perception of the friend always takes place at the same time), but still more the communion in the diviner pleasures. And the reason is, that it is always pleasanter [1245<sup>b</sup>1] to see one’s self enjoying the superior good. And this is sometimes a passion, sometimes an action, sometimes something else. But if it is pleasant for a man himself to live well and also his friend, and in their common life to engage in mutually helpful activity, their partnership surely would be above all in things included in the end. Therefore, men should contemplate in common and feast in [5] common, only not on the pleasures of food or on necessary pleasures; such society does not<sup>94</sup> seem to be true society, but sensuous enjoyment. But the end which each can attain is that in which he desires the society of another; if that is not possible, men desire to benefit and be benefited by friends in preference to others. Thus it is [10] clear that friends ought to live together, that all wish this above all things, and that the happiest and best man tends especially to do so. But that the contrary appeared as the conclusion of the argument was also reasonable, since the argument said what was true. For it is because of the comparison of the two cases that the solution is not found, the case compared being in itself truly enough stated. For because a [15] god is not such as to need a friend, we claim

the same of the man who resembles a god. But by this reasoning the virtuous man will not even think; for the perfection of a god is not in this, but in being superior to thinking of anything beside himself. The reason is, that with us welfare involves a something beyond us, but the deity is his own well-being.

[20] As to our seeking and praying for many friends, while we say that the man who has many friends has no friend, both are correct. For if it is possible to live with and share the perceptions of many at the same time, it is most desirable that these should be as numerous as possible; but since this is most difficult, the activity of joint perception must exist among fewer. So that it is not only hard to get many friends—for testing is necessary—but also to use them when you have got them. [25]

Sometimes we wish the object of our love to be happy away from us, sometimes to share the same fortune as ourselves; the wish to be together is characteristic of friendship. For if the two can both be together and be happy, all choose this; but if they cannot be both, then we choose as the mother of Heracles might have chosen, [30] i.e. that her son should be a god rather than in her company but a serf to Eurystheus. One might say something like the jesting remark of the Laconian, when some one bade him in a storm to summon the Dioscuri.

It appears to be the mark of one who loves to keep the object of his love from sharing in hardships, but of the beloved to wish to share them; the conduct of both is [35] reasonable. For nothing ought to be so painful to a friend as not to see his friend, but it is thought that he ought not to choose what is for his own interest. Therefore men keep their friends from participation in their calamities; their own suffering is enough, that they may not show themselves studying their own interest, and choosing joy at the cost of a friend's pain, . . .<sup>95</sup> again, being relieved by not bearing [1246<sup>a</sup>1] their troubles alone. But since both well-being and participation are desirable, it is clear that participation with a smaller good is more desirable than to enjoy a greater good in solitude. But since the weight to be attached to participation is not [5] ascertained, men differ, and some think that participation in all things at once is the mark of friendship, e.g. they say that it is better to dine together than separately, though having the same food; yet others would not wish it. And since if one takes extreme cases . . . they agree that they suffer great adversity together or great good fortune apart . . .<sup>96</sup> We have something similar in the case of ill-fortune. For [10] sometimes we wish our friends to be absent and we wish to give them no pain, when they are not going to be of any use to us; at another time we find it pleasantest for them to

be present. But this contradiction is quite reasonable. For this happens in consequence of what we have mentioned above, and because we often simply avoid the sight of a friend in pain or in bad condition, as we should the sight of ourselves so [15] placed; yet to see a friend is as pleasant as anything can be (because of the above-mentioned cause), and to see him not ill if you are ill yourself. So that whichever of these two is the pleasanter decides us whether to wish the friend present or not. This also happens, for the same reason, in the case of the worse sort [20] of men; for they are most anxious that their friends should not fare well nor even exist if they themselves have to fare badly.<sup>97</sup> Therefore some kill the objects of their love with themselves. For they think that if the objects of their love are to survive they would perceive their own trouble more acutely, just as one who remembered that once he had been happy would feel it more than if he thought himself to be [25] always unhappy . . .<sup>98</sup>

13<sup>99</sup> · Here one might raise a question. One can use each thing both for its natural purpose and otherwise, and either *per se* or again *per accidens*, as, for instance, one might use the eye for seeing, and also for falsely seeing by squinting, [30] so that one thing appears as two. Both these uses are due to the eye being an eye, but it was possible to use the eye in another way—*per accidens*, e.g. if one could sell or eat it.<sup>100</sup> Knowledge may be used similarly; it is possible to use it truly or to do what is wrong, e.g. when a man voluntarily writes incorrectly, thus using knowledge as ignorance, like a person using his hand as a foot—dancing-girls sometimes use the [35] foot as a hand and the hand as a foot. If, then, all the excellences are kinds of knowledge, one might use justice also as injustice, and so one would be unjust and do unjust actions from justice, as ignorant things may be done from knowledge. But [1246<sup>b</sup>1] if this is impossible, it is clear that the excellences are not species of knowledge. And even if ignorance cannot proceed from knowledge, but only error and the doing of the same things as proceed from ignorance, it must be remembered that from justice one will not act as from injustice. But since practical wisdom is knowledge [5] and something true, it may behave like knowledge; one might act foolishly though possessed of wisdom, and commit the errors of the foolish. But if the use of each thing as such were single, then in so acting men would still be acting wisely. Over other kinds of knowledge, then, there is something superior that diverts them; but how can there be any knowledge that diverts the highest knowledge of all? There is [10] no longer any knowledge to do this. But neither can excellence do it, for wisdom *uses* that; for the

excellence of the ruling part uses that of the subject. Then what will it be? Perhaps the position is like that of incontinence, which is said to be a vice of the irrational part of the soul, and the incontinent man who has reason but is [15] intemperate. But if so, supposing appetite to be strong it will twist him and he will draw the opposite conclusion. Or is it obvious<sup>101</sup> that if there is excellence in the irrational part, but ignorance in the rational, they are transformed? Thus it will be possible to use justice unjustly<sup>102</sup> and badly, and wisdom foolishly—and therefore the opposite uses will also be possible. For it is absurd that vice occurring sometimes [20] in the irrational part should twist the excellence in the rational part and make the man ignorant, but that excellence in the irrational part, when ignorance is present in the rational, should not divert the latter and make the man judge wisely and as is right, and again, wisdom in the rational part should not make the intemperance in the irrational part act temperately. This seems the very essence of continence. And [25] therefore we shall also get wise action arising out of ignorance. But all these consequences are absurd, especially that of acting wisely out of ignorance, for we certainly do not see this in any other case, e.g. intemperance does not pervert one's medical or grammatical knowledge. But at any rate we may say that not<sup>103</sup> [30] ignorance, if opposite, (for it has no superiority), but excellence is rather related in this way to vice in general. For whatever the just man can do, the unjust can do; and in general powerlessness is covered by power. And so it is clear that wisdom and excellence go together, and that those are states of someone else,<sup>104</sup> and the Socratic saying that nothing is stronger than wisdom is right. But when Socrates said this of knowledge he was wrong. For wisdom is an excellence and not a species of [35] knowledge, but another kind of cognition. . . .<sup>105</sup>

14 · But since not only wisdom and excellence produce well-doing, but we say also that the fortunate do well, thus assuming that good fortune produces well-doing and the same results as knowledge, we must inquire whether it is or is not [1247<sup>a</sup>1] by nature that one man is fortunate, another not, and what is the truth about these things. For that there are fortunate men we see, who though foolish are often successful in matters controlled by fortune. Again, in matters involving art, chance [5] too largely enters, e.g. strategy and navigation. Does their success, then, arise from some mental condition, or do they effect fortunate results not because of their own qualities at all (at present men take the latter view, regarding them as having some special natural endowment); does

nature, rather, make men with different qualities [10] so that they differ from birth; as some are blue-eyed and some black-eyed because they have some particular part of a particular nature,<sup>106</sup> so are some lucky and others unlucky? For that they do not succeed through wisdom is clear, for wisdom is not irrational but can give a reason why it acts as it does; but they could not say why they succeed; that would be art. Further, it is clear that they succeed though foolish, [15] and not about other things—that would not be strange at all, e.g. Hippocrates was a geometer, but in other respects was thought silly and foolish, and once on a voyage was robbed of much money by the customs-collectors at Byzantium, owing to his silliness, as we are told—but foolish in the very business in which they are lucky. [20] For in navigation not the cleverest are the most fortunate, but it is as in throwing dice, where one throws nothing, another throws a high score, according to his natural luck. Or is it because he is loved, as the phrase is, by a god, success being something coming from without, as a worse-built vessel often sails better, not owing [25] to itself but because it has a good pilot? So, the fortunate man has a good pilot, namely, the divinity. But it is absurd that a god or divinity should love such a man and not the best and most wise of men. If, then, success must be due either to nature or intelligence or some sort of protection, and the latter two causes are out of the [30] question, then the fortunate must be so by nature. But, on the other hand, nature is the cause of what is always or for the most part so, fortune the opposite. If, then, it is thought that unexpected success is due to chance, but that, if it is through chance that one is fortunate, the cause of his fortune is not the sort of cause that produces always or usually the same result—further, if a person succeeds or fails because he [35] is a certain sort of man, just as a man sees badly because he is blue-eyed, then it follows that not fortune but nature is the cause; the man then is not fortunate but rather naturally gifted. So we must say that the people we call fortunate are not so through fortune; therefore they are not fortunate, for those goods only are in the [1247<sup>b</sup>1] disposal of fortune of which good fortune is the cause.

But if this is so, shall we say that fortune does not exist at all, or that it exists but is not a cause? No, it must both exist and be a cause. It will, then, also cause good or evil to certain people. But whether it is to be wholly removed, and we ought [5] to say that nothing happens by chance, but *do* say that chance is a cause simply because, though there is some other cause, we do not see it (and therefore, in defining chance, some make it a cause incalculable to human reasoning, taking it to be a genuine reality)—this would be matter for another inquiry. But since we

see people who are fortunate once only, why should they not be fortunate a second [10] time? Because they succeed once, they do so again. The cause is the same. Then this cannot be a matter of chance. But when the same event follows from indefinite and undetermined antecedents, it will be good or evil, but there will not be the science that comes by experience of it, since otherwise some would have learned to be lucky, [15] or even—as Socrates said—all the sciences would have been kinds of good luck. What, then, prevents such things happening to a man often in succession, not because they should, but as, say, dice might continually throw a lucky number? But again, are there not in the soul impulses, some from reason and others from [20] irrational desire, the latter being the earlier? For if the desire arising from appetite for the pleasant is natural, everything would by nature march towards the good. If, then, some have a natural endowment—as musical<sup>107</sup> people, though they have not learned to sing, are fortunately endowed in this way—and move without reason in the direction<sup>108</sup> given them by their nature, and desire that which they ought at the [25] time and in the manner they ought, such men are successful, even if they are foolish and irrational, just as the others will sing<sup>109</sup> well though not able to teach singing. And such men are fortunate, namely those who generally succeed without the aid of reason. Men, then, who are fortunate will be so by nature. Perhaps, however, ‘good fortune’ is a phrase with several senses. For some things are done from impulse and [30] are due to choice, and others not, but the opposite; and if, in the former cases, they succeed where they seem to have reasoned badly, we say that they have been lucky; and again, in the latter cases, if they wished for a different good than they got.<sup>110</sup> Men who are lucky in the former way, then, may be fortunate by nature, for the [35] impulse and the desire was for the right object and succeeded, but the reasoning was silly; and people in this case, when it happens that their reasoning seems incorrect but desire is the cause of their reasoning, are saved by the rightness of their desire;<sup>111</sup> but on another occasion a man reasons again in this way owing to appetite and turns out unfortunate.

But in the other cases how can the good luck be due to a natural goodness in [248<sup>a</sup>1] desire and appetite? But surely the good fortune and chance spoken of here and in the other case are the same, or else there is more than one sort of good fortune, and chance is of two kinds.<sup>112</sup> But since we see some men lucky contrary to all knowledge and right reasonings, it is clear that the cause of luck must be something different from these. But is it luck or not by which<sup>113</sup> a man desires what and when



he ought, [5] though for him<sup>114</sup> human reasoning could not lead to this? For that is not altogether unreasonable, nor is the desire natural, though it is misled by something. The man, then, is thought to have good luck, because luck is the cause of things contrary to reason, and this is contrary to reason (for it is contrary to knowledge and the [10] universal). But probably it does not spring from chance, but seems so for the above reason. So that this argument shows not that good luck is due to nature, but that not all who seem to be lucky are successful owing to chance, but rather owing to nature; nor does it show that fortune is not the cause of anything, but only not of all [15] that it seems to be the cause of. This, however, one might question: whether fortune is the cause of just this, viz. desiring what and when one ought. But will it not in this case be the cause of everything, even of thought and deliberation? For one does not deliberate after previous deliberation which itself presupposed deliberation, but there is some starting-point; nor does one think after thinking previously to [20] thinking, and so *ad infinitum*. Thought, then, is not the starting-point of thinking nor deliberation of deliberation. What, then, can be the starting-point except chance? Thus everything would come from chance. Perhaps there is a starting-point with none other outside it, and this can act in this sort of way by being such as it is. The object of our search is this—what is the commencement of movement in the [25] soul? The answer is clear: as in the universe, so in the soul, it is god. For in a sense the divine element in us moves everything. The starting-point of reasoning is not reasoning, but something greater. What, then, could be greater even than knowledge and intellect but god? For excellence is an instrument of the intellect. And for this reason, as I said a while ago,<sup>115</sup> those are called fortunate who, whatever they [30] start on,<sup>116</sup> succeed in it without being good at reasoning. And deliberation is of no advantage to them, for they have in them a principle that is better than intellect and deliberation, while the others have not this but have intellect; they have inspiration, but they cannot deliberate. For, though lacking reason, they succeed, and like the prudent and wise, their divination is speedy; and we must mark off as included in it [35] all but the judgement that comes from reasoning;<sup>117</sup> in some cases it is due to experience, in others to habituation in the use of reflection; and both experience and habituation use god. This quality sees well the future and the present, and these<sup>118</sup> are the men in whom the reasoning-power is relaxed. Hence we have the melancholic men, the dreamers of what is true. For the moving principle seems to become stronger when the reasoning-power is relaxed. So the blind remember [1248<sup>b</sup>1] better, being



freed from concern with the visible, since their memory is stronger. It is clear, then, that there are two kinds of good luck, the one divine—and so the lucky seem to succeed owing to god—, the other natural. Men of this sort seem to succeed [5] in following their impulse, the others to succeed contrary to their impulse; both are irrational, but the one is persistent good luck, the other not.

15 · About each excellence by itself we have already spoken; now since we have distinguished their natures separately, we must describe clearly the excellence [10] that arises out of the combination of them, what we have already called nobility-and-goodness. That he who truly deserves this denomination must have the separate excellences is clear; it cannot be otherwise with other things either, for no one is healthy in his entire body and yet healthy in no part of it, but the most numerous [15] and important parts, if not all, must be in the same condition as the whole. Now goodness and nobility-and-goodness differ not only in name but also in themselves. For all goods have ends which are to be chosen for their own sake. Of these, we call [20] noble those which, existing all of them for their own sake, are praised. For these are those which are the source of praised acts and are themselves praised, such as justice itself and just acts; also temperate acts,<sup>119</sup> for temperance is praised, but health is not praised, for its effect is not; nor vigorous action, for vigour is not. These [25] are good but not praised. Induction makes this clear about the rest, too. A good man, then, is one for whom the natural goods are good. For the goods men fight for and think the greatest—honour, wealth, bodily excellences, good fortune, and [30] power—are naturally good, but may be to some hurtful because of their dispositions. For neither the foolish nor the unjust nor the intemperate would get any good from the employment of them, any more than an invalid from the food of a healthy man, or one weak and maimed from the equipment of one in health and sound in all limbs. A man is noble and good because those goods which are noble are possessed [35] by him for themselves, and because he practises the noble and for its own sake, the noble being the excellences and the acts that proceed from excellence. There is also the civic disposition, such as the Laconians have, and others like them might have; its nature would be something like this—there are some who think one should have excellence but only for the sake of the natural goods, and so such men are good (for [1249<sup>a</sup>1] the natural goods are good for them), but they have not nobility and goodness. For it is not true of them that they acquire the noble for itself, that they choose acts good and noble at

once<sup>120</sup>—more than this, that what is not noble by nature but good by [5] nature is noble to them; for objects are noble when a man's motives for acting and choosing them are noble, because to the noble and good man the naturally good is noble—for what is just is noble, justice is proportion to merit, and he merits these things; or what is fitting is noble, and to him these things—wealth, high birth, and [10] power—are fitting. So that to the noble and good man things profitable are also noble; but to the many the profitable and the noble do not coincide, for things absolutely good are not good for them as they are for the good man; to the noble and good man they are also noble, for he does many noble deeds by reason of them.<sup>121</sup> But the man [15] who thinks he ought to have the excellences for the sake of external goods does deeds that are noble only *per accidens*. Nobility and goodness, then, is perfect excellence.

About pleasure, too, we have spoken, what it is and in what sense good; we have said that the absolutely pleasant is also noble, and the absolutely good pleasant. But pleasure only arises in action; therefore the truly happy man will also live most pleasantly: that this should be so is no idle demand of man. [20]

But since the doctor has a standard by reference to which he distinguishes what is healthy for the body from what is not, and with reference to which each thing up to a certain point ought to be done and is healthy,<sup>122</sup> while if less or more is done health is the result no longer, so in regard to actions and choice of what is naturally good but not praiseworthy, the good man should have a standard both of disposition and of choice and avoidance with regard to excess or deficiency of [1249<sup>b</sup>1] wealth and good fortune, the standard being—as above said—as reason directs; this corresponds to saying in regard to diet that the standard should be as medical science and its reason direct. But this, though true, is not illuminating. One must, [5] then, here as elsewhere, live with reference to the ruling principle and with reference to the formed habit and<sup>123</sup> the activity of the ruling principle, as the slave must live with reference to that of the master, and each of us by the rule proper to him. But since man is by nature composed of a ruling and a subject part, each of us [10] should live according to the governing element within himself—but this is ambiguous, for medical science governs in one sense, health in another, the former existing for the latter. And so it is with the theoretic faculty; for god is not an imperative ruler, but is the end with a view to which wisdom issues its commands (the word 'end' is ambiguous, and has been distinguished elsewhere), for *god* needs nothing. [15] What choice, then, or possession of the natural goods

—whether bodily goods, wealth, friends, or other things—will most produce the contemplation of god, that choice or possession is best; this is the noblest standard, but any that through deficiency or excess hinders one from the contemplation and service of god is bad; [20] this a man possesses in his soul, and this is the best standard for the soul—to perceive the irrational part of the soul, as such, as little as possible.

So much, then, for the standard of nobility and goodness and the object of the absolute goods. [25]

<sup>1</sup>Omitting τίς.

<sup>2</sup>Reading ἐπειτα for ἐπὶ τό.

<sup>3</sup>Susemihl marks a lacuna.

<sup>4</sup>Excised by Susemihl.

<sup>5</sup>Reading καίτοι for καὶ τότε.

<sup>6</sup>Reading τοῦτο for τοῦ.

<sup>7</sup>Susemihl marks a lacuna.

<sup>8</sup>Reading οὐσία τὸ αὐτό.

<sup>9</sup>Retaining καί.

<sup>10</sup>‘Moral’ translates ἠθικός; the word should be taken in the sense ‘concerned with character’.

<sup>11</sup>ἦθος (‘character’) from ἔθος (‘habit’).

<sup>12</sup>Reading ποι’ ἅττα for ποιότης τά.

<sup>13</sup>Text uncertain.

<sup>14</sup>Excised by Susemihl.

<sup>15</sup>Excised by Susemihl.

<sup>16</sup>Susemihl marks lacunae.

<sup>17</sup>Excised by Susemihl.

<sup>18</sup>Excised by Susemihl.

<sup>19</sup>Susemihl marks a lacuna.

<sup>20</sup>Reading καταλλακτικόν.

<sup>21</sup>Reading αὐτό for αὐτόν.

<sup>22</sup>Reading ἅμα κατὰ.

<sup>23</sup>Reading καὶ αἱ πράξεις for ἡ πράξεις.

<sup>24</sup>The text is uncertain.

<sup>25</sup>Ignoring Susemihl's indication of a lacuna.

<sup>26</sup>Omitting ἐστι.

<sup>27</sup>Reading ἐκούσια (Susemihl's ἀκούσια is a misprint).

<sup>28</sup>Omitting Susemihl's ἥ.

<sup>29</sup>Reading διὰ στροφῆν.

<sup>30</sup>Reading διὰ στροφῆν.

<sup>31</sup>Reading λέγωμεν.

<sup>32</sup>Omitting μεγάλα καί, and reading φοβερὰ. ἡτὰ δὲ φοβερὰά φόβον.

<sup>33</sup>Susemihl marks a lacuna.

<sup>34</sup>See Plato, *Protagoras* 360D.

<sup>35</sup>*Iliad* XXII 100.

<sup>36</sup>Reading ὅτι for ὅτε.

<sup>37</sup>Reading δοκοῦντα for τοιαῦτα.

<sup>38</sup>Reading μέγα γὰρ ἡγεῖσθαι.

<sup>39</sup>Reading τό for τῷ.

<sup>40</sup>Retaining καί.

<sup>41</sup>Reading ἥ for εἰ, and ignoring Susemihl's lacuna.

<sup>42</sup>The text of this clause is uncertain.

<sup>43</sup>Omitting ἐπὶ τό.

<sup>44</sup>Reading ἐστι τῷ for ἐπὶ τό.

<sup>45</sup>Reading ὁ δυνάμενος.

<sup>46</sup>Reading ἀλλήλους, δεῖ φίλους.

<sup>47</sup>Omitting οὔτε.

<sup>48</sup>Reading πᾶσιν for ἡμῖν.

<sup>49</sup>Reading τόσον φίλος ἔστε.

<sup>50</sup>Reading ἕως for ὥς.

<sup>51</sup>Reading ὦ for ὡς.

<sup>52</sup>Reading ἔχει γὰρ ἐπίστασιν πότερον.

<sup>53</sup>Reading ἄνπως for ἀπλως.

<sup>54</sup>Susemihl marks a lacuna.

<sup>55</sup>Reading αὐτῷ, οἶον τό for τὸ καλὸν τοιοῦτον.

<sup>56</sup>Reading τῷ φιλουμένῳ.

<sup>57</sup>Reading εἰ for τί.

<sup>58</sup>Reading ἀγαπητὸν γὰρ τὸ εὖνοεῖν, συζῆν δὲ μή.

<sup>59</sup>Reading τοῦτο τῷ ἄλλῳ ἢ καί.

<sup>60</sup>Retaining οὐκ for ὅτι.

<sup>61</sup>Reading οὐ διὰ.

<sup>62</sup>Ignoring Susemihl's lacuna.

<sup>63</sup>Omitting οὐδέν.

<sup>64</sup>The text at this point is corrupt.

<sup>65</sup>Reading δεῖ for αἰ.

<sup>66</sup>Reading ἀνάγκη ἐνεργοῦντι.

<sup>67</sup>Omitting μή τῷ τὸ εἶναι.

<sup>68</sup>Reading αὐτῷ for αὐτῶ.

<sup>69</sup>Text corrupt.

<sup>70</sup>Susemihl marks a lacuna.

<sup>71</sup>Susemihl marks a lacuna.

<sup>72</sup>Susemihl marks a lacuna.

<sup>73</sup>Reading νοεῖν καὶ for τὸ κινεῖν.

<sup>74</sup>Reading οὐδ' εἰ for οὐ δεῖ.

<sup>75</sup>Reading ταῦτά for ταῦτα.

<sup>76</sup>Reading ὀργέων.

<sup>77</sup>Omitting ἔ τι πολιτεῖαι.

<sup>78</sup>Omitting ἀρίστη.

<sup>79</sup>Reading αὐτό τό for τοῦτο.

<sup>80</sup>Susemihl marks a lacuna.

<sup>81</sup>Text corrupt.

<sup>82</sup>Reading ἦ κατ' ισότητα.

<sup>83</sup>Sophocles, frag. 684 Nauck.

<sup>84</sup>Reading τί ἀντί τίνος for παντί τινος.

<sup>85</sup>Susemihl marks a lacuna.

<sup>86</sup>Frag. 882 Nauck.

<sup>87</sup>Reading ὅποιω δὴ for ὅποῖος δεῖ.

<sup>88</sup>Ignoring Susemihl's lacuna.

<sup>89</sup>Ignoring Susemihl's lacuna, placing a comma after τοῦτω φίλος, and putting a full stop after αὐταρκέστατος.

<sup>90</sup>Reading μηθενός δεομένω for οὔτε μηθέν δεσπότης.

<sup>91</sup>Reading ὁ δι' ἀρετήν.

<sup>92</sup>Ignoring Susemihl's lacuna.

<sup>93</sup>Reading αὐτοῖς for αὐτό τοῖς.

<sup>94</sup>Reading τοιαῦται γάρ οὐχ ὁμιλῖαι.

<sup>95</sup>Susemihl marks a lacuna.

<sup>96</sup>Susemihl marks two lacunae.

<sup>97</sup>Reading ἂν ἀνάγκη for ἀνάγκαι.

<sup>98</sup>Susemihl marks a lacuna.

<sup>99</sup>Susemihl begins a new book here, so that VII 13–15 become VIII 1–3.

<sup>100</sup>The text is uncertain.

<sup>101</sup>Reading ἦ ἔστι δῆλον for ἡ\*\*σφι\*\*δῆλον.

<sup>102</sup>Reading τ' οὐ for τό.

<sup>103</sup>Reading οὐ for ό.

<sup>104</sup>Reading αγαθοί, εκειναι δ' αλλου.

<sup>105</sup>Susemihl marks a lacuna.

<sup>106</sup>Reading τῷ τοδι τοιονδι ε̃ χειν.

<sup>107</sup>Reading ὠδικοί for α̃δικοι.

<sup>108</sup>Reading ἦ ή φύσις.

<sup>109</sup>Reading ῥ̃σσονται for ε̃σσονται.

<sup>110</sup>Reading ε̃βούλοντο α̃λλο ἦ ε̃λαβον.

<sup>111</sup>Reading τυχη̃, ή δ' α̃υτοϋ αιτία ο̃υσα, α̃υτη.

<sup>112</sup>Placing και̃ τυχη̃ διττη̃ after ευ̃τυχίαι.

<sup>113</sup>Reading ἦ for ή̃.

<sup>114</sup>Reading ὦ for \*\*το.

<sup>115</sup>Omitting οί.

<sup>116</sup>Reading ο̃ι ο̃ι̃.

<sup>117</sup>Text uncertain.

<sup>118</sup>Reading ο̃υ̃τοι for ο̃υ̃τος.

<sup>119</sup>Reading αι̃ σω̃φρονες.

<sup>120</sup>Reading κα̃λ̃α̃ κα̃γα̃θα̃ for κα̃λο̃ι̃ κα̃γα̃θο̃ι̃.

<sup>121</sup>Reading δι' α̃υ̃τα̃.

<sup>122</sup>Reading υ̃γι̃εινόν for ε̃υ̃ υ̃γι̃α̃ϊνον.

<sup>123</sup>Reading και̃ for κα̃τα̃.



# ON VIRTUES AND VICES\*\*

*J. Solomon*

[1249<sup>a</sup>25] **1** · The noble is the object of praise, the base of blame: at the head of what is noble stand the excellences, at the head of what is base the vices; the excellences, then, are objects of praise, but so also are the causes of the excellences and their [30] accompaniments and results, the opposites are objects of blame.

If in agreement with Plato we take the soul to have three parts, then wisdom is [1249<sup>b</sup>25] the excellence of the rational, gentleness and bravery of the passionate, temperance and continence of the appetitive; and of the soul as a whole, justice, liberality, and magnanimity. Folly is the vice of the rational, irascibility and cowardice of the [1250<sup>a</sup>1] passionate, intemperance and incontinence of the appetitive; and of the soul as a whole, injustice, illiberality, and small-mindedness.

**2** · Wisdom is an excellence of the rational part capable of procuring all that [5] tends to happiness. Gentleness is an excellence of the passionate part, through which men become difficult to stir to anger. Bravery is an excellence of the passionate part, through which men are difficult to scare by apprehension of death. Temperance is an excellence of the appetitive part, by which men cease to desire [10] bad sensual pleasures. Continence is an excellence of the appetitive part, by which men check by thinking the appetite that rushes to bad pleasures. Justice is an excellence of the soul that distributes to each according to his desert. Liberality is an excellence of the soul ready to spend on noble objects. Magnanimity is an excellence of the soul, by which men are able to bear good and bad fortune, honour [15] and dishonour.

**3** · Folly is a vice of the rational part, causing evil living. Irascibility is a vice of the passionate part, through which men are easily stirred to anger. Cowardice is a vice of the passionate part, through which men are

scared by apprehensions, [20] especially such as relate to death. Intemperance is a vice of the appetitive part, by which men become desirous of bad sensual pleasures. Incontinence is a vice of the appetitive part, through which one chooses bad pleasures, though reason opposes this. Injustice is a vice of the soul, through which men become covetous of more than [25] they deserve. Illiberality is a vice of the soul, through which men aim at gain from every source. Small-mindedness is a vice of the soul, which makes men unable to bear alike good and bad fortune, alike honour and dishonour.

4 · To wisdom belongs right deliberation, right judgement as to what is good [30] and bad and all in life that is to be chosen and avoided, noble use of all the goods that belong to us, correctness in social intercourse, the grasping of the right moment, the sagacious use of word and deed, the possession of experience of all that is useful. Memory, experience, tact, good judgement, sagacity—each of these either [35] arises from wisdom or accompanies it. Or possibly some of them are, as it were, subsidiary causes of wisdom (such as experience and memory), while others are, as it were, parts of it, e.g. good judgement and sagacity.

To gentleness belongs the power to bear with moderation accusations and<sup>1</sup> [40] slights, not to rush hastily to vengeance, not to be easily stirred to anger, to be without bitterness or contentiousness in one's character, to have in one's soul quietude and steadfastness.

To bravery belongs slowness to be scared by apprehensions of death, to be of good courage in dangers and bold in facing risks, and to choose a noble death rather [1250<sup>b</sup>1] than preservation in some base way, and to be the cause of victory. Also it belongs to bravery to labour, to endure, and to play the man. And there accompanies it readiness to dare, high spirits, and confidence; and further, fondness for toil and [5] endurance.

To temperance belongs absence of admiration for the enjoyment of bodily pleasures, absence of desire for all base sensual enjoyment, fear of ill-repute, an ordered course of life, alike in small things and in great. And temperance is [10] accompanied by discipline, orderliness, shame, caution.

5 · To continence belongs the power to restrain by reason the appetite when it rushes to base enjoyment of pleasures, endurance, steadfastness under natural want and pain. [15]

To justice belongs the capacity to distribute to each his deserts, to preserve ancestral customs and laws and also the written law, to be truthful in matters of importance, to observe one's agreements. First among acts of justice come those towards the gods, then those to deified spirits, then those towards one's country and [20] parents, then those towards the departed: amongst these comes piety, which is either a part of justice or an accompaniment of it. Also justice is accompanied by purity, truth, trust, and hatred of wickedness.

To liberality it belongs to be profuse of money on praiseworthy objects, to be [25] generous in spending on a proper purpose, to be helpful and kind in disputed matters,<sup>2</sup> and not to take from improper sources. The liberal man is also clean in his dress and house, ready to provide himself with what is not strictly necessary but [30] beautiful and enjoyable without profit, inclined to keep all animals that have anything peculiar or marvellous about them. Liberality is accompanied by a suppleness and ductility of disposition, by kindness, by pitifulness, by love for friends, for strangers, for what is noble.

[35] It belongs to magnanimity to bear nobly good and bad fortune, honour and dishonour; not to admire luxury or attention or power or victory in contests, but to have a sort of depth and greatness of soul. The magnanimous is one who neither [40] values living highly nor is fond of life, but is in disposition simple and noble, one who can be injured and is not prompt to avenge himself. The accompaniments of magnanimity are simpleness, nobleness, and truth.

6 · To folly it belongs to judge things badly, to deliberate badly, to be bad in social intercourse, to use badly present goods, to think erroneously about what is [1251a1] good and noble as regards life. Folly is accompanied by ignorance, inexperience, incontinence, tactlessness, shortness of memory.

Of irascibility there are three species—promptness to anger, peevishness, [5] sullenness. It is the mark of the irascible man to be unable to bear small slights or defeats, to be ready to punish, prompt at revenge, easily moved to anger by any chance word or deed. The accompaniments of irascibility are a disposition easily excited, ready changes of feeling, attention to small matters, vexation at small [10] things, and all these rapid and on slight occasion.

To cowardice it belongs to be easily moved by chance fears, especially if relating to death or maiming of the body, and to suppose

preservation in any manner to be better than a noble death. Its accompaniments are softness, [15] unmanliness, despair, love of life. Beneath it, however, is a sort of caution of disposition and slowness to quarrel.

To intemperance it belongs to choose the enjoyments of hurtful and base pleasures, to suppose that those living in such pleasures are in the highest sense [20] happy, to love laughter, jeering, wit, and levity in word and deed. Its accompaniments are indiscipline, shamelessness, disorder, luxury, ease, negligence, contempt, dissipation.

To incontinence it belongs to choose the enjoyment of pleasures though reason [25] forbids, to partake of them none the less though believing it to be better not to partake of them, and while thinking one ought to do what is noble and profitable still to abstain from these for the sake of pleasures. The accompaniments of incontinence are effeminacy, negligence, and generally the same as those of intemperance.

[30] **7** · Of injustice there are three species—impiety, greed, outrage. Impiety is wrong-doing towards gods, deified spirits, the departed, one's parents, and one's country. Greed is wrong-doing in regard to agreements, claiming a share of the object in dispute beyond one's deserts. Outrage occurs when in providing pleasure [35] for oneself one brings shame on others, whence Evenus says of it: 'That which while gaining nothing still wrongs another'. It belongs to injustice to violate ancestral customs and laws, to disobey enactments and rulers, to lie, to commit perjury, to violate agreements and pledges. The accompaniments of injustice are quibbling, [1251<sup>b</sup>1] boasting, unsociability, pretence, malignity, unscrupulousness.

Of illiberality there are three species, pursuit of disgraceful gain, parsimony, stinginess: pursuit of disgraceful gain, in so far as such men seek gain from all [5] sources and think more of the profit than of the shame; parsimony, in so far as they are unready to spend money on a suitable purpose; stinginess, in so far as, while spending, they spend in small sums and badly, and are more hurt than profited from not spending in season. It belongs to illiberality to value money above everything, [10] and to think no reproach can ever attach to what yields a profit. The life of the illiberal man is servile, suited to a slave, and sordid, remote from ambition and liberality. The accompaniments of illiberality are pettiness, sullenness, small-mindedness, [15] self-humiliation, lack of measure, ignobility, misanthropy.

It belongs to small-mindedness to be able to bear neither honour nor dishonour, neither good nor ill fortune, but to grow braggart when honoured, to be elated at small prosperities, to be unable to bear even the smallest deprivation of honour, to regard any ill-success whatever as a great misfortune, to complain and to [20] be impatient over everything. Further, the small-minded man is such as to call every slight an outrage and a dishonour, even such as are inflicted through ignorance or forgetfulness. The accompaniments of small-mindedness are pettiness, grumbling, hopelessness, self-humiliation. [25]

8 · In general it belongs to excellence to make the condition of the soul good, using quiet and ordered motions and in agreement with itself throughout all its parts: whence the condition of a good soul seems a pattern of a good political constitution. It belongs also to excellence to do good to the worthy, to love the good; [30] not to be prompt either to chastise or seek vengeance, but to be complaisant, kindly, and forgiving. Its accompaniments are worth, equity, indulgence, good hope, and further all such qualities as love of home, love of friends, love of comrades, love of [35] strangers, love of men, love of the noble: all these qualities are among the laudable. The marks of vice are the opposites, and its accompaniments the opposites; and all these marks and accompaniments of vice belong to the class of the blameable.

**\*\*TEXT:** F. Susemihl, Teubner, Leipzig, 1884

<sup>1</sup>Omitting μετρίας.

<sup>2</sup>Omitting Susemihl's καὶ φιλόανθρωπον.

# POLITICS\*\*

*B. Jowett*

## BOOK I

[1252<sup>a</sup>1] **1** · Every state is a community of some kind, and every community is established with a view to some good; for everyone always acts in order to obtain that which they think good. But, if all communities aim at some good, the state or [5] political community, which is the highest of all, and which embraces all the rest, aims at good in a greater degree than any other, and at the highest good.

Some people think that the qualifications of a statesman, king, householder, [10] and master are the same, and that they differ, not in kind, but only in the number of their subjects. For example, the ruler over a few is called a master; over more, the manager of a household; over a still larger number, a statesman or king, as if there were no difference between a great household and a small state. The distinction which is made between the king and the statesman is as follows: When the [15] government is personal, the ruler is a king; when, according to the rules of the political science, the citizens rule and are ruled in turn, then he is called a statesman.

But all this is a mistake, as will be evident to any one who considers the matter according to the method which has hitherto guided us. As in other departments of science, so in politics, the compound should always be resolved into the simple elements or least parts of the whole. We must therefore look at the elements of [20] which the state is composed, in order that we may see in what the different kinds of rule differ from one another, and whether any scientific result can be attained about each one of them.

**2** · He who thus considers things in their first growth and origin,

whether a [25] state or anything else, will obtain the clearest view of them. In the first place there must be a union of those who cannot exist without each other; namely, of male and female, that the race may continue (and this is a union which is formed, not of choice, but because, in common with other animals and with plants, mankind have a [30] natural desire to leave behind them an image of themselves), and of natural ruler and subject, that both may be preserved. For that which can foresee by the exercise of mind is by nature lord and master, and that which can with its body give effect to such foresight is a subject, and by nature a slave; hence master and slave have the same interest. Now nature has distinguished between the female and the slave. For [1252<sup>b</sup>1] she is not niggardly, like the smith who fashions the Delphian knife for many uses; she makes each thing for a single use, and every instrument is best made when intended for one and not for many uses. But among barbarians no distinction is [5] made between women and slaves, because there is no natural ruler among them: they are a community of slaves, male and female. That is why the poets say,—

It is meet that Hellenes should rule over barbarians;

as if they thought that the barbarian and the slave were by nature one.

Out of these two relationships the first thing to arise is the family, and Hesiod [10] is right when he says,—

First house and wife and an ox for the plough,

for the ox is the poor man's slave. The family is the association established by nature for the supply of men's everyday wants, and the members of it are called by Charondas, 'companions of the cupboard', and by Epimenides the Cretan, 'companions [15] of the manger'. But when several families are united, and the association aims at something more than the supply of daily needs, the first society to be formed is the village. And the most natural form of the village appears to be that of a colony from the family, composed of the children and grandchildren, who are said to be 'suckled with the same milk'. And this is the reason why Hellenic states were originally governed by kings; because the Hellenes were under royal rule before they came together, as the barbarians still are. Every family is ruled by the eldest, [20] and therefore in the colonies of the family the kingly form of government prevailed because they were of the same blood. As Homer says:

Each one gives law to his children and to his wives.



For they lived dispersedly, as was the manner in ancient times. That is why men say that the Gods have a king, because they themselves either are or were in ancient [25] times under the rule of a king. For they imagine not only the forms of the Gods but their ways of life to be like their own.

When several villages are united in a single complete community, large enough to be nearly or quite self-sufficing, the state comes into existence, originating in the bare needs of life, and continuing in existence for the sake of a good life. And [30] therefore, if the earlier forms of society are natural, so is the state, for it is the end of them, and the nature of a thing is its end. For what each thing is when fully developed, we call its nature, whether we are speaking of a man, a horse, or a family. Besides, the final cause and end of a thing is the best, and to be self-sufficing [1253<sup>a</sup>1] is the end and the best.

Hence it is evident that the state is a creation of nature, and that man is by nature a political animal. And he who by nature and not by mere accident is without a state, is either a bad man or above humanity; he is like the

Tribeless, lawless, hearthless one,

[5] whom Homer denounces—the natural outcast is forthwith a lover of war; he may be compared to an isolated piece at draughts.

Now, that man is more of a political animal than bees or any other gregarious animals is evident. Nature, as we often say, makes nothing in vain, and man is the [10] only animal who has the gift of speech. And whereas mere voice is but an indication of pleasure or pain, and is therefore found in other animals (for their nature attains to the perception of pleasure and pain and the intimation of them to one another, and no further), the power of speech is intended to set forth the [15] expedient and inexpedient, and therefore likewise the just and the unjust. And it is a characteristic of man that he alone has any sense of good and evil, of just and unjust, and the like, and the association of living beings who have this sense makes a family and a state.

Further, the state is by nature clearly prior to the family and to the individual, [20] since the whole is of necessity prior to the part; for example, if the whole body be destroyed, there will be no foot or hand, except homonymously, as we might speak of a stone hand; for when destroyed the hand will be no better than that. But things are defined by their function and power; and we ought not to say that they are the same

when they no longer have their proper quality, but only that they are [25] homonymous. The proof that the state is a creation of nature and prior to the individual is that the individual, when isolated, is not self-sufficing; and therefore he is like a part in relation to the whole. But he who is unable to live in society, or who has no need because he is sufficient for himself, must be either a beast or a god: he is [30] no part of a state. A social instinct is implanted in all men by nature, and yet he who first founded the state was the greatest of benefactors. For man, when perfected, is the best of animals, but, when separated from law and justice, he is the worst of all; since armed injustice is the more dangerous, and he is equipped at birth with arms, [35] meant to be used by intelligence and excellence, which he may use for the worst ends. That is why, if he has not excellence, he is the most unholy and the most savage of animals, and the most full of lust and gluttony. But justice is the bond of men in states; for the administration of justice, which is the determination of what is just, is the principle of order in political society.

[1253<sup>b</sup>1] **3** · Seeing then that the state is made up of households, before speaking of the state we must speak of the management of the household. The parts of household management correspond to the persons who compose the household, and a complete household consists of slaves and freemen. Now we should begin by [5] examining everything in its fewest possible elements; and the first and fewest possible parts of a family are master and slave, husband and wife, father and children. We have therefore to consider what each of these three relations is and ought to be:—I mean the relation of master and servant, the marriage relation (the [10] conjunction of man and wife has no name of its own), and thirdly, the paternal relation (this also has no proper name). And there is another element of a household, the so-called art of getting wealth, which, according to some, is identical with household management, according to others, a principal part of it; the nature of this art will also have to be considered by us.

Let us first speak of master and slave, looking to the needs of practical life and [15] also seeking to attain some better theory of their relation than exists at present. For some are of the opinion that the rule of a master is a science, and that the management of a household, and the mastership of slaves, and the political and royal rule, as I was saying at the outset, are all the same. Others affirm that the rule [20] of a master over slaves is contrary to nature, and that the distinction between slave

and freeman exists by convention only, and not by nature; and being an interference with nature is therefore unjust.

4 · Property is a part of the household, and the art of acquiring property is a part of the art of managing the household; for no man can live well, or indeed live at [25] all, unless he is provided with necessities. And as in the arts which have a definite sphere the workers must have their own proper instruments for the accomplishment of their work, so it is in the management of a household. Now instruments are of various sorts; some are living, others lifeless; in the rudder, the pilot of a ship has a lifeless, in the look-out man, a living instrument; for in the arts the servant is a kind [30] of instrument. Thus, too, a possession is an instrument for maintaining life. And so, in the arrangement of the family, a slave is a living possession, and property a number of such instruments; and the servant is himself an instrument for instruments. For if every instrument could accomplish its own work, obeying or anticipating the will of others, like the statues of Daedalus, or the tripods of [35] Hephaestus, which, says the poet,

of their own accord entered the assembly of the Gods;

if, in like manner, the shuttle would weave and the plectrum touch the lyre, chief workmen would not want servants, nor masters slaves. Now the instruments [1254<sup>a</sup>1] commonly so called are instruments of production, whilst a possession is an instrument of action. From a shuttle we get something else besides the use of it, whereas of a garment or of a bed there is only the use. Further, as production and [5] action are different in kind, and both require instruments, the instruments which they employ must likewise differ in kind. But life is action and not production, and therefore the slave is the minister of action. Again, a possession is spoken of as a part is spoken of; for the part is not only a part of something else, but wholly belongs [10] to it; and this is also true of a possession. The master is only the master of the slave; he does not belong to him, whereas the slave is not only the slave of his master, but wholly belongs to him. Hence we see what is the nature and office of a slave; he who is by nature not his own but another's man, is by nature a slave; and he may be said [15] to be another's man who, being a slave, is also a possession. And a possession may be defined as an instrument of action, separable from the possessor.

5 · But is there any one thus intended by nature to be a slave, and for whom such a condition is expedient and right, or rather is not all slavery a violation of nature?

[20] There is no difficulty in answering this question, on grounds both of reason and of fact. For that some should rule and others be ruled is a thing not only necessary, but expedient; from the hour of their birth, some are marked out for subjection, others for rule.

And there are many kinds both of rulers and subjects (and that rule is the [25] better which is exercised over better subjects—for example, to rule over men is better than to rule over wild beasts; for the work is better which is executed by better workmen, and where one man rules and another is ruled, they may be said to have a work); for in all things which form a composite whole and which are made up [30] of parts, whether continuous or discrete, a distinction between the ruling and the subject element comes to light. Such a duality exists in living creatures, originating from nature as a whole; even in things which have no life there is a ruling principle, as in a musical mode. But perhaps this is matter for a more popular investigation. A living creature consists in the first place of soul and body, and of these two, the one [35] is by nature the ruler and the other the subject. But then we must look for the intentions of nature in things which retain their nature, and not in things which are corrupted. And therefore we must study the man who is in the most perfect state both of body and soul, for in him we shall see the true relation of the two; although [1254<sup>b</sup>1] in bad or corrupted natures the body will often appear to rule over the soul, because they are in an evil and unnatural condition. At all events we may firstly observe in living creatures both a despotical and a constitutional rule; for the soul rules the [5] body with a despotical rule, whereas the intellect rules the appetites with a constitutional and royal rule. And it is clear that the rule of the soul over the body, and of the mind and the rational element over the passionate, is natural and expedient; whereas the equality of the two or the rule of the inferior is always [10] hurtful. The same holds good of animals in relation to men; for tame animals have a better nature than wild and all tame animals are better off when they are ruled by man; for then they are preserved. Again, the male is by nature superior, and the female inferior; and the one rules, and the other is ruled; this principle, of necessity, [15] extends to all mankind. Where then there is such a difference as that between soul and body, or between men and animals (as in the case of those whose business is to use their body, and who can

do nothing better), the lower sort are by nature slaves, [20] and it is better for them as for all inferiors that they should be under the rule of a master. For he who can be, and therefore is, another's, and he who participates in reason enough to apprehend, but not to have, is a slave by nature. Whereas the lower animals cannot even apprehend reason;<sup>1</sup> they obey their passions. And indeed the use made of slaves and of tame animals is not very different; for both with their [25] bodies minister to the needs of life. Nature would like to distinguish between the bodies of freemen and slaves, making the one strong for servile labour, the other [30] upright, and although useless for such services, useful for political life in the arts both of war and peace. But the opposite often happens—that some have the souls and others have the bodies of freemen. And doubtless if men differed from one another in the mere forms of their bodies as much as the statues of the Gods do from [35] men, all would acknowledge that the inferior class should be slaves of the superior. And if this is true of the body, how much more just that a similar distinction should exist in the soul? But the beauty of the body is seen, whereas the beauty of the soul is not seen. It is clear, then, that some men are by nature free, and others slaves, and [1255a1] that for these latter slavery is both expedient and right.

6 · But that those who take the opposite view have in a certain way right on their side, may be easily seen. For the words slavery and slave are used in two senses. [5] There is a slave or slavery by convention as well as by nature. The convention is a sort of agreement—the convention by which whatever is taken in war is supposed to belong to the victors. But this right many jurists impeach, as they would an orator who brought forward an unconstitutional measure: they detest the notion that, because one man has the power of doing violence and is superior in brute strength, [10] another shall be his slave and subject. Even among philosophers there is a difference of opinion. The origin of the dispute, and what makes the views invade each other's territory, is as follows: in some sense excellence, when furnished with means, has actually the greatest power of exercising force: and as superior power is only found [15] where there is superior excellence of some kind, power seems to imply excellence, and the dispute to be simply one about justice (for it is due to one party identifying<sup>2</sup> justice with goodwill, while the other identifies it with the mere rule of the stronger). If these views are thus set out separately, the other views have no force or [20] plausibility against the view that the superior in excellence ought to rule, or be master.

Others, clinging, as they think, simply to a principle of justice (for convention is a sort of justice), assume that slavery in accordance with the custom of war is just, but at the same moment they deny this. For what if the cause of the war be unjust? And again, no one would ever say that he is a slave who is unworthy to be [25] a slave. Were this the case, men of the highest rank would be slaves and the children of slaves if they or their parents chanced to have been taken captive and sold. That is why people do not like to call themselves slaves, but confine the term to foreigners. Yet, in using this language, they really mean the natural slave of whom we spoke at first; for it must be admitted that some are slaves everywhere, others nowhere. The [30] same principle applies to nobility. People regard themselves as noble everywhere, and not only in their own country, but they deem foreigners noble only when at home, thereby implying that there are two sorts of nobility and freedom, the one absolute, the other relative. The Helen of Theodectes says: [35]

Who would presume to call me servant who am on both sides sprung  
from the stem of the Gods?

What does this mean but that they distinguish freedom and slavery, noble and [1255<sup>b</sup>1] humble birth, by the two principles of good and evil? They think that as men and animals beget men and animals, so from good men a good man springs. Nature intends to do this often but cannot.

[5] We see then that there is some foundation for this difference of opinion, and that all are not either slaves by nature or freemen by nature, and also that there is in some cases a marked distinction between the two classes, rendering it expedient and right for the one to be slaves and the others to be masters: the one practising obedience, the others exercising the authority and lordship which nature intended [10] them to have. The abuse of this authority is injurious to both; for the interests of part and whole, of body and soul, are the same, and the slave is a part of the master, a living but separated part of his bodily frame. Hence, where the relation of master and slave between them is natural they are friends and have a common interest, but [15] where it rests merely on convention and force the reverse is true.

7 · The previous remarks are quite enough to show that the rule of a master is not a constitutional rule, and that all the different kinds of rule are not, as some affirm, the same as each other. For there is one rule

exercised over subjects who are by nature free, another over subjects who are by nature slaves. The rule of a household is a monarchy, for every house is under one head: whereas constitutional [20] rule is a government of freemen and equals. The master is not called a master because he has science, but because he is of a certain character, and the same remark applies to the slave and the freeman. Still there may be a science for the master and a science for the slave. The science of the slave would be such as the man [25] of Syracuse taught, who made money by instructing slaves in their ordinary duties. And such a knowledge may be carried further, so as to include cookery and similar menial arts. For some duties are of the more necessary, others of the more honourable sort; as the proverb says, 'slave before slave, master before master'. But [30] all such branches of knowledge are servile. There is likewise a science of the master, which teaches the use of slaves; for the master as such is concerned, not with the acquisition, but with the use of them. Yet this science is not anything great or wonderful; for the master need only know how to order that which the slave must [35] know how to execute. Hence those who are in a position which places them above toil have stewards who attend to their households while they occupy themselves with philosophy or with politics. But the art of acquiring slaves, I mean of justly acquiring them, differs both from the art of the master and the art of slave, being a species of hunting or war. Enough of the distinction between master and slave.

[1256<sup>a</sup>1] **8** · Let us now inquire into property generally, and into the art of getting wealth, in accordance with our usual method, for a slave has been shown to be a part of property. The first question is whether the art of getting wealth is the same as the [5] art of managing a household or a part of it, or instrumental to it; and if the last, whether in the way that the art of making shuttles is instrumental to the art of weaving, or in the way that the casting of bronze is instrumental to the art of the statuary, for they are not instrumental in the same way, but the one provides tools and the other material; and by material I mean the substratum out of which any work is made; thus wool is the material of the weaver, bronze of the statuary. Now it is easy to see that the art of household management is not identical with the art of [10] getting wealth, for the one uses the material which the other provides. For the art which uses household stores can be no other than the art of household management. There is, however, a doubt whether the art of getting wealth is a part of household management or a distinct art. If the getter

of wealth has to consider whence wealth [15] and property can be procured, but there are many sorts of property and riches, then are husbandry, and the care and provision of food in general, parts of the art of household management or distinct arts? Again, there are many sorts of food, and therefore there are many kinds of lives both of animals and men; they must all have [20] food, and the differences in their food have made differences in their ways of life. For of beasts, some are gregarious, others are solitary; they live in the way which is best adapted to sustain them, accordingly as they are carnivorous or herbivorous or [25] omnivorous: and their habits are determined for them by nature with regard to their ease and choice of food. But the same things are not naturally pleasant to all of them; and therefore the lives of carnivorous or herbivorous animals further differ among themselves. In the lives of men too there is a great difference. The laziest are [30] shepherds, who lead an idle life, and get their subsistence without trouble from tame animals; their flocks having to wander from place to place in search of pasture, they are compelled to follow them, cultivating a sort of living farm. Others support [35] themselves by hunting, which is of different kinds. Some, for example, are brigands, others, who dwell near lakes or marshes or rivers or a sea in which there are fish, are fishermen, and others live by the pursuit of birds or wild beasts. The greater number obtain a living from the cultivated fruits of the soil. Such are the modes of [40] subsistence which prevail among those whose industry springs up of itself, and whose food is not acquired by exchange and retail trade—there is the shepherd, the [1256<sup>b</sup>1] husbandman, the brigand, the fisherman, the hunter. Some gain a comfortable maintenance out of two employments, eking out the deficiencies of one of them by another: thus the life of a shepherd may be combined with that of a brigand, the life [5] of a farmer with that of a hunter. Other modes of life are similarly combined in any way which the needs of men may require. Property, in the sense of a bare livelihood, seems to be given by nature herself to all, both when they are first born, and when [10] they are grown up. For some animals bring forth, together with their offspring, so much food as will last until they are able to supply themselves; of this the vermiparous or oviparous animals are an instance; and the viviparous animals have up to a certain time a supply of food for their young in themselves, which is called milk. In like manner we may infer that, after the birth of animals, plants exist for [15] their sake, and that the other animals exist for the sake of man,<sup>3</sup> the tame for use and food, the wild, if not all, at least the greater part of them, for food, and for the provision of clothing and



various instruments. Now if nature makes nothing [20] incomplete, and nothing in vain, the inference must be that she has made all animals for the sake of man. And so, from one point of view, the art of war is a natural art of acquisition, for the art of acquisition includes hunting, an art which we ought to practise against wild beasts, and against men who, though intended by [25] nature to be governed, will not submit; for war of such a kind is naturally just.

Of the art of acquisition then there is one kind which by nature is a part of the management of a household, in so far as the art of household management must either find ready to hand, or itself provide, such things necessary to life, and useful [30] for the community of the family or state, as can be stored. They are the elements of true riches; for the amount of property which is needed for a good life is not unlimited, although Solon in one of his poems says that

No bound to riches has been fixed for man.

But there is a boundary fixed, just as there is in the other arts; for the instruments of [35] any art are never unlimited, either in number or size, and riches may be defined as a number of instruments to be used in a household or in a state. And so we see that there is a natural art of acquisition which is practised by managers of households and by statesmen, and the reason for this.

[40] **9** · There is another variety of the art of acquisition which is commonly and rightly called an art of wealth-getting, and has in fact suggested the notion that [1257<sup>a</sup>1] riches and property have no limit. Being nearly connected with the preceding, it is often identified with it. But though they are not very different, neither are they the same. The kind already described is given by nature, the other is gained by [5] experience and art.

Let us begin our discussion of the question with the following considerations. Of everything which we possess there are two uses: both belong to the thing as such, but not in the same manner, for one is the proper, and the other the improper use of [10] it. For example, a shoe is used for wear, and is used for exchange; both are uses of the shoe. He who gives a shoe in exchange for money or food to him who wants one, does indeed use the shoe as a shoe, but this is not its proper use, for a shoe is not made to be an object of barter. The same may be said of all possessions, for the art [15] of exchange extends to all of them, and it

arises at first from what is natural, from the circumstance that some have too little, others too much. Hence we may infer that retail trade is not a natural part of the art of getting wealth; had it been so, men would have ceased to exchange when they had enough. In the first community, [20] indeed, which is the family, this art is obviously of no use, but it begins to be useful when the society increases. For the members of the family originally had all things in common; later, when the family divided into parts, the parts shared in many things, and different parts in different things, which they had to give in exchange [25] for what they wanted, a kind of barter which is still practised among barbarous nations who exchange with one another the necessaries of life and nothing more; giving and receiving wine, for example, in exchange for corn, and the like. This sort of barter is not part of the wealth-getting art and is not contrary to nature, but is [30] needed for the satisfaction of men's natural wants. The other form of exchange grew, as might have been inferred, out of this one. When the inhabitants of one country became more dependent on those of another, and they imported what they needed, and exported what they had too much of, money necessarily came into use. For the various necessaries of life are not easily carried about, and hence men agreed to employ in their dealings with each other something which was intrinsically [35] useful and easily applicable to the purposes of life, for example, iron, silver, and the like. Of this the value was at first measured simply by size and weight, but in process of time they put a stamp upon it, to save the trouble of weighing and to [40] mark the value.

When the use of coin had once been discovered, out of the barter of necessary [1257<sup>b</sup>1] articles arose the other art of wealth-getting, namely, retail trade; which was at first probably a simple matter, but became more complicated as soon as men learned by experience whence and by what exchanges the greatest profit might be made. Originating in the use of coin, the art of getting wealth is generally thought to be [5] chiefly concerned with it, and to be the art which produces riches and wealth, having to consider how they may be accumulated. Indeed, riches is assumed by many to be only a quantity of coin, because the arts of getting wealth and retail trade are concerned with coin. Others maintain that coined money is a mere sham, a [10] thing not natural, but conventional only, because, if the users substitute another commodity for it, it is worthless, and because it is not useful as a means to any of the necessities of life, and, indeed, he who is rich in coin may often be in want of necessary food. But how can that be wealth of which a man may have a great abundance and yet perish with hunger, like Midas in the

fable, whose insatiable [15] prayer turned everything that was set before him into gold?

Hence men seek after a better notion of riches and of the art of getting wealth, and they are right. For natural riches and the natural art of wealth-getting are a different thing; in their true form they are part of the management of a household; [20] whereas retail trade is the art of producing wealth, not in every way, but by exchange. And it is thought to be concerned with coin; for coin is the unit of exchange and the limit of it. And there is no bound to the riches which spring from this art of wealth-getting. As in the art of medicine there is no limit to the pursuit of [25] health, and as in the other arts there is no limit to the pursuit of their several ends, for they aim at accomplishing their ends to the uttermost (but of the means there is a limit, for the end is always the limit), so, too, in this art of wealth-getting there is no limit of the end, which is riches of the spurious kind, and the acquisition of [30] wealth. But the art of wealth-getting which consists in household management, on the other hand, has a limit;<sup>4</sup> the unlimited acquisition of wealth is not its business. And, therefore, from one point of view, all riches must have a limit; nevertheless, as a matter of fact, we find the opposite to be the case; for all getters of wealth increase their hoard of coin without limit. The source of the confusion is the near connexion [35] between the two kinds of wealth-getting; in both, the instrument is the same, although the use is different, and so they pass into one another; for each is a use of the same property, but with a difference: accumulation is the end in the one case, but there is a further end in the other. Hence some persons are led to believe that getting wealth is the object of household management, and the whole idea of their [40] lives is that they ought either to increase their money without limit, or at any rate not to lose it. The origin of this disposition in men is that they are intent upon living [1258<sup>a</sup>1] only, and not upon living well; and, as their desires are unlimited, they also desire that the means of gratifying them should be without limit. Those who do aim at a good life seek the means of obtaining bodily pleasures; and, since the enjoyment of [5] these appears to depend on property, they are absorbed in getting wealth: and so there arises the second species of wealth-getting. For, as their enjoyment is in excess, they seek an art which produces the excess of enjoyment; and, if they are not able to supply their pleasures by the art of getting wealth, they try other causes, [10] using in turn every faculty in a manner contrary to nature. The quality of courage, for example, is not intended to make wealth, but to inspire confidence; neither is this the aim of the general's or of the

physician's art; but the one aims at victory and the other at health. Nevertheless, some men turn every quality or art into a means of getting wealth; this they conceive to be the end, and to the promotion of the end they think all things must contribute.

[15] Thus, then, we have considered the art of wealth-getting which is unnecessary, and why men want it; and also the necessary art of wealth-getting, which we have seen to be different from the other, and to be a natural part of the art of managing a household, concerned with the provision of food, not, however, like the former kind, unlimited, but having a limit.

10 · And we have found the answer to our original question, Whether the art [20] of getting wealth is the business of the manager of a household and of the statesman or not their business?—viz. that wealth is presupposed by them. For as political science does not make men, but takes them from nature and uses them, so too nature provides them with earth or sea or the like as a source of food. At this stage [25] begins the duty of the manager of a household, who has to order the things which nature supplies—he may be compared to the weaver who has not to make but to use wool, and to know, too, what sort of wool is good and serviceable or bad and unserviceable. Were this otherwise, it would be difficult to see why the art of getting wealth is a part of the management of a household and the art of medicine not; for [30] surely the members of a household must have health just as they must have life or any other necessity. The answer is that as from one point of view the master of the house and the ruler of the state have to consider about health, from another point of view not they but the physician has to; so in one way the art of household management, in another way the subordinate art, has to consider about wealth. But, strictly speaking, as I have already said, the means of life must be provided [35] beforehand by nature; for the business of nature is to furnish food to that which is born, and the food of the offspring is always what remains over of that from which it is produced. That is why the art of getting wealth out of fruits and animals is always natural.

There are two sorts of wealth-getting, as I have said; one is a part of household management, the other is retail trade: the former is necessary and honourable, while that which consists in exchange is justly censured; for it is unnatural, and a [1258<sup>b</sup>1] mode by which men gain from one another. The most hated sort, and with the greatest reason, is usury,

which makes a gain out of money itself, and not from the natural object of it. For money was intended to be used in exchange, but not to increase at interest. And this term interest, which means the birth of money from [5] money, is applied to the breeding of money because the offspring resembles the parent. That is why of all modes of getting wealth this is the most unnatural.

11 · Enough has been said about the theory of wealth-getting; we will now proceed to the practical part. Such things may be studied by a free man, but will [10] only be practised from necessity. The useful parts of wealth-getting are, first, the knowledge of live-stock—which are most profitable, and where, and how—as for example, what sort of horses or sheep or oxen or any other animals are most likely to give a return. A man ought to know which of these pay better than others, and [15] which pay best in particular places, for some do better in one place and some in another. Secondly, husbandry, which may be either tillage or planting, and the keeping of bees and of fish, or fowl, or of any animals which may be useful to man. [20] These are the divisions of the true or proper art of wealth-getting and come first. Of the other, which consists in exchange, the first and most important division is commerce (of which there are three kinds—ship-owning, the conveyance of goods, exposure for sale—these again differing as they are safer or more profitable), the second is usury, the third, service for hire—of this, one kind is employed in the [25] mechanical arts, the other in unskilled and bodily labour. There is still a third sort of wealth-getting intermediate between this and the first or natural mode which is partly natural, but is also concerned with exchange, viz. the industries that make their profit from the earth, and from things growing from the earth which, although [30] they bear no fruit, are nevertheless profitable; for example, the cutting of timber and all mining. The art of mining itself has many branches, for there are various kinds of things dug out of the earth. Of the several divisions of wealth-getting I now speak generally; a minute consideration of them might be useful in practice, but it [35] would be tiresome to dwell upon them at greater length now.

Those occupations are most truly arts in which there is the least element of chance; they are the meanest in which the body is most maltreated, the most servile in which there is the greatest use of the body, and the most illiberal in which there is the least need of excellence.

Works have been written upon these subjects by various persons; for

example, by Chares the Parian, and Apollodorus the Lemnian, who have treated of Tillage [1259<sup>a</sup>1] and Planting, while others have treated of other branches; anyone who cares for such matters may refer to their writings. It would be well also to collect the scattered stories of the ways in which individuals have succeeded in amassing a [5] fortune; for all this is useful to persons who value the art of getting wealth. There is the anecdote of Thales the Milesian and his financial scheme, which involves a principle of universal application, but is attributed to him on account of his reputation for wisdom. He was reproached for his poverty, which was supposed to [10] show that philosophy was of no use. According to the story, he knew by his skill in the stars while it was yet winter that there would be a great harvest of olives in the coming year; so, having a little money, he gave deposits for the use of all the olive-presses in Chios and Miletus, which he hired at a low price because no one bid [15] against him. When the harvest-time came, and many were wanted all at once and of a sudden, he let them out at any rate which he pleased, and made a quantity of money. Thus he showed the world that philosophers can easily be rich if they like, but that their ambition is of another sort. He is supposed to have given a striking [20] proof of his wisdom, but, as I was saying, his scheme for getting wealth is of universal application, and is nothing but the creation of a monopoly. It is an art often practised by cities when they are in want of money; they make a monopoly of provisions.

There was a man of Sicily, who, having money deposited with him, bought up [25] all the iron from the iron mines; afterwards, when the merchants from their various markets came to buy, he was the only seller, and without much increasing the price he gained 200 per cent. Which when Dionysius heard, he told him that he might [30] take away his money, but that he must not remain at Syracuse, for he thought that the man had discovered a way of making money which was injurious to his own interests. He made the same discovery as Thales; they both contrived to create a monopoly for themselves. And statesmen as well ought to know these things; for a state is often as much in want of money and of such schemes for obtaining it as a [35] household, or even more so; hence some public men devote themselves entirely to finance.

12 · Of household management we have seen that there are three parts—one is the rule of a master over slaves, which has been discussed already, another of a father, and the third of a husband. A husband and

father, we, saw, rules over wife [1259<sup>b</sup>1] and children, both free, but the rule differs, the rule over his children being a royal, over his wife a constitutional rule. For although there may be exceptions to the order of nature, the male is by nature fitter for command than the female, just as the elder and full-grown is superior to the younger and more immature. But in most [5] constitutional states the citizens rule and are ruled by turns, for the idea of a constitutional state implies that the natures of the citizens are equal, and do not differ at all. Nevertheless, when one rules and the other is ruled we endeavour to create a difference of outward forms and names and titles of respect, which may be illustrated by the saying of Amasis about his foot-pan. The relation of the male to [10] the female is always of this kind. The rule of a father over his children is royal, for he rules by virtue both of love and of the respect due to age, exercising a kind of royal power. And therefore Homer has appropriately called Zeus 'father of Gods and men', because he is the king of them all. For a king is the natural superior of his [15] subjects, but he should be of the same kin or kind with them, and such is the relation of elder and younger, of father and son.

13 · Thus it is clear that household management attends more to men than to the acquisition of inanimate things, and to human excellence more than to the excellence of property which we call wealth, and to the excellence of freemen more [20] than to the excellence of slaves. A question may indeed be raised, whether there is any excellence at all in a slave beyond those of an instrument and of a servant—whether he can have the excellences of temperance, courage, justice, and the like; or whether slaves possess only bodily services. And, whichever way we answer the [25] question, a difficulty arises; for, if they have excellence, in what will they differ from freemen? On the other hand, since they are men and share in rational principle, it seems absurd to say that they have no excellence. A similar question may be raised about women and children, whether they too have excellences; ought [30] a woman to be temperate and brave and just, and is a child to be called temperate, and intemperate, or not? So in general we may ask about the natural ruler, and the natural subject, whether they have the same or different excellences. For if a noble nature is equally required in both, why should one of them always rule, and the [35] other always be ruled? Nor can we say that this is a question of degree, for the difference between ruler and subject is a difference of kind, which the difference of more and less never is. Yet how strange is the supposition that the one ought, and that

the other ought not, to have excellence! For if the ruler is intemperate and unjust, how can he rule well? if the subject, how can he obey well? If he is [1260<sup>a</sup>1] licentious and cowardly, he will certainly not do what is fitting. It is evident, therefore, that both of them must have a share of excellence, but varying as natural subjects also vary among themselves. Here the very constitution of the soul has shown us the way; in it one part naturally rules, and the other is subject, and the [5] excellence of the ruler we maintain to be different from that of the subject—the one being the excellence of the rational, and the other of the irrational part. Now, it is obvious that the same principle applies generally, and therefore almost all things rule and are ruled according to nature. But the kind of rule differs—the freeman rules over the slave after another manner from that in which the male rules over the [10] female, or the man over the child; although the parts of the soul are present in all of them, they are present in different degrees. For the slave has no deliberative faculty at all; the woman has, but it is without authority, and the child has, but it is immature. So it must necessarily be supposed to be with the excellences of character [15] also; all should partake of them, but only in such manner and degree as is required by each for the fulfilment of his function. Hence the ruler ought to have excellence of character in perfection, for his function, taken absolutely, demands a master artificer, and reason is such an artificer; the subjects, on the other hand, require only that measure of excellence which is proper to each of them. Clearly, then, excellence of character belongs to all of them; but the temperance of a man and of a [20] woman, or the courage and justice of a man and of a woman, are not, as Socrates maintained, the same the courage of a man is shown in commanding, of a woman in obeying. And this holds of all other excellences, as will be more clearly seen if we look at them in detail, for those who say generally that excellence consists in a good [25] disposition of the soul, or in doing rightly, or the like, only deceive themselves Far better than such definitions is the mode of speaking of those who, like Gorgias, enumerate the excellences. All classes must be deemed to have their special attributes; as the poet says of women,

[30] Silence is a woman's glory,

but this is not equally the glory of man. The child is imperfect, and therefore obviously his excellence is not relative to himself alone, but to the perfect man and to his teacher, and in like manner the excellence of the slave is relative to a master. Now we determined that a slave is useful for the wants of life, and therefore he will [35] obviously require only so



much excellence as will prevent him from failing in his function through cowardice or lack of self-control. Someone will ask whether, if what we are saying is true, excellence will not be required also in the artisans, for they often fail in their work through the lack of self-control. But is there not a great [40] difference in the two cases? For the slave shares in his master's life; the artisan is less closely connected with him, and only attains excellence in proportion as he [1260<sup>b</sup>1] becomes a slave. The meaner sort of mechanic has a special and separate slavery; and whereas the slave exists by nature, not so the shoemaker or other artisan. It is manifest, then, that the master ought to be the source of such excellence in the [5] slave, and not a mere possessor of the art of mastership which trains the slave in his functions. That is why they are mistaken who forbid us to converse with slaves and say that we should employ command only, for slaves stand even more in need of admonition than children.

So much for this subject; the relations of husband and wife, father and child, [10] their several excellences, what in their intercourse with one another is good, and what is evil, and how we may pursue the good and escape the evil, will have to be discussed when we speak of the different forms of government. For, inasmuch as every family is a part of a state, and these relationships are the parts of a family, and the excellence of the part must have regard to the excellence of the whole, women [15] and children must be trained by education with an eye to the constitution, if the excellences of either of them are supposed to make any difference in the excellences of the state. And they must make a difference: for the children grow up to be [20] citizens, and half the free persons in a state are women.

Of these matters, enough has been said; of what remains, let us speak at another time. Regarding, then, our present inquiry as complete, we will make a new beginning. And, first, let us examine the various theories of a perfect state.

## BOOK II

[25] 1 · Our purpose is to consider what form of political community is best of all for those who are most able to realize their ideal of life. We must therefore examine not only this but other constitutions, both such as actually exist in well-governed [30] states, and any theoretical forms which are held in esteem, so that what is good and useful may be brought to light. And let no one suppose that in seeking for something beyond them we are anxious to make a sophistical display at any cost; we only undertake this inquiry because all the constitutions which now exist are faulty. [35]

We will begin with the natural beginning of the subject. The members of a state must either have all things or nothing in common, or some things in common and some not. That they should have nothing in common is clearly impossible, for the constitution is a community, and must at any rate have a common place—one city will be in one place, and the citizens are those who share in that one city. But [1261<sup>a</sup>1] should a well-ordered state have all things, as far as may be, in common, or some only and not others? For the citizens might conceivably have wives and children and [5] property in common, as Socrates proposes in the *Republic* of Plato. Which is better, our present condition, or one conforming to the law laid down in the *Republic*?

2 · There are many difficulties in the community of women. And the [10] principle on which Socrates rests the necessity of such an institution evidently is not established by his arguments. Further, as a means to the end which he ascribes to the state, the scheme, taken literally, is impracticable, and how we are to interpret it is nowhere precisely stated. I am speaking of the supposition from which the argument of Socrates proceeds, that it is best for the whole state to be as unified as [15] possible. Is it not obvious that a state may at length attain such a degree of unity as to be no longer a state?—since the nature of a state is to be a plurality, and in tending to greater unity, from being a state, it becomes a family, and from being a family, an individual; for the family may be said to be more one than the state, and [20] the individual than the family. So that we ought not to attain this greatest unity even if we could, for it would be the destruction of the state. Again, a state is not made up only of so many men, but of different kinds of men; for similars do not

constitute a state. It is not like a military alliance. The usefulness of the latter [25] depends upon its quantity even where there is no difference in quality (for mutual protection is the end aimed at), just as a greater weight depresses the scale more (in like manner, a state differs from a nation, when the nation has not its population organized in villages, but lives an Arcadian sort of life); but the elements out of which a unity is to be formed differ in kind. That is why the principle of reciprocity, [30] as I have already remarked in the *Ethics*, is the salvation of states. Even among freemen and equals this is a principle which must be maintained, for they cannot all rule together, but must change at the end of a year or some other period of time or in some order of succession. The result is that upon this plan they all govern; just as if [35] shoemakers and carpenters were to exchange their occupations, and the same persons did not always continue shoemakers and carpenters. And since it is better that this should be so in politics as well, it is clear that while there should be continuance of the same persons in power where this is possible, yet where this is not possible by reason of the natural equality of the citizens, and at the same time it is [1261<sup>b</sup>1] just that all should share in the government (whether to govern be a good thing or a bad),—in these cases this is imitated.<sup>1</sup> Thus the one party rules and the others are ruled in turn, as if they were no longer the same persons. In like manner when they [5] hold office there is a variety in the offices held. Hence it is evident that a city is not by nature one in that sense which some persons affirm; and that what is said to be the greatest good of cities is in reality their destruction; but surely the good of things [10] must be that which preserves them. Again, from another point of view, this extreme unification of the state is clearly not good; for a family is more self-sufficing than an individual, and a city than a family, and a city only comes into being when the community is large enough to be self-sufficing. If then self-sufficiency is to be [15] desired, the lesser degree of unity is more desirable than the greater.

3 · But, even supposing that it were best for the community to have the greatest degree of unity, this unity is by no means proved to follow from the fact of all men saying ‘mine’ and ‘not mine’ at the same instant of time, which, according [20] to Socrates, is the sign of perfect unity in a state. For the word ‘all’ is ambiguous. If the meaning be that every individual says ‘mine’ and ‘not mine’ at the same time, then perhaps the result at which Socrates aims may be in some degree accomplished; each man will call the same person his own son and the same person his own

wife, and so of his property and of all that falls to his lot. This, however, is not the [25] way in which people would speak who had their wives and children in common; they would say 'all' but not 'each'. In like manner their property would be described as belonging to them, not severally but collectively. There is an obvious fallacy in the term 'all': like some other words, 'both', 'odd', 'even', it is ambiguous, and even in [30] abstract argument becomes a source of logical puzzles. That all persons call the same thing mine in the sense in which each does so may be a fine thing, but it is impracticable; or if the words are taken in the other sense, such a unity in no way conduces to harmony. And there is another objection to the proposal. For that which is common to the greatest number has the least care bestowed upon it. Everyone [35] thinks chiefly of his own, hardly at all of the common interest; and only when he is himself concerned as an individual. For besides other considerations, everybody is more inclined to neglect something which he expects another to fulfil; as in families many attendants are often less useful than a few. Each citizen will have a thousand [1262<sup>a</sup>1] sons who will not be his sons individually, but anybody will be equally the son of anybody, and will therefore be neglected by all alike. Further, upon this principle, every one will use the word 'mine' of one who is prospering or the reverse, however small a fraction he may himself be of the whole number; the same boy will be my son, so and so's son, the son of each of the thousand, or whatever be the number of [5] the citizens; and even about this he will not be positive; for it is impossible to know who chanced to have a child, or whether, if one came into existence, it has survived. But which is better—for each to say 'mine' in this way, making a man the same relation to two thousand or ten thousand citizens, or to use the word 'mine' as it is now used in states? For usually the same person is called by one man his own son [10] whom another calls his own brother or cousin or kinsman—blood relation or connexion by marriage—either of himself or of some relation of his, and yet another his clansman or tribesman; and how much better is it to be the real cousin of somebody than to be a son after Plato's fashion! Nor is there any way of preventing [15] brothers and children and fathers and mothers from sometimes recognizing one another; for children are born like their parents, and they will necessarily be finding indications of their relationship to one another. Geographers declare such to be the fact; they say that in part of Upper Libya, where the women are common, [20] nevertheless the children who are born are assigned to their respective fathers on the ground of their likeness. And some women, like the females of other animals—for

example, mares and cows—have a strong tendency to produce offspring resembling their parents, as was the case with the Pharsalian mare called Honest Wife.

4 · Other difficulties, against which it is not easy for the authors of such a [25] community to guard, will be assaults and homicides, voluntary as well as involuntary, quarrels and slanders, all of which are most unholy acts when committed against fathers and mothers and near relations, but not equally unholy when there is no relationship. Moreover, they are much more likely to occur if the relationship is [30] unknown than if it is known and, when they have occurred, the customary expiations of them can be made if the relationship is known, but not otherwise. Again, how strange it is that Socrates, after having made the children common, should hinder lovers from carnal intercourse only, but should permit love and [35] familiarities between father and son or between brother and brother, than which nothing can be more unseemly, since even without them love of this sort is improper. How strange, too, to forbid intercourse for no other reason than the violence of the pleasure, as though the relationship of father and son or of brothers with one another made no difference. [40]

This community of wives and children seems better suited to the husbandmen than to the guardians, for if they have wives and children in common, they will be bound to one another by weaker ties, as a subject class should be, and they will [1262<sup>b</sup>1] remain obedient and not rebel. In a word, the result of such a law would be just the opposite of that which good laws ought to have, and the intention of Socrates in making these regulations about women and children would defeat itself. For [5] friendship we believe to be the greatest good of states and what best preserves them against revolutions; and Socrates particularly praises the unity of the state which seems and is said by him to be created by friendship. But the unity which he [10] commends would be like that of the lovers in the *Symposium*, who, as Aristophanes says, desire to grow together in the excess of their affection, and from being two to become one, in which case one or both would certainly perish. Whereas in a state having women and children common, love will be diluted; and the father will [15] certainly not say ‘my son’, or the son ‘my father’. As a little sweet wine mingled with a great deal of water is imperceptible in the mixture, so, in this sort of community, the idea of relationship which is based upon these names will be lost; there is no reason why the so-called

father should care about the son, or the son about the [20] father, or brothers about one another. Of the two qualities which chiefly inspire regard and affection—that a thing is your own and that it is precious—neither can exist in such a state as this.

Again, the transfer of children as soon as they are born from the rank of [25] husbandmen or of artisans to that of guardians, and from the rank of guardians into a lower rank, will be very difficult to arrange; the givers or transferrers cannot but know whom they are giving and transferring, and to whom. And the previously [30] mentioned assaults, unlawful loves, homicides, will happen more often among them; for they will no longer call the members of the class they have left brothers, and children, and fathers, and mothers, and will not, therefore, be afraid of committing [35] any crimes by reason of consanguinity. Touching the community of wives and children, let this be our conclusion.

5 · Next let us consider what should be our arrangements about property: should the citizens of the perfect state have their possessions in common or not? [40] This question may be discussed separately from the enactments about women and children. Even supposing that the women and children belong to individuals, according to the custom which is at present universal, may there not be an [1263<sup>a</sup>1] advantage in having and using possessions in common? E.g. (1) the soil may be appropriated, but the produce may be thrown for consumption into the common [5] stock; and this is the practice of some nations. Or (2), the soil may be common, and may be cultivated in common, but the produce divided among individuals for their private use; this is a form of common property which is said to exist among certain foreigners. Or (3), the soil and the produce may be alike common.

When the husbandmen are not the owners, the case will be different and easier [10] to deal with; but when they till the ground for themselves the question of ownership will give a world of trouble. If they do not share equally in enjoyments and toils, those who labour much and get little will necessarily complain of those who labour [15] little and receive or consume much. But indeed there is always a difficulty in men living together and having all human relations in common, but especially in their having common property. The partnerships of fellow-travellers are an example to the point; for they generally fall out over everyday matters and quarrel about any trifle which turns up. So with servants: we are most liable to take offence at those [20] with whom we most frequently

come into contact in daily life.

These are only some of the disadvantages which attend the community of property; the present arrangement, if improved as it might be by good customs and [25] laws, would be far better, and would have the advantages of both systems. Property should be in a certain sense common, but, as a general rule, private; for, when everyone has a distinct interest, men will not complain of one another, and they will make more progress, because everyone will be attending to his own business. And [30] yet by reason of goodness, and in respect of use, 'Friends', as the proverb says, 'will have all things common'. Even now there are traces of such a principle, showing that it is not impracticable, but, in well-ordered states, exists already to a certain extent and may be carried further. For, although every man has his own property, some things he will place at the disposal of his friends, while of others he shares the [35] use with them. The Lacedaemonians, for example, use one another's slaves, and horses, and dogs, as if they were their own; and when they lack provisions on a journey, they appropriate what they find in the fields throughout the country. It is clearly better that property should be private, but the use of it common; and the special business of the legislator is to create in men this benevolent disposition. Again, how immeasurably greater is the pleasure, when a man feels a thing to be his own; for surely the love of self is a feeling implanted by nature and not given in vain, [1263<sup>b</sup>1] although selfishness is rightly censured; this, however, is not the mere love of self, but the love of self in excess, like the miser's love of money; for all, or almost all, men love money and other such objects in a measure. And further, there is the greatest pleasure in doing a kindness or service to friends or guests or companions, [5] which can only be rendered when a man has private property. These advantages are lost by excessive unification of the state. The exhibition of two excellences, besides, is visibly annihilated in such a state: first, temperance towards women (for it is an honourable action to abstain from another's wife for temperance sake); secondly, [10] liberality in the matter of property. No one, when men have all things in common, will any longer set an example of liberality or do any liberal action; for liberality consists in the use which is made of property.

Such legislation may have a specious appearance of benevolence; men readily [15] listen to it, and are easily induced to believe that in some wonderful manner everybody will become everybody's friend—especially when someone is heard denouncing the evils now existing in states, suits about contracts, convictions for perjury, flatteries of rich men and the

like, which are said to arise out of the [20] possession of private property. These evils, however, are due not to the absence of communism but to wickedness. Indeed, we see that there is much more quarrelling among those who have all things in common, though there are not many of them [25] when compared with the vast numbers who have private property.

Again, we ought to reckon not only the evils from which the citizens will be saved, but also the advantages which they will lose. The life which they are to lead appears to be quite impracticable. The error of Socrates must be attributed to the [30] false supposition from which he starts. Unity there should be, both of the family and of the state, but in some respects only. For there is a point at which a state may attain such a degree of unity as to be no longer a state, or at which, without actually ceasing to exist, it will become an inferior state, like harmony passing into unison, or [35] rhythm which has been reduced to a single foot. The state, as I was saying, is a plurality, which should be united and made into a community by education; and it is strange that the author of a system of education which he thinks will make the state virtuous, should expect to improve his citizens by regulations of this sort, and not by [40] philosophy or by customs and laws, like those which prevail at Sparta and Crete respecting common meals, whereby the legislator has made property common. Let us remember that we should not disregard the experience of ages; in the multitude [1264<sup>a</sup>1] of years these things, if they were good, would certainly not have been unknown; for almost everything has been found out, although sometimes they are not put together; in other cases men do not use the knowledge which they have. Great light would be thrown on this subject if we could see such a form of government in the [5] actual process of construction; for the legislator could not form a state at all without distributing and dividing its constituents into associations for common meals, and into phratries and tribes. But all this legislation ends only in forbidding agriculture to the guardians, a prohibition which the Lacedaemonians try to enforce already. [10]

But, indeed, Socrates has not said, nor is it easy to decide, what in such a community will be the general form of the state. The citizens who are not guardians are the majority, and about them nothing has been determined: are the husbandmen [15], too, to have their property in common? Or is each individual to have his own? and are their wives and children to be individual or common? If, like the guardians, they are to have all things in common, in what do they differ from them, or what will they gain by submitting to their government? Or upon what principle



would they [20] submit, unless indeed the governing class adopt the ingenious policy of the Cretans, who give their slaves the same institutions as their own, but forbid them gymnastic exercises and the possession of arms. If, on the other hand, the inferior classes are to be like other cities in respect of marriage and property, what will be the form of the [25] community? Must it not contain two states in one, each hostile to the other? He makes the guardians into a mere occupying garrison, while the husbandmen and artisans and the rest are real citizens. But if so the suits and quarrels, and all the evils which Socrates affirms to exist in other states, will exist equally among them. [30] He says indeed that, having so good an education, the citizens will not need many laws, for example laws about the city or about the markets; but then he confines his education to the guardians. Again, he makes the husbandmen owners of the property upon condition of their paying a tribute. But in that case they are likely to [35] be much more unmanageable and conceited than the Helots, or Penestae, or slaves in general. And whether community of wives and property be necessary for the lower equally with the higher class or not, and the questions akin to this, what will be the education, form of government, laws of the lower class, Socrates has nowhere determined: neither is it easy to discover this, nor is their character of small importance if the common life of the guardians is to be maintained.

[1264<sup>b</sup>1] Again, if Socrates makes the women common, and retains private property, the men will see to the fields, but who will see to the house? And who will do so if the agricultural class have both their property and their wives in common? Once more: [5] it is absurd to argue, from the analogy of animals, that men and women should follow the same pursuits, for animals have not to manage a household. The government, too, as constituted by Socrates, contains elements of danger; for he makes the same persons always rule. And if this is often a cause of disturbance [10] among the meaner sort, how much more among high-spirited warriors? But that the persons whom he makes rulers must be the same is evident; for the gold which the God mingles in the souls of men is not at one time given to one, at another time to another, but always to the same: as he says, God mingles gold in some, and silver in others, from their very birth; but brass and iron in those who are meant to be [15] artisans and husbandmen. Again, he deprives the guardians even of happiness, and says that the legislator ought to make the whole state happy. But the whole cannot be happy unless most, or all, or some of its parts enjoy happiness. In this respect [20] happiness is not like the even principle in numbers, which may exist only in the whole, but in neither of

the parts; not so happiness. And if the guardians are not happy, who are? Surely not the artisans, or the common people. The Republic of [25] which Socrates discourses has all these difficulties, and others quite as great.

6 · The same, or nearly the same, objections apply to Plato's later work, the *Laws*, and therefore we had better examine briefly the constitution which is therein described. In the *Republic*, Socrates has definitely settled in all a few questions only; such as the community of women and children, the community of property, [30] and the constitution of the state. The population is divided into two classes—one of husbandmen, and the other of warriors; from this latter is taken a third class of counsellors and rulers of the state. But Socrates has not determined whether the husbandmen and artisans are to have a share in the government, and whether they, [35] too, are to carry arms and share in the military service, or not. He certainly thinks that the women ought to share in the education of the guardians, and to fight by their side. The remainder of the work is filled up with digressions foreign to the main subject, and with discussions about the education of the guardians. In the *Laws* there is hardly anything but laws; not much is said about the constitution. [1265<sup>a</sup>1] This, which he had intended to make more of the ordinary type, he gradually brings round to the other form. For with the exception of the community of women and [5] property, he supposes everything to be the same in both states; there is to be the same education; the citizens of both are to live free from servile occupations, and there are to be common meals in both. The only difference is that in the *Laws*, the common meals are extended to women, and the warriors number 5000, but in the [10] *Republic* only 1000.

The discourses of Socrates are never commonplace; they always exhibit grace and originality and thought; but perfection in everything can hardly be expected. We must not overlook the fact that the number of 5000 citizens, just now mentioned, will require a territory as large as Babylon, or some other huge site, if so [15] many persons are to be supported in idleness, together with their women and attendants, who will be a multitude many times as great. In framing an ideal we may assume what we wish, but should avoid impossibilities.

It is said that the legislator ought to have his eye directed to two points—the people and the country. But neighbouring countries also must not be forgotten by [20] him, firstly because the state for which he

legislates is to have a political and not an isolated life. For a state must have such a military force as will be serviceable against her neighbours, and not merely useful at home. Even if such a life is not accepted, either for individuals or states, still a city should be formidable to [25] enemies, whether invading or retreating.

There is another point: Should not the amount of property be defined in some way which differs from this by being clearer? For Socrates says that a man should have so much property as will enable him to live temperately, which is only a way of [30] saying to live well; this is too general a conception. Further, a man may live temperately and yet miserably. A better definition would be that a man must have so much property as will enable him to live not only temperately but liberally; if the two are parted, liberality will combine with luxury; temperance will be associated with toil. For liberality and temperance are the only eligible qualities which have to [35] do with the use of property. A man cannot use property with mildness or courage, but temperately and liberally he may; and therefore the practice of these excellences is inseparable from property. There is an absurdity, too, in equalizing [40] the property and not regulating the number of citizens; the population is to remain unlimited, and he thinks that it will be sufficiently equalized by a certain number of marriages being unfruitful, however many are born to others, because he finds this [1265<sup>b</sup>1] to be the case in existing states. But greater care will be required than now; for among ourselves, whatever may be the number of citizens, the property is always distributed among them, and therefore no one is in want; but, if the property were [5] incapable of division as in the *Laws*, the supernumeraries, whether few or many, would get nothing. One would have thought that it was even more necessary to limit population than property; and that the limit should be fixed by calculating the [10] chances of mortality in the children, and of sterility in married persons. The neglect of this subject, which in existing states is so common, is a never-failing cause of poverty among the citizens; and poverty is the parent of revolution and crime. Pheidon the Corinthian, who was one of the most ancient legislators, thought that the families and the number of citizens ought to remain the same, although [15] originally all the lots may have been of different sizes; but in the *Laws* the opposite principle is maintained. What in our opinion is the right arrangement will have to be explained hereafter.

There is another omission in the *Laws*: Socrates does not tell us how the rulers [20] differ from their subjects; he only says that they should be related as the warp and the woof, which are made out of different wools.

He allows that a man's whole property may be increased fivefold, but why should not his land also increase to a [25] certain extent? Again, will the good management of a household be promoted by his arrangement of homesteads? for he assigns to each individual two homesteads in separate places, and it is difficult to live in two houses.

The whole system of government tends to be neither democracy nor oligarchy, but something in a mean between them, which is usually called a polity, and is composed of the heavy-armed soldiers. Now, if he intended to frame a constitution [30] which would suit the greatest number of states, he was very likely right, but not if he meant to say that this constitutional form came nearest to his first state; for many would prefer the Lacedaemonian, or, possibly, some other more aristocratic government. Some, indeed, say that the best constitution is a combination of all [35] existing forms, and they praise the Lacedaemonian because it is made up of oligarchy, monarchy, and democracy, the king forming the monarchy, and the council of elders the oligarchy, while the democratic element is represented by the Ephors; for the Ephors are selected from the people. Others, however, declare the Ephorate to be a tyranny, and find the element of democracy in the common meals [1266<sup>a</sup>1] and in the habits of daily life. In the *Laws* it is maintained that the best constitution is made up of democracy and tyranny, which are either not constitutions at all, or are the worst of all. But they are nearer the truth who combine many forms; for the [5] constitution is better which is made up of more numerous elements. The constitution proposed in the *Laws* has no element of monarchy at all; it is nothing but oligarchy and democracy, leaning rather to oligarchy. This is seen in the mode of appointing magistrates; for although the appointment of them by lot from among those who have been already selected combines both elements, the way in which the rich are compelled by law to attend the assembly and vote for magistrates or [10] discharge other political duties, while the rest may do as they like, and the endeavour to have the greater number of the magistrates appointed out of the richer classes and the highest officers selected from those who have the greatest incomes, both these are oligarchical features. The oligarchical principle prevails also in the choice of the council, for all are compelled to choose, but the compulsion extends [15] only to the choice out of the first class, and of an equal number out of the second class and out of the third class, but not in this latter case to all the voters but to those from the third or fourth class; and the selection of candidates out of the fourth class is only compulsory on the first and second. Then, from the persons so chosen, he says that there

ought to be an equal number of each class selected. Thus a preponderance [20] will be given to the better sort of people, who have the larger incomes, because some of the lower classes, not being compelled, will not vote. These considerations, and others which will be adduced when the time comes for examining similar [25] constitutions, tend to show that states like Plato's should not be composed of democracy and monarchy. There is also a danger in electing the magistrates out of a body who are themselves elected; for, if but a small number choose to combine, the elections will always go as they desire. Such is the constitution which is described in the *Laws*. [30]

7 · Other constitutions have been proposed; some by private persons, others by philosophers and statesmen, which all come nearer to established or existing ones than either of Plato's. No one else has introduced such novelties as the community [35] of women and children, or public tables for women: other legislators begin with what is necessary. In the opinion of some, the regulation of property is the chief point of all, that being the question upon which all revolutions turn. This danger was recognized by Phaleas of Chalcedon, who was the first to affirm that the citizens of a state ought to have equal possessions. He thought that in a new colony the [1266<sup>b1</sup>] equalization might be accomplished without difficulty, not so easily when a state was already established; and that then the shortest way of compassing the desired end would be for the rich to give and not to receive marriage portions, and for the poor not to give but to receive them.

Plato in the *Laws* was of the opinion that, to a certain extent, accumulation [5] should be allowed, forbidding, as I have already observed, any citizen to possess more than five times the minimum qualification. But those who make such laws should remember what they are apt to forget—that the legislator who fixes the amount of property should also fix the number of children; for, if the children are [10] too many for the property, the law must be broken. And, besides the violation of the law, it is a bad thing that many from being rich should become poor; for men of ruined fortunes are sure to stir up revolutions. That the equalization of property exercises an influence on political society was clearly understood even by some of [15] the old legislators. Laws were made by Solon and others prohibiting an individual from possessing as much land as he pleased; and there are other laws in states which forbid the sale of property: among the Locrians, for example, there is a law that

a [20] man is not to sell his property unless he can prove unmistakably that some misfortune has befallen him. Again, there have been laws which enjoin the preservation of the original lots. Such a law existed in the island of Leucas, and the abrogation of it made the constitution too democratic, for the rulers no longer had the prescribed qualification. Again, where there is equality of property, the amount [25] may be either too large or too small, and the possessor may be living either in luxury or penury. Clearly, then, the legislator ought not only to aim at the equalization of properties, but at moderation in their amount. Further, if he prescribe this moderate amount equally to all, he will be no nearer the mark; for it is not the [30] possessions but the desires of mankind which require to be equalized, and this is impossible, unless a sufficient education is provided by the laws. But Phaleas will probably reply that this is precisely what he means; and that, in his opinion, there ought to be in states, not only equal property, but equal education. Still he should [35] tell us what will be the character of his education; there is no use in having one and the same for all, if it is of a sort that predisposes men to avarice, or ambition, or both. Moreover, civil troubles arise, not only out of the inequality of property, but out of the inequality of honour, though in opposite ways. For the common people [1267<sup>a</sup>1] quarrel about the inequality of property, the higher class about the equality of honour; as the poet says,

The bad and good alike in honour share.

There are crimes for which the motive is want; and for these Phaleas expects to find a cure in the equalization of property, which will take away from a man the temptation to be a robber, because he is hungry or cold. But want is not the sole [5] incentive to crime; men also wish to enjoy themselves and not to be in a state of desire—they wish to cure some desire, going beyond the necessities of life, which preys upon them; indeed this is not the only reason—they may desire to enjoy pleasures unaccompanied with pain, and therefore they commit crimes.

Now what is the cure of these three disorders? Of the first, moderate [10] possessions and occupation; of the second, habits of temperance; as to the third, if any desire pleasures which depend on themselves, they will find the satisfaction of their desires nowhere but in philosophy; for all other pleasures we are dependent on others. The fact is, that the greatest crimes are caused by excess and not by necessity. Men do not become tyrants in order that they may not suffer cold; and [15] hence great is the honour bestowed, not on him who kills a thief, but on him

who kills a tyrant. Thus we see that the institutions of Phaleas avail only against petty crimes.

There is another objection to them. They are chiefly designed to promote the internal welfare of the state. But the legislator should consider also its relation to neighbouring nations, and to all who are outside of it. The government must be [20] organized with a view to military strength; and of this he has said not a word. And so with respect to property: there should not only be enough to supply the internal wants of the state, but also to meet dangers coming from without. The property of the state should not be so large that more powerful neighbours may be tempted by [25] it, while the owners are unable to repel the invaders; nor yet so small that the state is unable to maintain a war even against states of equal power, and of the same character. Phaleas has not laid down any rule; but we should bear in mind that abundance of wealth is an advantage. The best limit will probably be, that a more powerful neighbour must have no inducement to go to war with you by reason of the [30] excess of your wealth, but only such as he would have had if you had possessed less. There is a story that Eubulus, when Autophradates was going to besiege Atarneus, told him to consider how long the operation would take, and then reckon up the cost which would be incurred in the time. 'For', said he, 'I am willing for a smaller sum than that to leave Atarneus at once.' These words of Eubulus made an impression [35] on Autophradates, and he desisted from the siege.

The equalization of property is one of the things that tend to prevent the citizens from quarrelling. Not that the gain in this direction is very great. For the nobles will be dissatisfied because they think themselves worthy of more than an equal share of honours; and this is often found to be a cause of sedition and revolution. And the avarice of mankind is insatiable; at one time two obols was pay [1267<sup>b</sup>1] enough; but now, when this sum has become customary, men always want more and more without end; for it is of the nature of desire to be unlimited, and most men live only for the gratification of it. The beginning of reform is not so much to equalize [5] property as to train the nobler sort of natures not to desire more, and to prevent the lower from getting more; that is to say, they must be kept down, but not ill-treated. Besides, the equalization proposed by Phaleas is imperfect; for he only equalizes [10] land, whereas a man may be rich also in slaves, and cattle, and money, and in the abundance of what are called his movables. Now either all these things must be equalized, or some limit must be imposed on them, or they must all be let alone. It would appear that Phaleas is legislating for a

small city only, if, as he supposes, all the artisans are to be public slaves and not to form a supplementary part of the body [15] of citizens. But if there is a law that artisans are to be public slaves, it should only apply to those engaged on public works, as at Epidamnus, or at Athens on the plan which Diophantus once introduced.

From these observations any one may judge how far Phaleas was wrong or [20] right in his ideas.

8 · Hippodamus, the son of Euryphon, a native of Miletus, the same who invented the art of planning cities, and who also laid out the Piraeus—a strange man, whose fondness for distinction led him into a general eccentricity of life, which made some think him affected (for he would wear flowing hair and expensive [25] ornaments; but these were worn on a cheap but warm garment both in winter and summer); he, besides aspiring to be an adept in the knowledge of nature, was the first person not a statesman who made inquiries about the best form of government. [30]

The city of Hippodamus was composed of 10,000 citizens divided into three parts—one of artisans, one of husbandmen, and a third of armed defenders of the state. He also divided the land into three parts, one sacred, one public, the third [35] private:—the first was set apart to maintain the customary worship of the gods, the second was to support the warriors, the third was the property of the husbandmen. He also divided laws into three classes, and no more, for he maintained that there are three subjects of lawsuits—insult, injury, and homicide. He likewise instituted [40] a single final court of appeal, to which all causes seeming to have been improperly decided might be referred; this court he formed of elders chosen for the purpose. He [1268<sup>a</sup>1] was further of the opinion that the decisions of the courts ought not to be given by the use of a voting pebble, but that everyone should have a tablet on which he might not only write a simple condemnation, or leave the tablet blank for a simple acquittal; but, if he partly acquitted and partly condemned, he was to distinguish [5] accordingly. To the existing law he objected that it obliged the judges to be guilty of perjury, whichever way they voted. He also enacted that those who discovered anything for the good of the state should be honoured, and he provided that the children of citizens who died in battle should be maintained at public expense, as if [10] such an enactment had never been heard of before, yet it actually exists at Athens and in other places. As to the magistrates, he would have them all elected



by the people, that is, by the three classes already mentioned, and those who were elected were to watch over the interests of the public, of strangers, and of orphans. These [15] are the most striking points in the constitution of Hippodamus. There is not much else.

The first of these proposals to which objection may be taken is the threefold division of the citizens. The artisans, and the husbandmen, and the warriors, all have a share in the government. But the husbandmen have no arms, and the artisans [20] neither arms nor land, and therefore they become all but slaves of the warrior class. That they should share in all the offices is an impossibility; for generals and guardians of the citizens, and nearly all the principal magistrates, must be taken from the class of those who carry arms. Yet, if the two other classes have no share in [25] the government, how can they be loyal citizens? It may be said that those who have arms must necessarily be masters of both the other classes, but this is not so easily accomplished unless they are numerous; and if they are, why should the other classes share in the government at all, or have power to appoint magistrates? [30] Further, what use are farmers to the city? Artisans there must be, for these are wanted in every city, and they can live by their craft, as elsewhere; and the husbandmen, too, if they really provided the warriors with food, might fairly have a share in the government. But in the republic of Hippodamus they are supposed to [35] have land of their own, which they cultivate for their private benefit. Again, as to this common land out of which the soldiers are maintained, if they are themselves to be the cultivators of it, the warrior class will be identical with the husbandmen, although the legislator intended to make a distinction between them. If, again, there are to be other cultivators distinct both from the husbandmen, who have land of [40] their own, and from the warriors, they will make a fourth class, which has no place in the state and no share in anything. Or, if the same persons are to cultivate their own lands, and those of the public as well, they will have a difficulty in supplying the quantity of produce which will maintain two households:<sup>2</sup> and why, in this case, [1268<sup>b</sup>1] should there be any division, for they might find food themselves and give to the warriors from the same land and the same lots? There is surely a great confusion in all this.

Neither is the law to be commended which says that the judges, when a simple [5] issue is laid before them, should make a distinction in their judgement; for the judge is thus converted into an arbitrator. Now, in an arbitration, although the arbitrators are many, they confer with one another about the decision; but in courts of law this is impossible, and,

indeed, most legislators take pains to prevent the judges from [10] holding any communication with one another. Again, will there not be confusion if the judge thinks that damages should be given, but not so much as the suitor demands? He asks, say, for twenty minae, and the judge allows him ten minae (or in general the suitor asks for more and the judge allows less), while another judge allows five, another four minae. In this way they will go on splitting up the damages, [15] and some will grant the whole and others nothing: how is the final reckoning to be taken? Again, no one contends that he who votes for a simple acquittal or condemnation perjures himself, if the indictment has been laid in an unqualified form; and this is just, for the judge who acquits does not decide that the defendant [20] owes nothing, but that he does not owe the twenty minae. He only is guilty of perjury who thinks that the defendant ought not to pay twenty minae, and yet condemns him.

To honour those who discover anything which is useful to the state is a proposal which has a specious sound, but cannot safely be enacted by law, for it may encourage informers, and perhaps even lead to political commotions. This question [25] involves another. It has been doubted whether it is or is not expedient to make any changes in the laws of a country, even if another law be better. Now, if all changes are inexpedient, we can hardly assent to the proposal of Hippodamus; for, under pretence of doing a public service, a man may introduce measures which are really [30] destructive to the laws or to the constitution. But, since we have touched upon this subject, perhaps we had better go a little into detail, for, as I was saying, there is a difference of opinion, and it may sometimes seem desirable to make changes. Such changes in the other arts and sciences have certainly been beneficial; medicine, for example, and gymnastics, and every other art and craft have departed from [35] traditional usage. And, if politics be an art, change must be necessary in this as in any other art. That improvement has occurred is shown by the fact that old customs are exceedingly simple and barbarous. For the ancient Hellenes went about armed [40] and bought their brides from each other. The remains of ancient laws which have come down to us are quite absurd; for examples, at Cumae there is a law about [1269<sup>a</sup>1] murder, to the effect that if the accuser produce a certain number of witnesses from among his own kinsmen, the accused shall be held guilty. Again, men in general desire the good, and not merely what their fathers had. But the primaeval inhabitants, whether they were born of the earth or were the survivors of some [5] destruction, may be supposed to have been no better than ordinary or even foolish people among ourselves

(such is certainly the tradition concerning the earth-born men); and it would be ridiculous to rest contented with their notions. Even when laws have been written down, they ought not always to remain unaltered. As in [10] other sciences, so in politics, it is impossible that all things should be precisely set down in writing; for enactments must be universal, but actions are concerned with particulars. Hence we infer that sometimes and in certain cases laws should be changed; but when we look at the matter from another point of view, great caution would seem to be required. For the habit of lightly changing the laws is an evil, and, [15] when the advantage is small, some errors both of lawgivers and rulers had better be left; the citizen will not gain so much by making the change as he will lose by the habit of disobedience. The analogy of the arts is false; a change in a law is a very [20] different thing from a change in an art. For the law has no power to command obedience except that of habit, which can only be given by time, so that a readiness to change from old to new laws enfeebles the power of the law. Even if we admit that the laws are to be changed, are they all to be changed, and in every state? And are [25] they to be changed by anybody who likes, or only by certain persons? These are very important questions; and therefore we had better reserve the discussion of them to a more suitable occasion.

9 · In the governments of Lacedaemon and Crete, and indeed in all [30] governments, two points have to be considered: first, whether any particular law is good or bad, when compared with the perfect state; secondly, whether it is or is not consistent with the idea and character which the lawgiver has set before his citizens. That in a well-ordered state the citizens should have leisure and not have to provide [35] for their daily wants is generally acknowledged, but there is a difficulty in seeing how this leisure is to be attained. The Thessalian Penestae have often risen against their masters, and the Helots in like manner against the Lacedaemonians, for whose misfortunes they are always lying in wait. Nothing, however, of this kind has as yet happened to the Cretans; the reason probably is that the neighboring cities, even [1269b1] when at war with one another, never form an alliance with rebellious serfs, rebellions not being for their interest, since they themselves have a dependent population. Whereas all the neighbours of the Lacedaemonians, whether Argives, Messenians, or Arcadians, were their enemies. In Thessaly, again, the original [5] revolt of the slaves occurred because the Thessalians were still at war with the neighbouring Achaeans, Perrhaebians and Magnesians. Besides, if there were no other difficulty, the treatment or

management of slaves is a troublesome affair; for, if not kept in hand, they are insolent, and think that they are as good as their [10] masters, and, if harshly treated, they hate and conspire against them. Now it is clear that when these are the results the citizens of a state have not found out the secret of managing their subject population.

Again, the license of the Lacedaemonian women defeats the intention of the Spartan constitution, and is adverse to the happiness of the state. For, a husband [15] and a wife being each a part of every family, the state may be considered as about equally divided into men and women; and, therefore, in those states in which the condition of the women is bad, half the city may be regarded as having no laws. And this is what has actually happened at Sparta; the legislator wanted to make the [20] whole state hardy, and he has carried out his intention in the case of the men, but he has neglected the women, who live in every sort of intemperance and luxury. The consequence is that in such a state wealth is too highly valued, especially if the citizens fall under the dominion of their wives, after the manner of most warlike [25] races, except the Celts and a few others who openly approve of male homosexuality. The old mythologer would seem to have been right in uniting Ares and Aphrodite, for all warlike races are prone to the love either of men or of women. This was [30] exemplified among the Spartans in the days of their greatness; many things were managed by their women. But what difference does it make whether women rule, or the rulers are ruled by women? The result is the same. Even in regard to boldness, which is of no use in daily life, and is needed only in war, the influence of the [35] Lacedaemonian women has been most mischievous. The evil showed itself in the Theban invasion, when, unlike the women in other cities, they were utterly useless and caused more confusion than the enemy. This license of the Lacedaemonian women existed from the earliest times, and was only what might be expected. For, during the wars of the Lacedaemonians, first against the Argives, and afterwards [1270<sup>a</sup>1] against the Arcadians and Messenians, the men were long away from home, and, on the return of peace, they gave themselves into the legislator's hand, already prepared by the discipline of a soldier's life (in which there are many elements of [5] excellence), to receive his enactments. But, when Lycurgus, as tradition says, wanted to bring the women under his laws, they resisted, and he gave up the attempt. These then are the causes of what then happened, and this defect in the constitution is clearly to be attributed to them. We are not, however, considering [10] what is or is not to be excused, but what is right or

wrong, and the disorder of the women, as I have already said, not only gives an air of indecorum to the constitution considered in itself, but tends in a measure to foster avarice.

The mention of avarice naturally suggests a criticism on the inequality of [15] property. While some of the Spartan citizens have quite small properties, others have very large ones: hence the land has passed into the hands of a few. And this is due also to faulty laws; for, although the legislator rightly holds up to shame the sale or purchase of an inheritance, he allows anybody who likes to give or bequeath it. [20] Yet both practices lead to the same result. And nearly two-fifths of the whole country are held by women; this is owing to the number of heiresses and to the large dowries which are customary. It would surely have been better to have given no [25] dowries at all, or, if any, but small or moderate ones. As the law now stands, a man may bestow his heiress on any one whom he pleases, and, if he die intestate, the privilege of giving her away descends to his heir. Hence, although the country is able to maintain 1500 cavalry and 30,000 hoplites, the whole number of Spartan [30] citizens fell below 1000. The result proves the faulty nature of their laws respecting property; for the city sank under a single defeat; the want of men was their ruin. There is a tradition that, in the days of their ancient kings, they were in the habit of [35] giving the rights of citizenship to strangers, and therefore, in spite of their long wars, no lack of population was experienced by them; indeed, at one time Sparta is said to have numbered not less than 10,000 citizens. Whether this statement is true or not, it would certainly have been better to have maintained their numbers by the equalization of property. Again, the law which relates to the procreation of children [1270<sup>b</sup>1] is adverse to the correction of this inequality. For the legislator, wanting to have as many Spartans as he could, encouraged the citizens to have large families; and there is a law at Sparta that the father of three sons shall be exempt from military service, and he who has four from all the burdens of the state. Yet it is obvious that, [5] if there were many children, the land being distributed as it is, many of them must necessarily fall into poverty.

The Lacedaemonian constitution is defective also in respect of the Ephorate. This magistracy has authority in the highest matters, but the Ephors are chosen [10] from the whole people, and so the office is apt to fall into the hands of very poor men, who, being badly off, are open to bribes. There have been many examples at Sparta of this evil in former times; and quite recently, in the matter of the Andrians, certain of the Ephors who were bribed did their best to ruin the state. And so great [15]

and tyrannical is their power, that even the kings have been compelled to court them, so that, in this way as well, together with the royal office the whole constitution has deteriorated, and from being an aristocracy has turned into a democracy. The Ephorate certainly does keep the state together; for the people are contented when they have a share in the highest office, and the result, whether due [20] to the legislator or to chance, has been advantageous. For if a constitution is to be permanent, all the parts of the state must wish that it should exist and these arrangements be maintained. This is the case at Sparta, where the kings desire its permanence because they have due honour in their own persons; the nobles because [25] they are represented in the council of elders (for the office of elder is a reward of excellence); and the people, because all are eligible for the Ephorate. The election of Ephors out of the whole people is perfectly right, but ought not to be carried on in the present fashion, which is too childish. Again, they have the decision of great causes, although they are quite ordinary men, and therefore they should not [30] determine them merely on their own judgement, but according to written rules, and to the laws. Their way of life, too, is not in accordance with the spirit of the constitution—they have a deal too much license; whereas, in the case of the other citizens, the excess of strictness is so intolerable that they run away from the law [35] into the secret indulgence of sensual pleasures.

Again, the council of elders is not free from defects. It may be said that the elders are good men and well trained in manly virtue; and that, therefore, there is an advantage to the state in having them. But that judges of important causes should hold office for life is a disputable thing, for the mind grows old as well as the body. [1271<sup>a</sup>1] And when men have been educated in such a manner that even the legislator himself cannot trust them, there is real danger. Many of the elders are well known to have taken bribes and to have been guilty of partiality in public affairs. And [5] therefore they ought not to be non-accountable; yet at Sparta they are so. All magistracies are accountable to the Ephors. But this prerogative is too great for them, and we maintain that the control should be exercised in some other manner. Further, the mode in which the Spartans elect their elders is childish; and it is [10] improper that the person to be elected should canvass for the office; the worthiest should be appointed, whether he chooses or not. And here the legislator clearly indicates the same intention which appears in other parts of his constitution; he would have his citizens ambitious, and he has reckoned upon this quality in the [15] election of the elders; for no one would ask

to be elected if he were not. Yet ambition and avarice, almost more than any other passions, are the motives of voluntary injustices.

Whether kings are or are not an advantage to states, I will consider at another [20] time; they should at any rate be chosen, not as they are now, but with regard to their personal life and conduct. The legislator himself obviously did not suppose that he could make them really good men; at least he shows a great distrust of their virtue. For this reason the Spartans used to join enemies with them in the same embassy, [25] and the quarrels between the kings were held to preserve the state.

Neither did the first introducer of the common meals, called 'phiditia', regulate them well. The entertainment ought to have been provided at public cost, as in Crete; but among the Lacedaemonians everyone is expected to contribute, and [30] some of them are too poor to afford the expense; thus the intention of the legislator is frustrated. The common meals were meant to be a democratic institution, but the existing manner of regulating them is the reverse of democratic. For the very poor can scarcely take part in them; and, according to ancient custom, those who cannot [35] contribute are not allowed to retain their rights of citizenship.

The law about the Spartan admirals has often been censured, and with justice; it is a source of dissension, for the kings are perpetual generals, and this office of admiral is but the setting up of another king.

The charge which Plato brings, in the *Laws*, against the intention of the [1271<sup>b</sup>1] legislator, is likewise justified; the whole constitution has regard to one part of excellence only—the excellence of the soldier, which gives victory in war. So long as they were at war, therefore, their power was preserved, but when they had attained empire they fell, for of the arts of peace they knew nothing, and have never engaged [5] in any employment higher than war. There is another error, equally great, into which they have fallen. Although they truly think that the goods for which men contend are to be acquired by excellence rather than by vice, they err in supposing [10] that these goods are to be preferred to the excellence which gains them.

Again, the revenues of the state are ill-managed; there is no money in the treasury, although they are obliged to carry on great wars, and they are unwilling to pay taxes. The greater part of the land being in the hands of Spartans, they do not look closely into one another's contributions. The result which the legislator has [15] produced is the reverse of beneficial; for he has made his city poor, and his citizens greedy.

Enough respecting the Spartan constitution, of which these are the principal defects.

[20] **10** · The Cretan constitution nearly resembles the Spartan, and in some few points is quite as good; but for the most part less perfect in form. The older constitutions are generally less elaborate than the later, and the Lacedaemonian is said to be, and probably is, in a very great measure, a copy of the Cretan. According [25] to tradition, Lycurgus, when he ceased to be the guardian of King Charillus, went abroad and spent most of his time in Crete. For the two countries are nearly connected; the Lychians are a colony of the Lacedaemonians, and the colonists, [30] when they came to Crete, adopted the constitution which they found existing among the inhabitants. Even to this day the Perioeci are governed by the original laws which Minos is supposed to have enacted. The island seems to be intended by nature for dominion in Hellas, and to be well situated; it extends right across the sea, [35] around which nearly all the Hellenes are settled; and while one end is not far from the Peloponnese, the other almost reaches to the region of Asia about Triopium and Rhodes. Hence Minos acquired the empire of the sea, subduing some of the islands [40] and colonizing others; at last he invaded Sicily, where he died near Camicus.

The Cretan institutions resemble the Lacedaemonian. The Helots are the [1272<sup>a</sup>1] husbandmen of the one, the Perioeci of the other, and both Cretans and Lacedaemonians have common meals, which were anciently called by the Lacedaemonians not 'phiditia' but 'andria'; and the Cretans have the same word, the use of which proves that the common meals originally came from Crete. Further, the two [5] constitutions are similar; for the office of the Ephors is the same as that of the Cretan Cosmi, the only difference being that whereas the Ephors are five, the Cosmi are ten in number. The elders, too, answer to the elders in Crete, who are termed by the Cretans the council. And the kingly office once existed in Crete, but [10] was abolished, and the Cosmi have now the duty of leading them in war. All classes share in the ecclesia, but it can only ratify the decrees of the elders and the Cosmi.

The common meals of Crete are certainly better managed than the Lacedaemonian; [15] for in Lacedaemon every one pays so much per head, or, if he fails, the law, as I have already explained, forbids him to exercise the rights of citizenship. But in Crete they are of a more popular character. There, of all the fruits of the earth the cattle raised on the



public lands, and of the tribute which is paid by the Perioeci, one [20] portion is assigned to the gods and to the service of the state, and another to the common meals, so that men, women, and children are all supported out of a common stock. The legislator has many ingenious ways of securing moderation in eating, which he conceives to be a gain; he likewise encourages the separation of men from women, lest they should have too many children, and the companionship [25] of men with one another—whether this is a good or bad thing I shall have an opportunity of considering at another time. Thus that the Cretan common meals are better ordered than the Lacedaemonian there can be no doubt.

On the other hand, the Cosmi are even a worse institution than the Ephors, of which they have all the evils without the good. Like the Ephors, they are any chance [30] persons, but in Crete this is not counterbalanced by a corresponding political advantage. At Sparta everyone is eligible, and the body of the people, having a share in the highest office, want the constitution to be permanent. But in Crete the Cosmi are elected out of certain families, and not out of the whole people, and the elders out of those who have been Cosmi. [35]

The same criticism may be made about the Cretan, which has been already made about the Lacedaemonian affairs. Their unaccountability and life tenure is too great a privilege, and their arbitrary power of acting upon their own judgement, and dispensing with written law, is dangerous. It is no proof of the goodness of the institution that the people are not discontented at being excluded from it. For there [40] is no profit to be made out of the office as out of the Ephorate, since, unlike the Ephors, the Cosmi, being in an island, are removed from temptation. [1272<sup>b</sup>1]

The remedy by which they correct the evil of this institution is an extraordinary one, suited rather to a dynasty than to a constitutional state. For the Cosmi are often expelled by a conspiracy of their own colleagues, or of private individuals; and they are allowed also to resign before their term of office has expired. Surely all [5] matters of this kind are better regulated by law than by the will of man, which is a very unsafe rule. Worst of all is the suspension of the office of Cosmi, a device to which the nobles often have recourse when they will not submit to justice. This shows that the Cretan government, although possessing some of the characteristics [10] of a constitutional state, is really a dynasty.

The nobles have a habit, too, of setting up a chief; they get together a party among the common people and their own friends and then quarrel and fight with one another. What is this but the temporary destruction of

the state and dissolution of society? A city is in a dangerous condition when those who are willing are also [15] able to attack her. But, as I have already said, the island of Crete is saved by her situation; distance has the same effect as the prohibition of strangers. This is the reason why the Perioeci are contented in Crete, whereas the Helots are perpetually revolting. For the Cretans have no foreign dominions and, when lately foreign [20] invaders found their way into the island, the weakness of the Cretan constitution was revealed. Enough of the government of Crete.

11 · The Carthaginians are also considered to have an excellent form of government, which differs from that of any other state in several respects, though it [25] is in some very like the Lacedaemonian. Indeed, all three states—the Lacedaemonian, the Cretan, and the Carthaginian—nearly resemble one another, and are very different from any others. Many of the Carthaginian institutions are excellent. The superiority of their constitution is proved by the fact that the common people [30] remains loyal to the constitution; the Carthaginians have never had any rebellion worth speaking of, and have never been under the rule of a tyrant.

Among the points in which the Carthaginian constitution resembles the Lacedaemonian are the following:—The common tables of the clubs answer to the Spartan phiditia, and their magistracy of the 104 to the Ephors; but, whereas the Ephors are any chance persons, the magistrates of the Carthaginians are elected according to merit—this is an improvement. They have also their kings and their [35] council of elders, who correspond to the kings and elders of Sparta. Their kings, unlike the Spartan, are not always of the same family, nor that an ordinary one, but if there is some distinguished family they are selected out of it and not appointed by seniority—this is far better. Such officers have great power, and therefore, if they [1273<sup>a</sup>1] are persons of little worth, do a great deal of harm, and they have already done harm at Lacedaemon.

Most of the defects or deviations from the perfect state, for which the Carthaginian constitution would be censured, apply equally to all the forms of [5] government which we have mentioned. But of the deflections from aristocracy and constitutional government, some incline more to democracy and some to oligarchy. The kings and elders, if unanimous, may determine whether they will or will not bring a matter before the people, but when they are not unanimous, the people decide on such matters as well. And whatever the kings and elders bring before the [10]

people is not only heard but also determined by them, and anyone who likes may oppose it; now this is not permitted in Sparta and Crete. That the magistracies of five who have under them many important matters should be co-opted, that they [15] should choose the supreme council of 100, and should hold office longer than other magistrates (for they are virtually rulers both before and after they hold office)—these are oligarchical features; their being without salary and not elected by lot, and any similar points, such as the practice of having all suits tried by the magistrates, [20] and not some by one class and some by another, as at Lacedaemon, are characteristic of aristocracy. The Carthaginian constitution deviates from aristocracy and inclines to oligarchy, chiefly on a point where popular opinion is on their side. For men in general think that magistrates should be chosen not only for their [25] merit, but for their wealth: a man, they say, who is poor cannot rule well—he has not the leisure. If, then, election of magistrates for their wealth be characteristic of oligarchy, and election for merit of aristocracy, there will be a third form under which the constitution of Carthage is comprehended; for the Carthaginians choose [30] their magistrates, and particularly the highest of them—their kings and generals—with an eye both to merit and to wealth.

But we must acknowledge that, in thus deviating from aristocracy, the legislator has committed an error. Nothing is more absolutely necessary than to provide that the highest class, not only when in office, but when out of office, should have leisure and not disgrace themselves in any way; and to this his attention should [35] be first directed. Even if you must have regard to wealth, in order to secure leisure, yet it is surely a bad thing that the greatest offices, such as those of kings and generals, should be bought. The law which allows this abuse makes wealth of more account than excellence, and the whole state becomes avaricious. For, whenever the chiefs of the state deem anything honourable, the other citizens are sure to follow [1273<sup>b</sup>1] their example; and, where excellence has not the first place, there aristocracy cannot be firmly established. Those who have been at the expense of purchasing their places will be in the habit of repaying themselves; and it is absurd to suppose that a poor and honest man will be wanting to make gains, and that a lower stamp of [5] man who has incurred a great expense will not. That is why they should rule who are able to rule best. And even if the legislator does not care to protect the good from poverty, he should at any rate secure leisure for them when in office.

It would seem also to be a bad principle that the same person should

hold many offices, which is a favourite practice among the Carthaginians, for one business is better done by one man. The legislator should see to this and should not appoint the [10] same person to be a flute-player and a shoemaker. Hence, where the state is large, it is more in accordance both with constitutional and with democratic principles that the offices of state should be distributed among many persons. For, as I said, this arrangement is fairer to all, and any action familiarized by repetition is better and [15] sooner performed. We have a proof in military and naval matters; the duties of command and of obedience in both these services extend to all.

The government of the Carthaginians is oligarchical, but they successfully escape the evils of oligarchy by being wealthy, sending out one portion of the people after another to the cities. This is their panacea and the means by which they give [20] stability to the state. This is the result of chance but it is the legislator who should be able to provide against revolution. As things are, if any misfortune occurred, and the bulk of the subjects revolted, there would be no way of restoring peace by legal methods.

Such is the character of the Lacedaemonian, Cretan, and Carthaginian [25] constitutions, which are justly celebrated.

12 · Of those who have treated of governments, some have never taken any part at all in public affairs, but have passed their lives in a private station; about most of them, what was worth telling has been already told. Others have been [30] lawgivers, either in their own or in foreign cities, whose affairs they have administered; and of these some have only made laws, others have framed constitutions; for example, Lycurgus and Solon did both. Of the Lacedaemonian [35] constitution I have already spoken. As to Solon, he is thought by some to have been a good legislator, who put an end to the exclusiveness of the oligarchy, emancipated the people, established the ancient Athenian democracy, and harmonized the different elements of the state. According to their view, the council of Areopagus [40] was an oligarchical element, the elected magistracy, aristocratic, and the courts of law, democratic. The truth seems to be that the council and the elected magistracy existed before the time of Solon, and were retained by him, but that he formed the [1274<sup>a</sup>1] courts of law out of all the citizens, thus creating the democracy, which is the very reason why he is sometimes blamed. For in giving the supreme power to the law courts, which are elected by lot, he is thought to have

destroyed the non-democratic [5] element. When the law courts grew powerful, to please the people who were now playing the tyrant the old constitution was changed into the existing democracy. Ephialtes and Pericles curtailed the power of the Areopagus; Pericles also instituted the payment of the juries, and thus every demagogue in turn increased the power of [10] the democracy until it became what we now see. All this seems, however, to be the result of circumstances, and not to have been intended by Solon. For the people, having been instrumental in gaining the empire of the sea in the Persian War, began to get a notion of itself, and followed worthless demagogues, whom the better class opposed. Solon, himself, appears to have given the Athenians only that power of [15] electing to offices and calling to account the magistrates which was absolutely necessary; for without it they would have been in a state of slavery and enmity to the government. All the magistrates he appointed from the notables and the men of [20] wealth, that is to say, from the pentacosimedimni, or from the class called zeugitae, or from a third class of so-called knights. The fourth class were labourers who had no share in any magistracy.

Mere legislators were Zaleucus, who gave laws to the Epizephyrian Locrians, and Charondas, who legislated for his own city of Catana, and for the other [25] Chalcidian cities in Italy and Sicily. Some people attempt to make out that Onomacritus was the first person who had any special skill in legislation, and that he, although a Locrian by birth, was trained in Crete, where he lived in the exercise of his prophetic art; that Thales was his companion, and that Lycurgus and [30] Zaleucus were disciples of Thales, as Charondas was of Zaleucus. But their account is quite inconsistent with chronology.

There was also Philolaus, the Corinthian, who gave laws to the Thebans. This Philolaus was one of the family of the Bacchiadae, and a lover of Diocles, the Olympic victor, who left Corinth in horror of the incestuous passion which his [35] mother Halcyone had conceived for him, and retired to Thebes, where the two friends together ended their days. The inhabitants still point out their tombs, which are in full view of one another, but one is visible from the Corinthian territory, the [40] other not. Tradition says the two friends arranged them thus, Diocles out of horror at his misfortunes, so that the land of Corinth might not be visible from his tomb; [1274<sup>b1</sup>] Philolaus that it might. This is the reason why they settled at Thebes, and so Philolaus legislated for the Thebans, and, besides some other enactments, gave them laws about the procreation of children, which they call the 'Laws of Adoption'. [5] These

laws were peculiar to him, and were intended to preserve the number of the lots.

In the legislation of Charondas there is nothing distinctive, except the suits against false witnesses. He is the first who instituted denunciation for perjury. His laws are more exact and more precisely expressed than even those of our modern legislators.

[10] (Characteristic of Phaleas is the equalization of property; of Plato, the community of women, children, and property, the common meals of women, and the law about drinking, that the sober shall be masters of the feast; also the training of soldiers to acquire by practice equal skill with both hands, so that one should be as useful as the other.)

[15] Draco has left laws, but he adapted them to a constitution which already existed, and there is no peculiarity in them which is worth mentioning, except the greatness and severity of the punishments.

Pittacus, too, was only a lawgiver, and not the author of a constitution; he has a law which is peculiar to him, that, if a drunken man do something wrong, he shall be [20] more heavily punished than if he were sober; he looked not to the excuse which might be offered for the drunkard, but only to expediency, for drunken more often than sober people commit acts of violence.

Androdamas of Rhegium gave laws to the Chalcidians of Thrace. Some of them relate to homicide, and to heiresses; but there is nothing distinctive in [25] them.

And here let us conclude our inquiry into the various constitutions which either actually exist, or have been devised by theorists.

## BOOK III

1 · He who would inquire into the essence and attributes of various kinds of government must first of all determine what a state is. At present this is a disputed question. Some say that the state has done a certain act; others, not the state, but [35] the oligarchy or the tyrant. And the legislator or statesman is concerned entirely with the state, a government being an arrangement of the inhabitants of a state. But a state is composite, like any other whole made up of many parts—these are the [40] citizens, who compose it. It is evident, therefore, that we must begin by asking, Who is the citizen, and what is the meaning of the term? For here again there may be a [1275<sup>a</sup>1] difference of opinion. He who is a citizen in a democracy will often not be a citizen in an oligarchy. Leaving out of consideration those who have been made citizens, or [5] who have obtained the name of citizen in any other accidental manner, we may say, first, that a citizen is not a citizen because he lives in a certain place, for resident aliens and slaves share in the place; nor is he a citizen who has legal rights to the extent of suing and being sued; for this right may be enjoyed under the provisions of [10] a treaty. Resident aliens in many places do not possess even such rights completely, for they are obliged to have a patron, so that they do but imperfectly participate in the community, and we call them citizens only in a qualified sense, as we might apply the term to children who are too young to be on the register, or to old men who [15] have been relieved from state duties. Of these we do not say quite simply that they are citizens, but add in the one case that they are not of age, and in the other, that they are past the age, or something of that sort; the precise expression is immaterial, for our meaning is clear. Similar difficulties to those which I have mentioned may be raised and answered about disfranchised citizens and about exiles. But the citizen whom we are seeking to define is a citizen in the strictest sense, against whom no such exception can be taken, and his special characteristic is that he [20] shares in the administration of justice, and in offices. Now of offices some are discontinuous, and the same persons are not allowed to hold them twice, or can only [25] hold them after a fixed interval; others have no limit of time—for example, the office of juryman or member of the assembly. It may, indeed, be argued that these are not magistrates at all, and that their functions give them no

share in the government. But surely it is ridiculous to say that those who have the supreme power do not govern. Let us not dwell further upon this, which is a purely verbal [30] question; what we want is a common term including both juryman and member of the assembly. Let us, for the sake of distinction, call it 'indefinite office', and we will assume that those who share in such office are citizens. This is the most comprehensive definition of a citizen, and best suits all those who are generally so called.

[35] But we must not forget that things of which the underlying principles differ in kind, one of them being first, another second, another third, have, when regarded in this relation, nothing, or hardly anything, worth mentioning in common. Now we see that governments differ in kind, and that some of them are prior and that others [1275<sup>b</sup>1] are posterior; those which are faulty or perverted are necessarily posterior to those which are perfect. (What we mean by perversion will be hereafter explained.) The citizen then of necessity differs under each form of government; and our definition [5] is best adapted to the citizen of a democracy; but not necessarily to other states. For in some states the people are not acknowledged, nor have they any regular assembly, but only extraordinary ones; and law-suits are distributed by sections among the magistrates. At Lacedaemon, for instance, the Ephors determine suits [10] about contracts, which they distribute among themselves, while the elders are judges of homicide, and other causes are decided by other magistrates. A similar principle prevails at Carthage; there certain magistrates decide all causes. We may, indeed, modify our definition of the citizen so as to include these states. In them it is [15] the holder of a definite, not an indefinite office, who is juryman and member of the assembly, and to some or all such holders of definite offices is reserved the right of deliberating or judging about some things or about all things. The conception of the citizen now begins to clear up.

He who has the power to take part in the deliberative or judicial administration [20] of any state is said by us to be a citizen of that state; and, speaking generally, a state is a body of citizens sufficing for the purposes of life.

2 · But in practice a citizen is defined to be one of whom both the parents are citizens (and not just one, i.e. father or mother); others insist on going further back; [25] say to two or three or more ancestors. This is a short and practical definition; but there are some who raise the further question of how this third or fourth ancestor came to be a citizen. Gorgias



of Leontini, partly because he was in a difficulty, partly in irony, said that mortars are what is made by the mortar-makers, and the citizens of Larissa are those who are made by the magistrates; for it is their trade to [30] 'make Larissaeans'. Yet the question is really simple, for, if according to the definition just given they shared in the government, they were citizens. This is a better definition than the other. For the words, 'born of a father or mother who is a citizen', cannot possibly apply to the first inhabitants or founders of a state.

There is a greater difficulty in the case of those who have been made citizens [35] after a revolution, as by Cleisthenes at Athens after the expulsion of the tyrants, for he enrolled in tribes many metics, both strangers and slaves. The doubt in these cases is, not who is, but whether he who is ought to be a citizen; and there will still be [1276<sup>a</sup>1] a further doubt, whether he who ought not to be a citizen, is one in fact, for what ought not to be is what is false. Now, there are some who hold office, and yet ought not to hold office, whom we describe as ruling, but ruling unjustly. And the citizen was defined by the fact of his holding some kind of rule or office—he who holds a certain sort of office fulfils our definition of a citizen. It is evident, therefore, that the citizens about whom the doubt has arisen must be called citizens. [5]

3 · Whether they ought to be so or not is a question which is bound up with the previous inquiry. For a parallel question is raised respecting the state, whether a certain act is or is not an act of the state; for example, in the transition from an oligarchy or a tyranny to a democracy. In such cases persons refuse to fulfil their contracts or any other obligations, on the ground that the tyrant and not the state, [10] contracted them; they argue that some constitutions are established by force, and not for the sake of the common good. But this would apply equally to democracies, and then the acts of the democracy will be neither more nor less acts of the state in [15] question than those of an oligarchy or of a tyranny. This question runs up into another:—on what principle shall we ever say that the state is the same, or different? It would be a very superficial view which considered only the place and [20] the inhabitants (for the soil and the population may be separated, and some of the inhabitants may live in one place and some in another). This, however, is not a very serious difficulty; we need only remark that the word 'state' is ambiguous.

It is further asked: When are men, living in the same place, to be

regarded as a [25] single city—what is the limit? Certainly not the wall of the city, for you might surround all Peloponnesus with a wall. Babylon, we may say, is like this, and every city that has the compass of a nation rather than a city; Babylon, they say, had been taken for three days before some part of the inhabitants become aware of the fact. [30] This difficulty may, however, with advantage be deferred to another occasion; the statesman has to consider the size of the state, and whether it should consist of more than one race or not.

Again, shall we say that while the race of inhabitants remains the same, the [35] city is also the same, although the citizens are always dying and being born, as we call rivers and fountains the same, although the water is always flowing away and more coming? Or shall we say that the generations of men, like the rivers, are the same, but that the state changes? For, since the state is a partnership, and is a [1276<sup>b</sup>1] partnership of citizens in a constitution, when the form of the government changes, and becomes different, then it may be supposed that the state is no longer the same, just as a tragic differs from a comic chorus, although the members of both may be [5] identical. And in this manner we speak of every union or composition of elements as different when the form of their composition alters; for example, a scale containing the same sounds is said to be different, accordingly as the Dorian or the Phrygian mode is employed. And if this is true it is evident that the sameness of the state [10] consists chiefly in the sameness of the constitution, and it may be called or not called by the same name, whether the inhabitants are the same or entirely different. It is quite another question, whether a state ought or ought not to fulfil engagements when the form of government changes. [15]

4 · There is a point nearly allied to the preceding: Whether the excellence of a good man and a good citizen is the same or not. But before entering on this discussion, we must certainly first obtain some general notion of the excellence of [20] the citizen. Like the sailor, the citizen is a member of a community. Now, sailors have different functions, for one of them is a rower, another a pilot, and a third a look-out man, a fourth is described by some similar term; and while the precise [25] definition of each individual's excellence applies exclusively to him, there is, at the same time, a common definition applicable to them all. For they have all of them a common object, which is safety in navigation. Similarly, one citizen differs from another, but the salvation

of the community is the common business of them all. [30] This community is the constitution; the excellence of the citizen must therefore be relative to the constitution of which he is a member. If, then, there are many forms of government, it is evident that there is not one single excellence of the good citizen which is perfect excellence. But we say that the good man is he who has one single excellence which is perfect excellence. Hence it is evident that the good citizen need [35] not of necessity possess the excellence which makes a good man.

The same question may also be approached by another road, from a consideration of the best constitution. If the state cannot be entirely composed of good men, and yet each citizen is expected to do his own business well, and must therefore have excellence, still, inasmuch as all the citizens cannot be alike, the excellence of the [1277<sup>a</sup>1] citizen and of the good man cannot coincide. All must have the excellence of the good citizen—thus, and thus only, can the state be perfect; but they will not have the excellence of a good man, unless we assume that in the good state all the citizens must be good.

[5] Again, the state, as composed of unlikes, may be compared to the living being: as the first elements into which a living being is resolved are soul and body, as soul is made up of rational principle and appetite, the family of husband and wife, property of master and slave, so of all these, as well as other dissimilar elements, the state is [10] composed; and therefore the excellence of all the citizens cannot possibly be the same, any more than the excellence of the leader of a chorus is the same as that of the performer who stands by his side. I have said enough to show why the two kinds of excellence cannot be absolutely the same.

But will there then be no case in which the excellence of the good citizen and the excellence of the good man coincide? To this we answer that the good *ruler* is a [15] good and wise man, but the citizen need not be wise. And some persons say that even the education of the ruler should be of a special kind; for are not the children of kings instructed in riding and military exercises? As Euripides says:

No subtle arts for me, but what the state requires.

[20] As though there were a special education needed for a ruler. If the excellence of a good ruler is the same as that of a good man, and we assume further that the subject is a citizen as well as the ruler, the excellence of the good citizen and the excellence of the good man cannot be absolutely the same, although in some cases they may; for the

excellence of a ruler differs from that of a citizen. It was the sense of this difference which made Jason say that 'he felt hungry when he was not a tyrant', [25] meaning that he could not endure to live in a private station. But, on the other hand, it may be argued that men are praised for knowing both how to rule and how to obey, and he is said to be a citizen of excellence who is able to do both well. Now if we suppose the excellence of a good man to be that which rules, and the excellence of the citizen to include ruling and obeying, it cannot be said that they are equally worthy of praise. Since, then, it is sometimes thought that the ruler and the ruled must learn different things and not the same, but that the citizen must know and [30] share in them both, the inference is obvious. There is, indeed, the rule of a master, which is concerned with menial offices—the master need not know how to perform these, but may employ others in the execution of them: the other would be degrading; and by the other I mean the power actually to do menial duties, which [35] vary much in character and are executed by various classes of slaves, such, for example, as handicraftsmen, who, as their name signifies, live by the labour of their hands—under these the mechanic is included. Hence in ancient times, and among [1277<sup>b</sup>1] some nations, the working classes had no share in the government—a privilege which they only acquired under extreme democracy. Certainly the good man and the statesman and the good citizen ought not to learn the crafts of inferiors except [5] for their own occasional use; if they habitually practise them, there will cease to be a distinction between master and slave.

But there is a rule of another kind, which is exercised over freemen and equals by birth—a constitutional rule, which the ruler must learn by obeying, as he would learn the duties of a general of cavalry by being under the orders of a general of [10] cavalry, or the duties of a general of infantry by being under the orders of a general of infantry, and by having had the command of a regiment and of a company. It has been well said that he who has never learned to obey cannot be a good commander. The excellence of the two is not the same, but the good citizen ought to be capable of both; he should know how to govern like a freeman, and how to obey like a [15] freeman—these are the excellences of a citizen. And, although the temperance and justice of a ruler are distinct from those of a subject, the excellence of a good man will include both; for the excellence of the good man who is free and also a subject, e.g. his justice, will not be one but will comprise distinct kinds, the one qualifying [20] him to rule, the other to obey, and differing as the temperance and courage of men and women differ. For a man would be thought a coward if he had no

more courage than a courageous woman, and a woman would be thought loquacious if she imposed no more restraint on her conversation than the good man; and indeed their part in the management of the household is different, for the duty of the one is to [25] acquire, and of the other to preserve. Practical wisdom is the only excellence peculiar to the ruler: it would seem that all other excellences must equally belong to ruler and subject. The excellence of the subject is certainly not wisdom, but only true opinion; he may be compared to the maker of the flute, while his master is like the flute-player or user of the flute. [30]

From these considerations may be gathered the answer to the question, whether the excellence of the good man is the same as that of the good citizen, or different, and how far the same, and how far different.

5 · There still remains one more question about the citizen: Is he only a true citizen who has a share of office, or is the mechanic to be included? If they who hold [35] no office are to be deemed citizens, not every citizen can have this excellence; for this man is a citizen. And if none of the lower class are citizens, in which part of the state are they to be placed? For they are not resident aliens, and they are not [1278<sup>a</sup>1] foreigners. May we not reply, that as far as this objection goes there is no more absurdity in excluding them than in excluding slaves and freedmen from any of the above-mentioned classes? It must be admitted that we cannot consider all those to be citizens who are necessary to the existence of the state; for example, children are not citizens equally with grown-up men, who are citizens absolutely, but children, [5] not being grown up, are only citizens on a certain assumption. In ancient times, and among some nations, the artisan class *were* slaves or foreigners, and therefore the majority of them are so now. The best form of state will not admit them to citizenship; but if they are admitted, then our definition of the excellence of a [10] citizen will not apply to every citizen, nor to every free man as such, but only to those who are freed from necessary services. The necessary people are either slaves who minister to the wants of individuals, or mechanics and labourers who are the servants of the community. These reflections carried a little further will explain their position; and indeed what has been said already is of itself, when understood, explanation enough.

[15] Since there are many forms of government there must be many varieties of citizens, and especially of citizens who are subjects; so that

under some governments the mechanic and the labourer will be citizens, but not in others, as, for example, in so-called aristocracies, if there are any, in which honours are given according to [20] excellence and merit; for no man can practise excellence who is living the life of a mechanic or labourer. In oligarchies the qualification for office is high, and therefore no labourer can ever be a citizen; but a mechanic may, for an actual [25] majority of them are rich. At Thebes there was a law that no man could hold office who had not retired from business for ten years. But in many states the law goes to the length of admitting aliens; for in some democracies a man is a citizen though his mother only be a citizen; and a similar principle is applied to illegitimate children [30] among many. Nevertheless they make such people citizens because of the dearth of legitimate citizens (for they introduce this sort of legislation owing to lack of population); so when the number of citizens increases, first the children of a male or a female slave are excluded; then those whose mothers only are citizens; and at last the right of citizenship is confined to those whose fathers and mothers are both citizens.

[35] Hence, as is evident, there are different kinds of citizens; and he is a citizen in the fullest sense who shares in the honours of the state. Compare Homer's words 'like some dishonoured stranger';<sup>1</sup> he who is excluded from the honours of the state is no better than an alien. But when this exclusion is concealed, then its object is to deceive their fellow inhabitants.

[1278<sup>b</sup>1] As to the question whether the excellence of the good man is the same as that of the good citizen, the considerations already adduced prove that in some states the good man and the good citizen are the same, and in others different. When they are the same it is not every citizen who is a good man, but only the statesman and those who have or may have, alone or in conjunction with others, the conduct of public affairs. [5]

6 · Having determined these questions, we have next to consider whether there is only one form of government or many, and if many, what they are, and how many, and what are the differences between them.

A constitution is the arrangement of magistracies in a state, especially of the highest of all. The government is everywhere sovereign in the state, and the [10] constitution is in fact the government. For example, in democracies the people are supreme, but in oligarchies, the few; and,

therefore, we say that these two constitutions also are different: and so in other cases.

First, let us consider what is the purpose of a state, and how many forms of rule [15] there are by which human society is regulated. We have already said, in the first part of this treatise, when discussing household management and the rule of a master, that man is by nature a political animal. And therefore, men, even when they do not require one another's help, desire to live together; not but that they are [20] also brought together by their common interests in so far as they each attain to any measure of well-being. This is certainly the chief end, both of individuals and of states. And mankind meet together and maintain the political community also for [25] the sake of mere life (in which there is possibly some noble element so long as the evils of existence do not greatly overbalance the good). And we all see that men cling to life even at the cost of enduring great misfortune, seeming to find in life a natural sweetness and happiness. [30]

There is no difficulty in distinguishing the various kinds of rule; they have been often defined already in our popular discussions. The rule of a master, although the slave by nature and the master by nature have in reality the same interests, is nevertheless exercised primarily with a view to the interest of the master, but [35] accidentally considers the slave, since, if the slave perish, the rule of the master perishes with him. On the other hand, the government of a wife and children and of a household, which we have called household management, is exercised in the first instance for the good of the governed or for the common good of both parties, but essentially for the good of the governed, as we see to be the case in medicine, [1279<sup>a</sup>1] gymnastic, and the arts in general, which are only accidentally concerned with the good of the artists themselves. For there is no reason why the trainer may not sometimes practise gymnastics, and the helmsman is always one of the crew. The trainer or the helmsman considers the good of those committed to his care. But, [5] when he is one of the persons taken care of, he accidentally participates in the advantage, for the helmsman is also a sailor, and the trainer becomes one of those in training. And so in politics: when the state is framed upon the principle of equality and likeness, the citizens think that they ought to hold office by turns. Formerly, as [10] is natural, everyone would take his turn of service; and then again, somebody else would look after his interest, just as he, while in office, had looked after theirs. But nowadays, for the sake of the advantage which is to be gained from the public revenues and from office, men want to be always in office. One

might imagine that [15] the rulers, being sickly, were only kept in health while they continued in office; in that case we may be sure that they would be hunting after places. The conclusion is evident: that governments which have a regard to the common interest are constituted in accordance with strict principles of justice, and are therefore true [20] forms; but those which regard only the interest of the rulers are all defective and perverted forms, for they are despotic, whereas a state is a community of freemen.

7 · Having determined these points, we have next to consider how many forms of government there are, and what they are; and in the first place what are the [25] true forms, for when they are determined the perversions of them will at once be apparent. The words constitution and government have the same meaning, and the government, which is the supreme authority in states, must be in the hands of one, or of a few, or of the many. The true forms of government, therefore, are those in which the one, or the few, or the many, govern with a view to the common interest; but governments which rule with a view to the private interest, whether of the one, [30] or of the few, or of the many, are perversions. For the members of a state, if they are truly citizens, ought to participate in its advantages. Of forms of government in which one rules, we call that which regards the common interest, kingship; that in [35] which more than one, but not many, rule, aristocracy; and it is so called, either because the rulers are the best men, or because they have at heart the best interests of the state and of the citizens. But when the many administer the state for the common interest, the government is called by the generic name—a constitution. And there is a reason for this use of language. One man or a few may excel in [1279<sup>b</sup>1] excellence; but as the number increases it becomes more difficult for them to attain perfection in every kind of excellence, though they may in military excellence, for this is found in the masses. Hence in a constitutional government the fighting-men have the supreme power, and those who possess arms are the citizens.

Of the above-mentioned forms, the perversions are as follows:—of kingship, [5] tyranny; of aristocracy, oligarchy; of constitutional government, democracy. For tyranny is a kind of monarchy which has in view the interest of the monarch only; oligarchy has in view the interest of the wealthy; democracy, of the needy: none of [10] them the common good of all.



8 · But there are difficulties about these forms of government, and it will therefore be necessary to state a little more at length the nature of each of them. For he who would make a philosophical study of the various sciences, and is not only concerned with practice, ought not to overlook or omit anything, but to set forth the [15] truth in every particular. Tyranny, as I was saying, is monarchy exercising the rule of a master over the political society; oligarchy is when men of property have the government in their hands; democracy, the opposite, when the indigent, and not the [20] men of property, are the rulers. And here arises the first of our difficulties, and it relates to the distinction just drawn. For democracy is said to be the government of the many. But what if the many are men of property and have the power in their hands? In like manner oligarchy is said to be the government of the few; but what if [25] the poor are fewer than the rich, and have the power in their hands because they are stronger? In these cases the distinction which we have drawn between these different forms of government would no longer hold good.

Suppose, once more, that we add wealth to the few and poverty to the many, and name the governments accordingly—an oligarchy is said to be that in which the few and the wealthy, and a democracy that in which the many and the poor are the [30] rulers—there will still be a difficulty. For, if the only forms of government are the ones already mentioned, how shall we describe those other governments also just mentioned by us, in which the rich are the more numerous and the poor are the fewer, and both govern in their respective states?

The argument seems to show that, whether in oligarchies or in democracies, [35] the number of the governing body, whether the greater number, as in a democracy, or the smaller number, as in an oligarchy, is an accident due to the fact that the rich everywhere are few, and the poor numerous. But if so, there is a misapprehension of the causes of the difference between them. For the real difference between democracy and oligarchy is poverty and wealth. Wherever men rule by reason of [1280<sup>a</sup>1] their wealth, whether they be few or many, that is an oligarchy, and where the poor rule, that is a democracy. But in fact the rich are few and the poor many; for few are well-to-do, whereas freedom is enjoyed by all, and wealth and freedom are the [5] grounds on which the two parties claim power in the state.

9 · Let us begin by considering the common definitions of oligarchy

and democracy, and what is oligarchical and democratic justice. For all men cling to justice of some kind, but their conceptions are imperfect and they do not express the [10] whole idea. For example, justice is thought by them to be, and is, equality—not, however, for all, but only for equals. And inequality is thought to be, and is, justice; neither is this for all, but only for unequals. When the persons are omitted, then men judge erroneously. The reason is that they are passing judgement on themselves, [15] and most people are bad judges in their own case. And whereas justice implies a relation to persons as well as to things, and a just distribution, as I have already said in the *Ethics*, implies the same ratio between the persons and between the things, they agree about the equality of the things, but dispute about the equality of the persons, chiefly for the reason which I have just given—because they are bad [20] judges in their own affairs; and secondly, because both the parties to the argument are speaking of a limited and partial justice, but imagine themselves to be speaking of absolute justice. For the one party, if they are unequal in one respect, for example wealth, consider themselves to be unequal in all; and the other party, if they are equal in one respect, for example free birth, consider themselves to be equal in all. But they leave out the capital point. For if men met and associated out of regard to [25] wealth only, their share in the state would be proportioned to their property, and the oligarchical doctrine would then seem to carry the day. It would not be just that he who paid one mina should have the same share of a hundred minae, whether of the [30] principal or of the profits, as he who paid the remaining ninety-nine. But a state exists for the sake of a good life, and not for the sake of life only: if life only were the object, slaves and brute animals might form a state, but they cannot, for they have no share in happiness or in a life based on choice. Nor does a state exist for the sake [35] of alliance and security from injustice, nor yet for the sake of exchange and mutual intercourse; for then the Tyrrhenians and the Carthaginians, and all who have commercial treaties with one another, would be the citizens of one state. True, they have agreements about imports, and engagements that they will do no wrong to one [1280<sup>b</sup>1] another, and written articles of alliance. But there are no magistracies common to the contracting parties; different states have each their own magistracies. Nor does one state take care that the citizens of the other are such as they ought to be, nor see that those who come under the terms of the treaty do no wrong or wickedness at all, but only that they do no injustice to one another. Whereas, those who care for good [5] government take into consideration political excellence and defect.

Whence it may be further inferred that excellence must be the care of a state which is truly so called, and not merely enjoys the name: for without this end the community becomes a mere alliance which differs only in place from alliances of which the [10] members live apart; and law is only a convention, 'a surety to one another of justice', as the sophist Lycophron says, and has no real power to make the citizens good and just.

[15] This is obvious; for suppose distinct places, such as Corinth and Megara, to be brought together so that their walls touched, still they would not be one city, not even if the citizens had the right to intermarry, which is one of the rights peculiarly characteristic of states. Again, if men dwelt at a distance from one another, but not so far off as to have no intercourse, and there were laws among them that they [20] should not wrong each other in their exchanges, neither would this be a state. Let us suppose that one man is a carpenter, another a farmer, another a shoemaker, and so on, and that their number is ten thousand: nevertheless, if they have nothing in common but exchange, alliance, and the like, that would not constitute a state. Why is this? Surely not because they are at a distance from one another; for even [25] supposing that such a community were to meet in one place, but that each man had a house of his own, which was in a manner his state, and that they made alliance with one another, but only against evil-doers; still an accurate thinker would not deem this to be a state, if their intercourse with one another was of the same character after as before their union. It is clear then that a state is not a mere [30] society, having a common place, established for the prevention of mutual crime and for the sake of exchange. These are conditions without which a state cannot exist; but all of them together do not constitute a state, which is a community of families and aggregations of families in well-being, for the sake of a perfect and self-sufficing [35] life. Such a community can only be established among those who live in the same place and intermarry. Hence there arise in cities family connexions, brotherhoods, common sacrifices, amusements which draw men together. But these are created by friendship, for to choose to live together is friendship. The end of the state is the good life, and these are the means towards it. And the state is the union [1281<sup>a</sup>1] of families and villages in a perfect and self-sufficing life, by which we mean a happy and honourable life.

Our conclusion, then, is that political society exists for the sake of noble actions, and not of living together. Hence they who contribute most to such a society have a greater share in it than those who have the same

or a greater freedom or [5] nobility of birth but are inferior to them in political excellence; or than those who exceed them in wealth but are surpassed by them in excellence.

From what has been said it will be clearly seen that all the partisans of different forms of government speak of a part of justice only. [10]

**10** · There is also a doubt as to what is to be the supreme power in the state:—Is it the multitude? Or the wealthy? Or the good? Or the one best man? Or a tyrant? Any of these alternatives seems to involve disagreeable consequences. If the poor, for example, because they are more in number, divide among themselves [15] the property of the rich—is not this unjust? No, by heaven (will be the reply), for the supreme authority justly willed it. But if this is not extreme injustice, what is? Again, when in the first division all has been taken, and the majority divide anew the property of the minority, is it not evident, if this goes on, that they will ruin the state? Yet surely, excellence is not the ruin of those who possess it, nor is justice destructive of a state; and therefore this law of confiscation clearly cannot be just. If [20] it were, all the acts of a tyrant must of necessity be just; for he only coerces other men by superior power, just as the multitude coerce the rich. But is it just then that the few and the wealthy should be the rulers? And what if they, in like manner, rob and plunder the people—is this just? If so, the other case will likewise be just. But [25] there can be no doubt that all these things are wrong and unjust.

Then ought the good to rule and have supreme power? But in that case everybody else, being excluded from power, will be dishonoured. For the offices of a [30] state are posts of honour; and if one set of men always hold them, the rest must be deprived of them. Then will it be well that the one best man should rule? That is still more oligarchical, for the number of those who are dishonoured is thereby increased. Someone may say that it is bad in any case for a man, subject as he is to [35] all the accidents of human passion, to have the supreme power, rather than the law. But what if the law itself be democratic or oligarchical, how will that help us out of our difficulties? Not at all; the same consequences will follow.

**11** · Most of these questions may be reserved for another occasion. The [40] principle that the multitude ought to be in power rather than the few best might seem to be solved and to contain some difficulty and

perhaps even truth.<sup>2</sup> For the many, of whom each individual is not a good man, when they meet together may be [1281<sup>b</sup>1] better than the few good, if regarded not individually but collectively, just as a feast to which many contribute is better than a dinner provided out of a single purse. For each individual among the many has a share of excellence and practical wisdom, and when they meet together, just as they become in a manner one man, who has [5] many feet, and hands, and senses, so too with regard to their character and thought. Hence the many are better judges than a single man of music and poetry; for some understand one part, and some another, and among them they understand the [10] whole. There is a similar combination of qualities in good men, who differ from any individual of the many, as the beautiful are said to differ from those who are not beautiful, and works of art from realities, because in them the scattered elements are combined, although, if taken separately, the eye of one person or some other [15] feature in another person would be fairer than in the picture. Whether this principle can apply to every democracy, and to all bodies of men, is not clear. Or rather, by heaven, in some cases it is impossible to apply; for the argument would equally hold [20] about brutes; and wherein, it will be asked, do some men differ from brutes? But there may be bodies of men about whom our statement is nevertheless true. And if so, the difficulty which has been already raised, and also another which is akin to it—viz. what power should be assigned to the mass of freemen and citizens, who are [25] not rich and have no personal merit—are both solved. There is still a danger in allowing them to share the great offices of state, for their folly will lead them into error, and their dishonesty into crime. But there is a danger also in not letting them share, for a state in which many poor men are excluded from office will necessarily [30] be full of enemies. The only way of escape is to assign to them some deliberative and judicial functions. For this reason Solon and certain other legislators give them the power of electing to offices, and of calling the magistrates to account, but they do [35] not allow them to hold office singly. When they meet together their perceptions are quite good enough, and combined with the better class they are useful to the state (just as impure food when mixed with what is pure sometimes makes the entire mass more wholesome than a small quantity of the pure would be), but each individual, left to himself, forms an imperfect judgement. On the other hand, the popular form of government involves certain difficulties. In the first place, it might [40] be objected that he who can judge of the healing of a sick man would be one who could himself heal his disease, and make him whole—that is, in

other words, the [1282<sup>a</sup>1] physician; and so in all professions and arts. As, then, the physician ought to be called to account by physicians, so ought men in general to be called to account by their peers. But physicians are of three kinds:—there is the ordinary practitioner, and there is the master physician, and thirdly the man educated in the art: in all arts [5] there is such a class; and we attribute the power of judging to them quite as much as to professors of the art. Secondly, does not the same principle apply to elections? For a right election can only be made by those who have knowledge; those who know geometry, for example, will choose a geometrician rightly, and those who know how [10] to steer, a pilot; and, even if there be some occupations and arts in which private persons share in the ability to choose, they certainly cannot choose better than those who know. So that, according to this argument, neither the election of magistrates, nor the calling of them to account, should be entrusted to the many. Yet possibly [15] these objections are to a great extent met by our old answer, that if the people are not utterly degraded, although individually they may be worse judges than those who have special knowledge, as a body they are as good or better. Moreover, there are some arts whose products are not judged of solely, or best, by the artists themselves, namely those arts whose products are recognized even by those who do not possess the art; for example, the knowledge of the house is not limited to the [20] builder only; the user, or, in other words, the master, of the house will actually be a better judge than the builder, just as the pilot will judge better of a rudder than the carpenter, and the guest will judge better of a feast than the cook.

This difficulty seems now to be sufficiently answered, but there is another akin to it. That inferior persons should have authority in greater matters than the good [25] would appear to be a strange thing, yet the election and calling to account of the magistrates is the greatest of all. And these, as I was saying, are functions which in some states are assigned to the people, for the assembly is supreme in all such matters. Yet persons of any age, and having but a small property qualification, sit in [30] the assembly and deliberate and judge, although for the great officers of state, such as treasurers and generals, a high qualification is required. This difficulty may be solved in the same manner as the preceding, and the present practice of democracies may be really defensible. For the power does not reside in the juryman, or counsellor, or member of the assembly, but in the court, and the council, and the [35] assembly, of which the aforesaid individuals—counsellor, assemblyman, juryman—are only parts or members. And for this reason

the many may claim to have a higher authority than the few; for the people, and the council, and the courts consist of many persons, and their property collectively is greater than the property of one [40] or of a few individuals holding great offices. But enough of this.

The discussion of the first question shows nothing so clearly as that laws, when [1282<sup>b</sup>1] good, should be supreme; and that the magistrate or magistrates should regulate those matters only on which the laws are unable to speak with precision owing to the difficulty of any general principle embracing all particulars. But what are good laws [5] has not yet been clearly explained; the old difficulty remains. The goodness or badness, justice or injustice, of laws varies of necessity with the constitutions of states. This, however, is clear, that the laws must be adapted to the constitutions [10] But, if so, true forms of government will of necessity have just laws, and perverted forms of government will have unjust laws.

12 · In all sciences and arts the end is a good, and the greatest good and in the highest degree a good in the most authoritative of all—this is the political [15] science of which the good is justice, in other words, the common interest. All men think justice to be a sort of equality; and to a certain extent they agree with what we have said in our philosophical works about ethics. For they say that what is just is [20] just *for* someone and that it should be equal for equals. But there still remains a question: equality or inequality of what? Here is a difficulty which calls for political speculation. For very likely some persons will say that offices of state ought to be unequally distributed according to superior excellence, in whatever respect, of the citizen, although there is no other difference between him and the rest of the [25] community; for those who differ in any one respect have different rights and claims. But, surely, if this is true, the complexion or height of a man, or any other advantage, will be a reason for his obtaining a greater share of political rights. The error here lies upon the surface, and may be illustrated from the other arts and [30] sciences. When a number of flute-players are equal in their art, there is no reason why those of them who are better born should have better flutes given to them; for they will not play any better on the flute, and the superior instrument should be [35] reserved for him who is the superior artist. If what I am saying is still obscure, it will be made clearer as we proceed. For if there were a superior flute-player who was far inferior in birth and beauty, although either of these may be a greater good than the

[40] art of flute-playing and may excel flute-playing in a greater ratio than he excels the others in his art, still he ought to have the best flutes given to him, unless the [1283<sup>a</sup>1] advantages of wealth and birth contribute to excellence in flute-playing, which they do not. Moreover, upon this principle any good may be compared with any other. [5] For if a given height<sup>3</sup> may be measured against wealth and against freedom, height in general may be so measured. Thus if A excels in height more than B in excellence, even if excellence in general excels height still more, all goods will be comparable; for if a certain amount is better than some other, it is clear that some other will be equal. But since no such comparison can be made, it is evident that [10] there is good reason why in politics men do not ground their claim to office on every sort of inequality. For if some be slow, and others swift, that is no reason why the one should have little and the others much; it is in gymnastic contests that such excellence is rewarded. Whereas the rival claims of candidates for office can only be [15] based on the possession of elements which enter into the composition of a state. And therefore the well-born, or free-born, or rich, may with good reason claim office; for holders of offices must be freemen and tax-payers: a state can be no more composed entirely of poor men than entirely of slaves. But if wealth and freedom are necessary [20] elements, justice and valour are equally so; for without the former qualities a state cannot exist at all, without the latter not well.

13 · If the existence of the state is alone to be considered, then it would seem that all, or some at least, of these claims are just; but, if we take into account a good [25] life, then, as I have already said, education and excellence have superior claims. As, however, those who are equal in one thing ought not to have an equal share in all, nor those who are unequal in one thing to have an unequal share in all, it is certain that all forms of government which rest on either of these principles are perversions. [30] All men have a claim in a certain sense, as I have already admitted, but not all have an absolute claim. The rich claim because they have a greater share in the land, and land is the common element of the state; also they are generally more trustworthy in contracts. The free claim under the same title as the well-born; for they are nearly [35] akin. For the well-born are citizens in a truer sense than the low-born, and good birth is always valued in a man's own home. Another reason is, that those who are sprung from better ancestors are likely to be better men, for good birth is excellence of race. Excellence, too, may be truly said to have a claim, for justice has been acknowledged



by us to be a social excellence, and it implies all others. Again, the [40] many may urge their claim against the few; for, when taken collectively, and compared with the few, they are stronger and richer and better. But, what if the good, the rich, the well-born, and the other classes who make up a state, are all [1283<sup>b</sup>1] living together in the same city, will there, or will there not, be any doubt who shall rule?—No doubt at all in determining who ought to rule in each of the above [5] mentioned forms of government. For states are characterized by differences in their governing bodies—one of them has a government of the rich, another of the good, and so on. But a difficulty arises when all these elements coexist. How are we to decide? Suppose the good to be very few in number: may we consider their numbers [10] in relation to their duties, and ask whether they are enough to administer the state, or so many as will make up a state? Objections may be urged against all the aspirants to political power. For those who found their claims on wealth or family might be thought to have no basis of justice; on this principle, if any one person were [15] richer than all the rest, it is clear that he ought to be ruler of them. In like manner he who is very distinguished by his birth ought to have the superiority over all those who claim on the ground that they are free-born. In an aristocracy a like difficulty [20] occurs about excellence; for if one citizen is better than the other members of the government, however good they may be, he too, upon the same principle of justice, should rule over them. And if the people are to be supreme because they are stronger than the few, then if one man, or more than one, but not a majority, is [25] stronger than the many, they ought to rule, and not the many.

All these considerations appear to show that none of the principles on which men claim to rule and to hold all other men in subjection to them are right. To those who claim to be masters of the government on the ground of their excellence or their [30] wealth, the many might fairly answer that they themselves are often better and richer than the few—I do not say individually, but collectively. And another problem which is sometimes put forward may be met in a similar manner. Some [35] persons doubt whether the legislator who desires to make the justest laws ought to legislate with a view to the good of the better or of the many, when the case which we have mentioned occurs. Now what is right must be construed as equally right, [40] and what is equally right is to be considered with reference to the advantage of the state, and the common good of the citizens. And a citizen is one who shares in governing and being governed. He differs under different forms of government, but

[1284<sup>a</sup>1] in the best state he is one who is able and chooses to be governed and to govern with a view to the life of excellence.

If, however, there be some one person, or more than one, although not enough to make up the full complement of a state, whose excellence is so pre-eminent that the excellence or the political capacity of all the rest admit of no comparison with [5] his or theirs, he or they can be no longer regarded as part of a state; for justice will not be done to the superior, if he is reckoned only as the equal of those who are so far inferior to him in excellence and in political capacity. Such a man may truly be [10] deemed a God among men. Hence we see that legislation is necessarily concerned only with those who are equal in birth and in capacity; and that for men of pre-eminent excellence there is no law—they are themselves a law. Anyone would be ridiculous who attempted to make laws for them: they would probably retort [15] what, in the fable of Antisthenes, the lions said to the hares, when in the council of the beasts the latter began haranguing and claiming equality for all. And for this reason democratic states have instituted ostracism; equality is above all things their aim, and therefore they ostracized and banished from the city for a time those who [20] seemed to predominate too much through their wealth, or the number of their friends, or through any other political influence. Mythology tells us that the Argonauts left Heracles behind for a similar reason; the ship Argo would not take [25] him because she feared that he would have been too much for the rest of the crew. That is why those who denounce tyranny and blame the counsel which Periander gave to Thrasybulus cannot be held altogether just in their censure. The story is that Periander, when the herald was sent to ask counsel of him, said nothing, but only cut [30] off the tallest ears of corn till he had brought the field to a level. The herald did not know the meaning of the action, but came and reported what he had seen to Thrasybulus, who understood that he was to cut off the principal men in the state; and this is a policy not only expedient for tyrants or in practice confined to them, but [35] equally necessary in oligarchies and democracies. Ostracism is a measure of the same kind, which acts by disabling and banishing the most prominent citizens. Great powers do the same to whole cities and nations, as the Athenians did to the [40] Samians, Chians, and Lesbians; no sooner had they obtained a firm grasp of the empire, than they humbled their allies contrary to treaty; and the Persian king has [1284<sup>b</sup>1] repeatedly crushed the Medes, Babylonians, and other nations, when their spirit has been stirred by the recollection of their former greatness.

The problem is a universal one, and equally concerns all forms of

government, [5] true as well as false; for, although perverted forms with a view to their own interests may adopt this policy, those which seek the common interest do so likewise. The same thing may be observed in the arts and sciences; for the painter will not allow [10] the figure to have a foot which, however beautiful, is not in proportion, nor will the ship-builder allow the stern or any other part of the vessel to be unduly large, any more than the chorus-master will allow anyone who sings louder or better than all the rest to sing in the choir. Monarchs, too, may practise compulsion and still live in [15] harmony with their cities, if their own government is for the interest of the state. Hence where there is an acknowledged superiority the argument in favour of ostracism is based upon a kind of political justice. It would certainly be better that the legislator should from the first so order his state as to have no need of such a remedy. But if the need arises, the next best thing is that he should endeavour to [20] correct the evil by this or some similar measure. The principle, however, has not been fairly applied in states; for, instead of looking to the good of their own constitution, they have used ostracism for factious purposes. It is true that under perverted forms of government, and from their special point of view, such a measure [25] is just and expedient, but it is also clear that it is not absolutely just. In the perfect state there would be great doubts about the use of it, not when applied to excess in strength, wealth, popularity, or the like, but when used against someone who is pre-eminent in excellence—what is to be done with him? People will not say that [30] such a man is to be expelled and exiled; on the other hand, he ought not to be a subject—that would be as if mankind should claim to rule over Zeus, dividing his offices among them. The only alternative is that all should happily obey such a ruler, according to what seems to be the order of nature, and that men like him should be kings in their state for life.

14 · The preceding discussion, by a natural transition, leads to the consideration [35] of kingship, which we say is one of the true forms of government. Let us see whether in order to be well governed a state or country should be under the rule of a king or under some other form of government; and whether monarchy, although good for some, may not be bad for others. But first we must determine whether there is one species of kingship or many. It is easy to see that there are many, and [1285<sup>a</sup>1] that the manner of government is not the same in all of them.

Of kingships according to law, the Lacedaemonian is thought to be

the best example; but there the royal power is not absolute, except when the kings go on an [5] expedition, and then they take the command. Matters of religion are likewise committed to them. The kingly office is in truth a kind of generalship, sovereign and perpetual. The king has not the power of life and death, except in certain cases, as for instance, in ancient times, he had it when upon a campaign, by right of force. This custom is described in Homer. For Agamemnon puts up with it when he is [10] attacked in the assembly, but when the army goes out to battle he has the power even of life and death. Does he not say: 'When I find a man skulking apart from the battle, nothing shall save him from the dogs and vultures, for in my hands is death'?<sup>4</sup>

This, then, is one form of kingship—a generalship for life; and of such [15] kingships some are hereditary and others elective.

There is another sort of monarchy not uncommon among foreigners, which nearly resembles tyranny. But this is both legal and hereditary. For foreigners, being more servile in character than Hellenes, and Asiatics than Europeans, do not [20] rebel against a despotic government. Such kingships have the nature of tyrannies because the people are by nature slaves; but there is no danger of their being overthrown, for they are hereditary and legal. For the same reason, their guards are such as a king and not such as a tyrant would employ, that is to say, they are [25] composed of citizens, whereas the guards of tyrants are mercenaries. For kings rule according to law over voluntary subjects, but tyrants over involuntary; and the one are guarded by their fellow-citizens, the others are guarded against them.

These are two forms of monarchy, and there was a third which existed in ancient Hellas, called an Aesymnetia. This may be defined generally as an elective [30] tyranny, which, like foreign monarchy, is legal, but differs from it in not being hereditary. Sometimes the office was held for life, sometimes for a term of years, or until certain duties had been performed. For example, the Mytilenaeans once [35] elected Pittacus leader against the exiles, who were headed by Antimenides and Alcaeus the poet. And Alcaeus himself shows in one of his banquet odes that they chose Pittacus tyrant, for he reproaches his fellow-citizens for 'having made the [1285b1] low-born Pittacus tyrant of the spiritless and ill-fated city, with one voice shouting his praises'.

These forms of government have always had the character of tyrannies, because they possess despotic power; but inasmuch as they are elective and acquiesced in by their subjects, they are kingly.

[5] There is a fourth species of kingly monarchy—that of the heroic

times—which was hereditary and legal, and was exercised over willing subjects. For the first chiefs were benefactors of the people in arts or arms; they either gathered them into a community, or procured land for them; and thus they became kings of voluntary subjects, and their power was inherited by their descendants. They took the [10] command in war and presided over the sacrifices, except those which required a priest. They also decided law-suits either with or without an oath; and when they swore, the form of the oath was the stretching out of their sceptre. In ancient times their power extended continuously to all things in city and country and across the [15] border; but at a later date they relinquished several of these privileges, and others the people took from them, until in some states nothing was left to them but the sacrifices; and where they retained more of the reality they had only the right of leadership in war beyond the border.

[20] These, then, are the four kinds of kingship. First the monarchy of the heroic ages; this was exercised over voluntary subjects, but limited to certain functions; the king was a general and a judge, and had the control of religion. The second is that of foreigners, which is an hereditary despotic government in accordance with law. A [25] third is the power of the so-called Aesymnete; this is an elective tyranny. The fourth is the Lacedaemonian, which is in fact a generalship, hereditary and perpetual. These four forms differ from one another in the manner which I have described.

There is a fifth form of kingly rule in which one man has the disposal of all, just [30] as each nation or each state has the disposal of public matters; this form corresponds to the control of a household. For as household management is the kingly rule of a house, so kingly rule is the household management of a city, or of a nation, or of many nations.

[35] **15** · Of these forms we need only consider two, the Lacedaemonian and the absolute royalty; for most of the others lie in a region between them, having less power than the last, and more than the first. Thus the inquiry is reduced to two points: first, is it advantageous to the state that there should be a perpetual general, and if so, should the office be confined to one family, or open to the citizens in turn? [1286<sup>a</sup>1] Secondly, is it well that a single man should have the supreme power in all things? The first question falls under the head of laws rather than of constitutions; for perpetual generalship might equally exist under any form of government, so that [5] this matter may be dismissed for the

present. The other kind of kingship is a sort of constitution; this we have now to consider, and to run over the difficulties involved in it. We will begin by inquiring whether it is more advantageous to be ruled by the best man or by the best laws.

The advocates of kingship maintain that the laws speak only in general terms, [10] and cannot provide for circumstances; and that for any science to abide by written rules is absurd. In Egypt the physician is allowed to alter his treatment after the fourth day, but if sooner, he takes the risk. Hence it is clear that a government acting according to written laws is plainly not the best. Yet surely the ruler cannot [15] dispense with the general principle which exists in law; and that is a better ruler which is free from passion than that in which it is innate. Whereas the law is passionless, passion must always sway the heart of man. Yes, it may be replied, but [20] then on the other hand an individual will be better able to deliberate in particular cases.

The best man, then, must legislate, and laws must be passed, but these laws will have no authority when they miss the mark, though in all other cases retaining their authority. But when the law cannot determine a point at all, or not well, should [25] the one best man or should all decide? According to our present practice assemblies meet, sit in judgement, deliberate, and decide, and their judgements all relate to individual cases. Now any member of the assembly, taken separately, is certainly inferior to the wise man. But the state is made up of many individuals. And as a feast to which all the guests contribute is better than a banquet furnished by a single [30] man, so a multitude is a better judge of many things than any individual.

Again, the many are more incorruptible than the few; they are like the greater quantity of water which is less easily corrupted than a little. The individual is liable to be overcome by anger or by some other passion, and then his judgement is necessarily perverted; but it is hardly to be supposed that a great number of persons would all get into a passion and go wrong at the same moment. Let us assume that [35] they are the freemen, and that they never act in violation of the law, but fill up the gaps which the law is obliged to leave. Or, if such virtue is scarcely attainable by the multitude, we need only suppose that the majority are good men and good citizens, and ask which will be the more incorruptible, the one good ruler, or the many who are all good? Will not the many? But, you will say, there may be factions among [1286<sup>b</sup>1] them, whereas the one man is not divided against himself. To which we may answer that their character is as good as his. If we call the rule of many

men, who are all of them good, aristocracy, and the rule of one man kingship, then aristocracy will be [5] better for states than kingship, whether the government is supported by force or not, provided only that a number of men equal in excellence can be found.

The first governments were kingships, probably for this reason, because of old, when cities were small, men of eminent excellence were few. Further, they were [10] made kings because they were benefactors, and benefits can only be bestowed by good men. But when many persons equal in merit arose, no longer enduring the pre-eminence of one, they desired to have a commonwealth, and set up a constitution. The ruling class soon deteriorated and enriched themselves out of the public treasury; riches became the path to honour, and so oligarchies naturally grew [15] up. These passed into tyrannies and tyrannies into democracies; for love of gain in the ruling classes was always tending to diminish their number, and so to strengthen the masses, who in the end set upon their masters and established democracies. [20] Since cities have increased in size, no other form of government appears to be any longer even easy to establish.

Even supposing the principle to be maintained that kingly power is the best thing for states, how about the family of the king? Are his children to succeed him? [25] If they are no better than anybody else, that will be mischievous. But perhaps the king, though he might, will not hand on his power to his children? That, however, is hardly to be expected, and is too much to ask of human nature. There is also a difficulty about the force which he is to employ; should a king have guards about [30] him by whose aid he may be able to coerce the refractory? If not, how will he administer his kingdom? Even if he is the lawful sovereign who does nothing arbitrarily or contrary to law, still he must have some force wherewith to maintain the law. In the case of a limited monarchy there is not much difficulty in answering [35] this question; the king must have such force as will be more than a match for one or more individuals, but not so great as that of the people. The ancients observed this principle when they gave guards to anyone whom they appointed Aesymnete or tyrant. Thus, when Dionysius asked the Syracusans to allow him guards, somebody advised that they should give him only such a number.

[1287<sup>a</sup>1] **16** · At this place in the discussion there impends the inquiry respecting the king who acts solely according to his own will; he

has now to be considered. The so-called kingship according to law, as I have already remarked, is not a form of government, for under all governments, as, for example, in a democracy or [5] aristocracy, there may be a general holding office for life, and one person is often made supreme over the administration of a state. A magistracy of this kind exists at Epidamnus, and also at Opus, but in the latter city has a more limited power. Now, [10] absolute monarchy, or the arbitrary rule of a sovereign over all the citizens, in a city which consists of equals, is thought by some to be quite contrary to nature; it is argued that those who are by nature equals must have the same natural right and worth, and that for unequals to have an equal share, or for equals to have an unequal share, in the offices of state, is as bad as for different bodily constitutions to [15] have the same food and clothing. That is why it is thought to be just that among equals everyone be ruled as well as rule, and therefore that all should have their turn. We thus arrive at law; for an order of succession implies law. And the rule of [20] the law, it is argued, is preferable to that of any individual. On the same principle, even if it be better for certain individuals to govern, they should be made only guardians and ministers of the law. For magistrates there must be—this is admitted; but then men say that to give authority to any one man when all are equal is unjust. There may indeed be cases which the law seems unable to determine, but [25] such cases a man could not determine either. But the law trains officers for this express purpose, and appoints them to determine matters which are left undecided by it, to the best of their judgement. Further, it permits them to make any amendment of the existing laws which experience suggests. Therefore he who bids the law rule may be deemed to bid God and Reason alone rule, but he who bids man [30] rule adds an element of the beast; for desire is a wild beast, and passion perverts the minds of rulers, even when they are the best of men. The law is reason unaffected by desire. We are told that a patient should call in a physician; he will not get better if he is doctored out of a book. But the parallel of the arts is clearly not in point; for the physician does nothing contrary to rule from motives of friendship; he only cures a [35] patient and takes a fee; whereas magistrates do many things from spite and partiality. And, indeed, if a man suspected the physician of being in league with his enemies to destroy him for a bribe, he would rather have recourse to the book. But certainly physicians, when they are sick, call in other physicians, and training [1287<sup>b</sup>1] masters, when they are in training, other training-masters, as if they could not judge truly about their own case and might be influenced by their feelings. Hence it is



evident that in seeking for justice men seek for the mean, for the law is the mean. Again, customary laws have more weight, and relate to more important matters, [5] than written laws, and a man may be a safer ruler than the written law, but not safer than the customary law.

Again, it is by no means easy for one man to superintend many things; he will have to appoint a number of subordinates, and what difference does it make [10] whether these subordinates always existed or were appointed by him because he needed them? If, as I said before, the good man has a right to rule because he is better, still two good men are better than one: this is the old saying,

two going together,

and the prayer of Agamemnon,

would that I had ten such counsellors! [15]

And even now there are magistrates, for example judges, who have authority to decide some matters which the law is unable to determine, since no one doubts that the law would command and decide in the best manner whatever it could. But some things can, and other things cannot, be comprehended under the law, and this is the origin of the vexed question whether the best law or the best man should rule. For [20] matters of detail about which men deliberate cannot be included in legislation. Nor does anyone deny that the decision of such matters must be left to man, but it is argued that there should be many judges, and not one only. For every ruler who has [25] been trained by the law judges well; and it would surely seem strange that a person should see better with two eyes, or hear better with two ears, or act better with two hands or feet, than many with many; indeed, it is already the practice of kings to make to themselves many eyes and ears and hands and feet. For they make [30] colleagues of those who are the friends of themselves and their governments. They must be friends of the monarch and of his government; if not his friends, they will not do what he wants; but friendship implies likeness and equality; and, therefore, if he thinks that his friends ought to rule, he must think that those who are equal to himself and like himself ought to rule equally with himself. These are the principal [35] controversies relating to monarchy.

17 · But may not all this be true in some cases and not in others? for there is by nature both a justice and an advantage appropriate to the rule

of a master, another to kingly rule, another to constitutional rule; but there is none naturally [40] appropriate to tyranny, or to any other perverted form of government; for these come into being contrary to nature. Now, to judge at least from what has been said, [1288<sup>a</sup>1] it is manifest that, where men are alike and equal, it is neither expedient nor just that one man should be lord of all, whether there are laws, or whether there are no laws, but he himself is in the place of law. Neither should a good man be lord over good men, nor a bad man over bad; nor, even if he excels in excellence, should he [5] have a right to rule, unless in a particular case, at which I have already hinted, and to which I will once more recur. But first of all, I must determine what natures are suited for government by a king, and what for an aristocracy, and what for a constitutional government.

A people who are by nature capable of producing a race superior in the excellence needed for political rule are fitted for kingly government; and a people [10] submitting to be ruled as freemen by men whose excellence renders them capable of political command are adapted for an aristocracy: while the people who are suited for constitutional freedom are those among whom there naturally exists a warlike multitude. In the former case the multitude is capable of being ruled by men whose excellence is appropriate to political command; in the latter case the multitude is [15] able to rule and to obey in turn by a law which gives office to the well-to-do according to their desert. But when a whole family, or some individual, happens to be so pre-eminent in excellence as to surpass all others, then it is just that they should be the royal family and supreme over all, or that this one citizen should be king. For, as I said before, to give them authority is not only agreeable to that notion [20] of justice which the founders of all states, whether aristocratic, or oligarchical, or again democratic, are accustomed to put forward (for these all recognize the claim of superiority, although not the same superiority), but accords with the principle [25] already laid down. For surely it would not be right to kill, or ostracize, or exile such a person, or require that he should take his turn in being governed. The whole is naturally superior to the part, and he who has this pre-eminence is in the relation of a whole to a part. But if so, the only alternative is that he should have the supreme power, and that mankind should obey him, not in turn, but always. These are the [30] conclusions at which we arrive respecting kingship and its various forms, and this is the answer to the question, whether it is or is not advantageous to states, and to which, and how.

18 · We maintain that the true forms of government are three, and that the [35] best must be that which is administered by the best, and in which there is one man, or a whole family, or many persons, excelling all the others together in excellence, and both rulers and subjects are fitted, the one to rule, the others to be ruled, in such a manner as to attain the most desirable life. We showed at the commencement of our inquiry that the excellence of the good man is necessarily the same as the excellence of the citizen of the perfect state. Clearly then in the same manner, and by the same means through which a man becomes truly good, he will frame a state [1288<sup>b</sup>1] that is to be ruled by an aristocracy or by a king, and the same education and the same habits will be found to make a good man and a man fit to be a statesman or king.

Having arrived at these conclusions, we must proceed to speak of the perfect state, and describe how it comes into being and is established.

So if we are to inquire in the appropriate way about it, we must. . . .  
[5]

## BOOK IV

1 · In all arts and sciences which embrace the whole of any subject, and do [10] not come into being in a fragmentary way, it is the province of a single art or science to consider all that appertains to a single subject. For example, the art of gymnastics considers not only the suitability of different modes of training to different bodies, but what sort is the best (for the best must suit that which is by nature best and best [15] furnished with the means of life), and also what common form of training is adapted to the great majority of men. And if a man does not desire the best habit of body, or the greatest skill in gymnastics, which might be attained by him, still the trainer or the teacher of gymnastics should be able to impart any lower degree of either. The same principle equally holds in medicine and ship-building, and the making of [20] clothes, and in the arts generally.

Hence it is obvious that government too is the subject of a single science, which has to consider what government is best and of what sort it must be, to be most in accordance with our aspirations, if there were no external impediment, and also what kind of government is adapted to particular states. For the best is often unattainable, and therefore the true legislator and statesman ought to be acquainted [25], not only with that which is best in the abstract, but also with that which is best relatively to circumstances. We should be able further to say how a state may be constituted under any given conditions; both how it is originally formed and, when formed, how it may be longest preserved; the supposed state neither having the best [30] constitution nor being provided even with the conditions necessary for the best, nor being the best under the circumstances, but of an inferior type.

We ought, moreover, to know the form of government which is best suited to states in general; for political writers, although they have excellent ideas, are often [35] unpractical. We should consider, not only what form of government is best, but also what is possible and what is easily attainable by all. There are some who would have none but the most perfect; for this many natural advantages are required. Others, [40] again, speak of a more attainable form, and, although they reject the constitution under which they are living, they extol some one in particular, for example the Lacedaemonian. Any change of government

which has to be introduced should be [1289<sup>a</sup>1] one which men, starting from their existing constitutions, will be both willing and able to adopt, since there is quite as much trouble in the reformation of an old constitution as in the establishment of a new one, just as to unlearn is as hard as to [5] learn. And therefore, in addition to the qualifications of the statesman already mentioned, he should be able to find remedies for the defects of existing constitutions, as has been said before. This he cannot do unless he knows how many forms of government there are. It is often supposed that there is only one kind of democracy and one of oligarchy. But this is a mistake; and, in order to avoid such mistakes, we [10] must ascertain what differences there are in the constitutions of states, and in how many ways they are combined. The same political insight will enable a man to know which laws are the best, and which are suited to different constitutions; for the laws are, and ought to be, framed with a view to the constitution, and not the constitution [15] to the laws. A constitution is the organization of offices in a state, and determines what is to be the governing body, and what is the end of each community. But laws are not to be confounded with the principles of the constitution; they are the rules according to which the magistrates should administer the state, and proceed against [20] offenders. So that we must know the varieties, and the number of varieties, of each form of government, if only with a view to making laws. For the same laws cannot be equally suited to all oligarchies or to all democracies, since there is certainly [25] more than one form both of democracy and of oligarchy.

2 · In our original discussion about governments we divided them into three true forms: kingly rule, aristocracy, and constitutional government, and three [30] corresponding perversions—tyranny, oligarchy, and democracy. Of kingly rule and of aristocracy we have already spoken, for the inquiry into the perfect state is the same thing as the discussion of the two forms thus named, since both imply a [35] principle of excellence provided with external means. We have already determined in what aristocracy and kingly rule differ from one another, and when the latter should be established. In what follows we have to describe the so-called constitutional government, which bears the common name of all constitutions, and the other forms, tyranny, oligarchy, and democracy.

It is obvious which of the three perversions is the worst, and which is the next in badness. That which is the perversion of the first and most

divine is necessarily the [1289<sup>b</sup>1] worst. And just as a royal rule, if not a mere name, must exist by virtue of some great personal superiority in the king, so tyranny, which is the worst of governments, is necessarily the farthest removed from a well-constituted form; oligarchy is little better, for it is a long way from aristocracy, and democracy is the most tolerable of the three.

[5] A writer who preceded me has already made these distinctions, but his point of view is not the same as mine. For he lays down the principle that when all the constitutions are good (the oligarchy and the rest being virtuous), democracy is the worst, but the best when all are bad. Whereas we maintain that they are in any case [10] defective, and that one oligarchy is not to be accounted better than another, but only less bad.

Not to pursue this question further at present, let us begin by determining how many varieties of constitution there are (since of democracy and oligarchy there are [15] several); what constitution is the most generally acceptable, and what is preferable in the next degree after the perfect state; and besides this what other there is which is aristocratic and well-constituted, and at the same time adapted to states in general; and of the other forms of government we must ask to what people each is suited. For democracy may meet the needs of some better than oligarchy, and conversely. In the next place we have to consider in what manner a man ought to [20] proceed who desires to establish some one among these various forms, whether of democracy or of oligarchy; and lastly, having briefly discussed these subjects to the best of our power, we will endeavour to ascertain the modes of ruin and preservation both of constitutions generally and of each separately, and to what causes they are [25] to be attributed.

3 · The reason why there are many forms of government is that every state contains many elements. In the first place we see that all states are made up of families, and in the multitude of citizens there must be some rich and some poor, [30] and some in a middle condition; the rich possess heavy armour, and the poor not. Of the common people, some are farmers, and some traders, and some artisans. There are also among the notables differences of wealth and property—for example, in the number of horses which they keep, for they cannot afford to keep them unless they [35] are rich. And therefore in old times the cities whose strength lay in their cavalry were oligarchies, and they used cavalry in wars

against their neighbours; as was the practice of the Eretrians and Chalcidians, and also of the Magnesians on the river Maeander, and of other peoples in Asia. Besides differences of wealth there are differences of rank and merit, and there are some other elements which were [1290<sup>a</sup>1] mentioned by us when in treating of aristocracy we enumerated the essentials of a state. Of these elements, sometimes all, sometimes the lesser, and sometimes the greater number, have a share in the government. It is evident then that there must [5] be many forms of government, differing in kind, since the parts of which they are composed differ from each other in kind. For a constitution is an organization of offices, which all the citizens distribute among themselves, according to the power which different classes possess (for example the rich or the poor), or according to [10] some principle of equality which includes both. There must therefore be as many forms of government as there are modes of arranging the offices, according to the superiorities and the differences of the parts of the state.

There are generally thought to be two principal forms: as men say of the winds that there are but two, north and south, and that the rest of them are only variations of these, so of governments there are said to be only two forms—democracy [15] and oligarchy. For aristocracy is considered to be a kind of oligarchy, as being the rule of a few, and the so-called constitutional government to be really a democracy, just as among the winds we make the west a variation of the north, and the east of the south wind. Similarly of musical modes there are said to be two kinds, [20] the Dorian and the Phrygian; the other arrangements of the scale are comprehended under one or other of these two. About forms of government this is a very favourite notion. But in either case the better and more exact way is to distinguish, as I have done, the one or two which are true forms, and to regard the others as [25] perversions, whether of the most perfectly attempered or of the best form of government: the more taut and more overpowering are oligarchical, and the more relaxed and gentler are democratic.

[30] 4 · It must not be assumed, as some are fond of saying, that democracy is simply that form of government in which the greater number are sovereign, for in oligarchies, and indeed in every government, the majority rules; nor again is oligarchy that form of government in which a few are sovereign. Suppose the whole [35] population of a city to be 1300, and that of these 1000 are rich, and do not allow the remaining

300 who are poor, but free, and in all other respects their equals, a share of the government—no one will say that this is a democracy. In like manner, if the poor were few and the masters of the rich who outnumber them, no one would ever call such a government, in which the rich majority have no share of office, an [1290<sup>b</sup>1] oligarchy. Therefore we should rather say that democracy is the form of government in which the free are rulers, and oligarchy in which the rich; it is only an accident that the free are the many and the rich are the few. Otherwise a government in which the offices were given according to stature, as is said to be the [5] case in Ethiopia, or according to beauty, would be an oligarchy; for the number of tall or good-looking men is small. And yet oligarchy and democracy are not sufficiently distinguished merely by these two characteristics of wealth and freedom. Both of them contain many other elements, and therefore we must carry our analysis further, and say that the government is not a democracy in which the [10] freemen, being few in number, rule over the many who are not free, as at Apollonia on the Ionian Gulf, and at Thera (for in each of these states the nobles, who were also the earliest settlers, held office, although they were but a few out of many). Neither is it a democracy when the rich have the government because they exceed [15] in number; as was the case formerly at Colophon, where the bulk of the inhabitants were possessed of large property before the Lydian War. But the form of government is a democracy when the free, who are also poor and the majority, govern, and an oligarchy when the rich and the noble govern, they being at the same [20] time few in number.

I have said that there are many forms of government, and have explained to what causes the variety is due. Why there are more than those already mentioned, and what they are, and whence they arise, I will now proceed to consider, starting from the principle already admitted, which is that every state consists, not of one, [25] but of many parts. If we were going to speak of the different species of animals, we should first of all determine the organs which are indispensable to every animal, as for example some organs of sense and the instruments of receiving and digesting food, such as the mouth and the stomach, besides organs of locomotion. Assuming now that there are only so many kinds of organs, but that there may be differences [30] in them—I mean different kinds of mouths, and stomachs, and perceptive and locomotive organs—the possible combinations of these differences will necessarily furnish many varieties of animals. (For animals cannot be the same which have different kinds of mouths or of ears.) And when all the combinations are



exhausted, [35] there will be as many sorts of animals as there are combinations of the necessary organs. The same, then, is true of the forms of government which have been described; states, as I have repeatedly said, are composed, not of one, but of many elements. One element is the food-producing class, who are called farmers; a second, the class of artisans who practise the arts without which a city cannot [1291<sup>a</sup>1] exist—of these arts some are absolutely necessary, others contribute to luxury or to the grace of life. The third class is that of traders, and by traders I mean those who are engaged in buying and selling, whether in commerce or in retail trade. A fourth [5] class is that of labourers. The military make up the fifth class, and they are as necessary as any of the others, if the country is not to be the slave of every invader. For how can a state which has any title to the name be of a slavish nature? The state is independent and self-sufficing, but a slave is the reverse of independent. Hence [10] we see that this subject, though ingeniously, has not been satisfactorily treated in the *Republic*. Socrates says that a state is made up of four sorts of people who are absolutely necessary; these are a weaver, a farmer, a shoemaker, and a builder; afterwards, finding that they are not enough, he adds a smith, and again a [15] herdsman, to look after the necessary animals; then a merchant, and then a retail trader. All these together form the complement of the first state, as if a state were established merely to supply the necessities of life, rather than for the sake of the good, or stood equally in need of shoemakers and of farmers. But he does not admit into the state a military class until the country has increased in size, and is [20] beginning to encroach on its neighbour's land, whereupon they go to war. Yet even amongst his four original citizens, or whatever be the number of those whom he associates in the state, there must be some one who will dispense justice and determine what is just. And as the soul may be said to be more truly part of an animal than the body, so the higher parts of states, that is to say, the warrior class, [25] the class engaged in the administration of justice, and that engaged in deliberation, which is the special business of political understanding—these are more essential to the state than the parts which minister to the necessities of life. Whether their several functions are the functions of different citizens, or of the same—for it may often happen that the same persons are both soldiers and farmers—is immaterial to [30] the argument. The higher as well as the lower elements are to be equally considered parts of the state, and if so, the military element at any rate must be included. There are also the wealthy who minister to the state with their property; these form the seventh class. The eighth class is

that of public servants and of administrators; for [35] the state cannot exist without rulers. And therefore some must be able to take office and to serve the state, either always or in turn. There only remains the class of those who deliberate and who judge between disputants; we were just now distinguishing [40] them. If the presence of all these elements, and their fair and equitable organization, is necessary to states, then there must also be persons who have the ability of [1291<sup>b</sup>1] statesmen. Different functions appear to be often combined in the same individual; for example, the soldier may also be a farmer, or an artisan; or, again the counsellor a judge. And all claim to possess political ability, and think that they are quite [5] competent to fill most offices. But the same persons cannot be rich and poor at the same time. For this reason the rich and the poor are especially regarded as parts of a [10] state. Again, because the rich are generally few in number, while the poor are many, they appear to be antagonistic, and as the one or the other prevails they form the government. Hence arises the common opinion that there are two kinds of government—democracy and oligarchy.

I have already explained that there are many forms of constitution, and to [15] what causes the variety is due. Let me now show that there are different forms both of democracy and oligarchy, as will indeed be evident from what has preceded. For both in the common people and in the notables various classes are included; of the common people, one class are farmers, another artisans; another traders, who are [20] employed in buying and selling; another are the sea-faring class, whether engaged in war or in trade, as ferrymen or as fishermen. (In many places any one of these classes forms quite a large population; for example, fishermen at Tarentum and Byzantium, crews of triremes at Athens, merchant seamen at Aegina and Chios, [25] ferrymen at Tenedos.) To the classes already mentioned may be added day-labourers, and those who, owing to their needy circumstances, have no leisure, or those who are not of free birth on both sides; and there may be other classes as well. The notables again may be divided according to their wealth, birth, excellence, [30] education, and similar differences.

Of forms of democracy first comes that which is said to be based strictly on equality. In such a democracy the law says that it is just for the poor to have no more advantage than the rich; and that neither should be masters, but both equal. For if [35] liberty and equality, as is thought by some, are chiefly to be found in democracy, they will be best attained when all persons alike share in the government to the utmost. And since the people are the majority, and the opinion of the majority is decisive,

such a government must necessarily be a democracy. Here then is one sort of democracy. There is another, in which the magistrates are elected according to a [40] certain property qualification, but a low one; he who has the required amount of property has a share in the government, but he who loses his property loses his [1292<sup>a</sup>1] rights. Another kind is that in which all the citizens who are under no disqualification share in the government, but still the law is supreme. In another, everybody, if he be only a citizen, is admitted to the government, but the law is supreme as before. A fifth form of democracy, in other respects the same, is that in which not the law, [5] but the multitude, have the supreme power, and supersede the law by their decrees. This is a state of affairs brought about by the demagogues. For in democracies which are subject to the law the best citizens hold the first place, and there are no [10] demagogues; but where the laws are not supreme, there demagogues spring up. For the people becomes a monarch, and is many in one; and the many have the power in their hand, not as individuals, but collectively. Homer says that 'it is not good to have a rule of many',<sup>1</sup> but whether he means this corporate rule, or the rule of many [15] individuals, is uncertain. At all events this sort of democracy, which is now a monarchy, and no longer under the control of law, seeks to exercise monarchical sway, and grows into a despot; the flatterer is held in honour; this sort of democracy is to other democracies what tyranny is to other forms of monarchy. The spirit of both is the same, and they alike exercise a despotic rule over the better citizens. The decrees of the one correspond to the edicts of the tyrant; and the demagogue is to the [20] one what the flatterer is to the other. Both have great power—the flatterer with the tyrant, the demagogue with democracies of the kind which we are describing. The demagogues make the decrees of the people override the laws, by referring all things [25] to the popular assembly. And therefore they grow great, because the people have all things in their hands, and they hold in their hands the votes of the people, who obey them. Further, those who have any complaint to bring against the magistrates say, 'let the people be judges'; the people are happy to accept the invitation; and so the authority of every office is undermined. Such a democracy is fairly open to the [30] objection that it is not a constitution at all; for where the laws have no authority, there is no constitution. The law ought to be supreme over all, and the magistracies should judge of particulars, and only this<sup>2</sup> should be considered a constitution. So that if democracy be a real form of government, the sort of system in which all [35] things are regulated by decrees is clearly not even a democracy in the true sense of the word, for

decrees relate only to particulars.

These then are the different kinds of democracy.

5 · Of oligarchies, too, there are different kinds: one where the property [40] qualification for office is such that the poor, although they form the majority, have no share in the government, yet he who acquires a qualification may obtain a share. Another sort is when there is a qualification for office, but a high one, and the [1292<sup>b</sup>1] vacancies in the governing body are filled by co-optation. If the election is made out of all the qualified persons, a constitution of this kind inclines to an aristocracy, if out of a privileged class, to an oligarchy. Another sort of oligarchy is when the son [5] succeeds the father. There is a fourth form, likewise hereditary, in which the magistrates are supreme and not the law. Among oligarchies this is what tyranny is among monarchies, and the last-mentioned form of democracy among democracies; and in fact this sort of oligarchy receives the name of a dynasty. [10]

These are the different sorts of oligarchies and democracies. It should, however, be remembered that in many states the constitution which is established by law, although not democratic, owing to the education and habits of the people may be administered democratically, and conversely in other states the established [15] constitution may incline to democracy, but may be administered in an oligarchical spirit. This most often happens after a revolution; for governments do not change at once; at first the dominant party are content with encroaching a little upon their opponents. The laws which existed previously continue in force, but the [20] authors of the revolution have the power in their hands.

6 · From what has been already said we may safely infer that there are these many democracies and oligarchies. For it is necessary that either all the classes [25] whom we mentioned must share in the government, or some only and not others. When the class of farmers and of those who possess moderate fortunes have the supreme power, the government is administered according to law. For the citizens being compelled to live by their labour have no leisure; and so they set up the authority of the law, and attend assemblies only when necessary. They all obtain a [30] share in the government when they have acquired the qualification which is fixed by the law; hence all who have acquired the property qualification are admitted to a share in the constitution. For the absolute exclusion of any class would be oligarchical; but leisure cannot be provided for them

unless there are revenues to support them. This is one sort of democracy, and these are the causes which give [35] birth to it. Another kind is based on the distinction which naturally comes next in order; in this, everyone to whose birth there is no objection is eligible, but actually shares in the government only if he can find leisure. Hence in such a democracy the supreme power is vested in the laws, because the state has no means of paying the citizens. A third kind is when all freemen have a right to share in the government, but do not actually share, for the reason which has been already given; so that in this [1293<sup>a</sup>1] form again the law must rule. A fourth kind of democracy is that which comes latest in the history of states. For when cities have far outgrown their original size, and their revenues have increased, all the citizens have a place in the government, through the great preponderance of the multitude; and they all, including the poor [5] who receive pay, and therefore have leisure to exercise their rights, share in the administration. Indeed, when they are paid, the common people have the most leisure, for they are not hindered by the care of their property, which often fetters the rich, who are thereby prevented from taking part in the assembly or in the [10] courts, and so the state is governed by the poor, who are a majority, and not by the laws. Such and so many are the kinds of democracy, and they grow out of these necessary causes.

Of oligarchies, one form is that in which the majority of the citizens have some property, but not very much; and this is the first form, which allows to anyone who [15] obtains the required amount the right of sharing in the government. The sharers in the government being a numerous body, it follows that the law must govern, and not individuals. For in proportion as they are further removed from a monarchical form of government, and in respect of property have neither so much as to be able to live without attending to business, nor so little as to need state support, they must admit [20] the rule of law and not claim to rule themselves. But if the men of property in the state are fewer than in the former case, and own more property, there arises a second form of oligarchy. For the stronger they are, the more power they claim, and having this object in view, they themselves select those of the other classes who are [25] to be admitted to the government; but, not being as yet strong enough to rule without the law, they make the law represent their wishes. When this power is intensified by a further diminution of their numbers and increase of their property, there arises a third and further stage of oligarchy, in which the governing class keep the offices in their own hands, and the law ordains that the son shall succeed the [30]

father. When, again, the rulers have great wealth and numerous friends, this sort of family despotism approaches a monarchy; individuals rule and not the law. This is the fourth sort of oligarchy, and is analogous to the last sort of democracy.

7 · There are still two forms besides democracy and oligarchy; one of them is [35] universally recognized and included among the four principal forms of government, which are said to be monarchy, oligarchy, democracy, and the so-called aristocracy. But there is also a fifth, which retains the generic name of constitutional [40] government; this is not common, and therefore has not been noticed by writers who attempt to enumerate the different kinds of government; like Plato, in their books [1293<sup>b</sup>1] about the state, they recognize four only. The term ‘aristocracy’ is rightly applied to the form of government which is described in the first part of our treatise; for that only can be rightly called aristocracy which is a government formed of the best men [5] absolutely, and not merely of men who are good relative to some hypothesis. In the perfect state the good man is absolutely the same as the good citizen; whereas in other states the good citizen is only good relatively to his own form of government. But there are some states differing from oligarchies and also differing from the so-called constitutional government; these are termed aristocracies, and in them magistrates are certainly chosen both according to their wealth and according to [10] their merit. Such a form of government differs from each of the two just now mentioned, and is termed an aristocracy. For indeed in states which do not make excellence the aim of the community, men of merit and reputation for excellence may be found. And so where a government has regard to wealth, excellence, and the populace, as at Carthage, that is aristocracy; and also where it has regard only to [15] two out of the three, as at Lacedaemon, to excellence and the populace, and the two principles of democracy and excellence temper each other. There are these two forms of aristocracy in addition to the first and perfect state, and there is a third form, viz. the constitutions which incline more than the so-called constitutional [20] government towards oligarchy.

8 · I have yet to speak of the so-called polity and of tyranny. I put them in this order, not because a polity or constitutional government is to be regarded as a perversion any more than the above-mentioned aristocracies. The truth is, that they [25] all fall short of the most perfect

form of government, and so they are reckoned among perversions, and the really perverted forms are perversions of these, as I said in the original discussion. Last of all I will speak of tyranny, which I place last in the series because I am inquiring into the constitutions of states, and this is the very [30] reverse of a constitution.

Having explained why I have adopted this order, I will proceed to consider constitutional government; of which the nature will be clearer now that oligarchy and democracy have been defined. For polity or constitutional government may be described generally as a fusion of oligarchy and democracy; but the term is usually applied to those forms of government which incline towards democracy, and the [35] term aristocracy to those which incline towards oligarchy, because birth and education are commonly the accompaniments of wealth. Moreover, the rich already possess the external advantages the want of which is a temptation to crime, and [40] hence they are called noblemen and gentlemen. And inasmuch as aristocracy seeks to give predominance to the best of the citizens, people say also of oligarchies that [1294<sup>a</sup>1] they are composed of noblemen and gentlemen. Now it appears to be an impossible thing that the state which is governed not by the best citizens but by the worst should be well-governed, and equally impossible that the state which is ill-governed should be governed by the best. But we must remember that good laws, if they are not obeyed, do not constitute good government. Hence there are two parts of good [5] government; one is the actual obedience of citizens to the laws, the other part is the goodness of the laws which they obey; they may obey bad laws as well as good. And there may be a further subdivision; they may obey either the best laws which are attainable to them, or the best absolutely.

The distribution of offices according to excellence is a special characteristic of [10] aristocracy, for the principle of an aristocracy is excellence, as wealth is of an oligarchy, and freedom of a democracy. In all of them there of course exists the right of the majority, and whatever seems good to the majority of those who share in the government has authority, whether in an oligarchy, an aristocracy or a [15] democracy. Now in most states the form called polity exists, for the fusion goes no further than the attempt to unite the freedom of the poor and the wealth of the rich, who commonly take the place of the noble. But as there are three grounds on which [20] men claim an equal share in the government, freedom, wealth, and excellence (for the fourth, what is called good birth, is the result of the two last, being only ancient wealth and excellence), it is clear that the admixture of the two elements, that is

to say, of the rich and poor, is to be called a polity or constitutional government; and the union of the three is to be called aristocracy, and more than any other form of [25] government, except the true and ideal, has a right to this name.

Thus far I have shown the existence of forms of states other than monarchy, democracy, and oligarchy, and what they are, and in what aristocracies differ from one another, and polities from aristocracies—that the two latter are not very unlike is obvious.

[30] 9 · Next we have to consider how by the side of oligarchy and democracy the so-called polity or constitutional government springs up, and how it should be organized. The nature of it will be at once understood from a comparison of oligarchy and democracy; we must ascertain their different characteristics, and [35] taking a portion from each, fit the two together, like the parts of a tally-stick. Now there are three modes in which fusions of government may be effected. In the first mode we must combine the laws made by both governments, say concerning the administration of justice. In oligarchies they impose a fine on the rich if they do not serve as judges, and to the poor they give no pay; but in democracies they give pay to [40] the poor and do not fine the rich. Now the union of these two modes is a common or middle term between them, and is therefore characteristic of a constitutional [1294<sup>b</sup>1] government, for it is a combination of both. This is one mode of uniting the two elements. Or a mean may be taken between the enactments of the two: thus democracies require no property qualification, or only a small one, from members of the assembly, oligarchies a high one; here neither of these is the common term, but a [5] mean between them. There is a third mode, in which something is borrowed from the oligarchical and something from the democratic principle. For example, the appointment of magistrates by lot is thought to be democratic, and the election of them oligarchical; democratic again when there is no property qualification, oligarchical when there is. In the aristocratic or constitutional state, one element [10] will be taken from each—from oligarchy the principle of electing to offices, from democracy the disregard of qualification. Such are the various modes of combination.

There is a true union of oligarchy and democracy when the same state may be [15] termed either a democracy or an oligarchy; those who use both names evidently feel that the fusion is complete. Such a fusion there is also in the mean; for both extremes appear in it. The



Lacedaemonian constitution, for example, is often described as a democracy, because it has many democratic features. In the first [20] place the youth receive a democratic education. For the sons of the poor are brought up with the sons of the rich, who are educated in such a manner as to make it possible for the sons of the poor to be educated like them. A similar equality prevails in the following period of life, and when the citizens are grown up to manhood the [25] same rule is observed; there is no distinction between the rich and poor. In like manner they all have the same food at their public tables, and the rich wear only such clothing as any poor man can afford. Again, the people elect to one of the two greatest offices of state, and in the other they share; for they elect the Senators and [30] share in the Ephoralty. By others the Spartan constitution is said to be an oligarchy, because it has many oligarchical elements. That all offices are filled by election and none by lot, is one of these oligarchical characteristics; that the power of inflicting death or banishment rests with a few persons is another; and there are others. In a well attuned polity there should appear to be both elements and yet neither; also [35] the government should rely on itself, and not on foreign aid, and on itself not through the good will of a majority<sup>3</sup>—they might be equally well-disposed when there is a vicious form of government—but through the general willingness of all classes in the state to maintain the constitution.

Enough of the manner in which a constitutional government, and in which the [40] so-called aristocracies, ought to be framed.

10 · Of the nature of tyranny I have still to speak, in order that it may have [1295<sup>a</sup>1] its place in our inquiry (since even tyranny is reckoned by us to be a form of government), although there is not much to be said about it. I have already in the former part of this treatise discussed royalty or kingship according to the most usual [5] meaning of the term, and considered whether it is or is not advantageous to states, and what kind of royalty should be established, and from what source, and how.

When speaking of royalty we also spoke of two forms of tyranny, which are both according to law, and therefore easily pass into royalty. Among Barbarians [10] there are elected monarchs who exercise a despotic power; despotic rulers were also elected in ancient Greece, called Aesymnetes. These monarchies, when compared with one another, exhibit certain differences. And they are, as I said before, royal, [15] in so far as

the monarch rules according to law over willing subjects; but they are tyrannical in so far as he is despotic and rules according to his own fancy. There is also a third kind of tyranny, which is the most typical form, and is the counterpart of [20] the perfect monarchy. This tyranny is just that arbitrary power of an individual which is responsible to no one, and governs all alike, whether equals or betters, with a view to its own advantage, not to that of its subjects, and therefore against their will. No freeman willingly endures such a government.

The kinds of tyranny are such and so many, and for the reasons which I have given.

[25] **11** · We have now to inquire what is the best constitution for most states, and the best life for most men, neither assuming a standard of excellence which is above ordinary persons, nor an education which is exceptionally favoured by nature and circumstances, nor yet an ideal state which is an aspiration only, but having [30] regard to the life in which the majority are able to share, and to the form of government which states in general can attain. As to those aristocracies, as they are called, of which we were just now speaking, they either lie beyond the possibilities of the greater number of states, or they approximate to the so-called constitutional government, and therefore need no separate discussion. And in fact the conclusion [35] at which we arrive respecting all these forms rests upon the same grounds. For if what was said in the *Ethics* is true, that the happy life is the life according to excellence lived without impediment, and that excellence is a mean, then the life which is in a mean, and in a mean attainable by everyone, must be the best. And the same principles of excellence and badness are characteristic of cities and of [1295<sup>b</sup>1] constitutions; for the constitution is so to speak the life of the city.

Now in all states there are three elements: one class is very rich, another very poor, and a third in a mean. It is admitted that moderation and the mean are best, [5] and therefore it will clearly be best to possess the gifts of fortune in moderation; for in that condition of life men are most ready to follow rational principle. But he who greatly excels in beauty, strength, birth, or wealth, or on the other hand who is very poor, or very weak, or of very low status, finds it difficult to follow rational principle. Of these two the one sort grow into violent and great criminals, the others [10] into rogues and petty rascals. And two sorts of offences correspond to them, the one committed from violence, the other from roguery [Again, the middle class is least likely to shrink from rule, or to be over-ambitious for it],<sup>4</sup> both of which are injuries to the state. Again, those who have too much of the goods of fortune, strength, [15] wealth, friends, and the like, are neither willing nor able to submit to authority. The evil begins at home; for when they are boys, by reason of the luxury in which they are brought up, they never learn, even at school, the habit of obedience. On the other hand, the very poor, who are in the opposite extreme, are too degraded. So that the one class cannot obey, and can only rule despotically; the other knows not [20] how to command and must be ruled like slaves. Thus arises a city, not of freemen, but of

masters and slaves, the one despising, the other envying; and nothing can be more fatal to friendship and good fellowship in states than this: for good fellowship springs from friendship; when men are at enmity with one another, they would rather not even share the same path. But a city ought to be composed, as far as [25] possible, of equals and similars; and these are generally the middle classes. Wherefore the city which is composed of middle-class citizens is necessarily best constituted in respect of the elements of which we say the fabric of the state naturally consists. And this is the class of citizens which is most secure in a state, for they do not, like the poor, covet other men's goods; nor do others covet theirs, as the [30] poor covet the goods of the rich; and as they neither plot against others, nor are themselves plotted against, they pass through life safely. Wisely then did Phocylides pray—'Many things are best in the mean; I desire to be of a middle condition in my city'.

Thus it is manifest that the best political community is formed by citizens of [35] the middle class, and that those states are likely to be well-administered in which the middle class is large, and stronger if possible than both the other classes, or at any rate than either singly; for the addition of the middle class turns the scale, and prevents either of the extremes from being dominant. Great then is the good fortune of a state in which the citizens have a moderate and sufficient property; for where some possess much, and the others nothing, there may arise an extreme democracy, [1296<sup>a1</sup>] or a pure oligarchy; or a tyranny may grow out of either extreme—either out of the most rampant democracy, or out of an oligarchy; but it is not so likely to arise out of the middle constitutions and those akin to them. I will explain the reason for this [5] hereafter, when I speak of the revolutions of states. The mean condition of states is clearly best, for no other is free from faction; and where the middle class is large, there are least likely to be factions and dissensions. For a similar reason large states are less liable to faction than small ones, because in them the middle class is large; [10] whereas in small states it is easy to divide all the citizens into two classes who are either rich or poor, and to leave nothing in the middle. And democracies are safer and more permanent than oligarchies, because they have a middle class which is more numerous and has a greater share in the government; for when there is no [15] middle class, and the poor are excessive in number, troubles arise, and the state soon comes to an end. A proof of the superiority of the middle class is that the best legislators have been of a middle condition; for example, Solon, as his own verses testify; and Lycurgus, for he was not a king; and Charondas, and almost all [20]

legislators.

These considerations will help us to understand why most governments are either democratic or oligarchical. The reason is that the middle class is seldom numerous in them, and whichever party, whether the rich or the common people, [25] transgresses the mean and predominates, draws the constitution its own way, and thus arises either oligarchy or democracy. There is another reason—the poor and the rich quarrel with one another, and whichever side gets the better, instead of [30] establishing a just or popular government, regards political supremacy as the prize of victory, and the one party sets up a democracy and the other an oligarchy. Further, both the parties which had the supremacy in Greece looked only to the interest of their own form of government, and established in states, the one, [35] democracies, and the other, oligarchies; they thought of their own advantage, and of the advantage of the other states not at all. For these reasons the middle form of government has rarely, if ever, existed, and among a very few only. One man alone of all who ever ruled in Greece was induced to give this middle constitution to states. [1296<sup>b</sup>1] But it has now become a habit among the citizens of states not even to care about equality; all men are seeking for dominion, or, if conquered, are willing to submit.

What then is the best form of government, and what makes it the best, is evident; and of other constitutions, since we say that there are many kinds of democracy and many of oligarchy, it is not difficult to see which has the first and [5] which the second or any other place in the order of excellence, now that we have determined which is the best. For that which is nearest to the best must of necessity be better, and that which is further from the mean worse, if we are judging absolutely and not relatively to given conditions: I say ‘relatively to given [10] conditions’, since a particular government may be preferable, but another form may be better for some people.

**12** · We have now to consider what and what kind of government is suitable to what and what kind of men. I may begin by assuming, as a general principle [15] common to all governments, that the portion of the state which desires the permanence of the constitution ought to be stronger than that which desires the reverse. Now every city is composed of quality and quantity. By quality I mean freedom, wealth, education, good birth, and by quantity, superiority of numbers. [20] Quality may exist in one of the classes which make up the state, and quantity in the

other. For example, the meanly-born may be more in number than the well-born, or the poor than the rich, yet they may not so much exceed in quantity as they fall short in quality; and therefore there must be a comparison of quantity and quality. [25] Where the number of the poor exceeds a given proportion, there will naturally be a democracy, varying in form with the sort of people who compose it in each case. If, for example, the farmers exceed in number, the first form of democracy will then [30] arise; if the artisans and labouring class, the last; and so with the intermediate forms. But where the rich and the notables exceed in quality more than they fall short in quantity, there oligarchy arises, similarly assuming various forms according to the kind of superiority possessed by the oligarchs.

[35] The legislator should always include the middle class in his government; if he makes his laws oligarchical, let him look to the middle class; if he makes them democratic, he should equally by his laws try to attach this class to the state. There only can the government ever be stable where the middle class exceeds one or both [1297<sup>a</sup>1] of the others, and in that case there will be no fear that the rich will unite with the poor against the rulers. For neither of them will ever be willing to serve the other, and if they look for some form of government more suitable to both, they will find none better than this, for the rich and the poor will never consent to rule in turn, because they mistrust one another. The arbiter is always the one most trusted, and [5] he who is in the middle is an arbiter. The more perfect the admixture of the political elements, the more lasting will be the constitution. Many even of those who desire to form aristocratic governments make a mistake, not only in giving too much power to the rich, but in attempting to cheat the people. There comes a time when out of a [10] false good there arises a true evil, since the encroachments of the rich are more destructive to the constitution than those of the people.

13 · The devices by which oligarchies deceive the people are five in number; [15] they relate to the assembly; the magistracies; the courts of law; the use of arms; and gymnastic exercises. The assemblies are thrown open to all, but either the rich only are fined for non-attendance, or a much larger fine is inflicted upon them. As to the magistracies, those who are qualified by property cannot decline office upon oath, [20] but the poor may. In the law-courts the rich, and the rich only, are fined if they do not serve, the poor are let off with impunity, or, as in the laws of

Charondas, a larger fine is inflicted on the rich, and a smaller one on the poor. In some states all citizens who have registered themselves are allowed to attend the assembly and to try [25] causes; but if after registration they do not attend either in the assembly or at the courts, heavy fines are imposed upon them. The intention is that through fear of the fines they may avoid registering themselves, and then they cannot sit in the law-courts or in the assembly. Concerning the possession of arms, and gymnastic exercises, they legislate in a similar spirit. For the poor are not obliged to have arms, [30] but the rich are fined for not having them; and in like manner no penalty is inflicted on the poor for non-attendance at the gymnasium, and consequently, having nothing to fear, they do not attend, whereas the rich are liable to a fine, and therefore they take care to attend.

These are the devices of oligarchical legislators, and in democracies they have [35] counter-devices. They pay the poor for attending the assemblies and the law-courts, and they inflict no penalty on the rich for non-attendance. It is obvious that he who would duly mix the two principles should combine the practice of both, and provide that the poor should be paid to attend, and the rich fined if they do not attend, for [40] then all will take part; if there is no such combination, power will be in the hands of one party only. The government should be confined to those who carry arms. As to [1297<sup>b</sup>1] the property qualification, no absolute rule can be laid down, but we must see what is the highest qualification sufficiently comprehensive to secure that the number of those who have the rights of citizens exceeds the number of those excluded. Even if [5] they have no share in office, the poor, provided only that they are not outraged or deprived of their property, will be quiet enough.

But to secure gentle treatment for the poor is not an easy thing, since a ruling class is not always humane. And in time of war the poor are apt to hesitate unless [10] they are fed; when fed, they are willing enough to fight. In some states the government is vested, not only in those who are actually serving, but also in those who have served; among the Malians, for example, the governing body consisted of [15] the latter, while the magistrates were chosen from those actually on service. And the earliest government which existed among the Greeks, after the overthrow of the kingly power, grew up out of the warrior class, and was originally taken from the knights (for strength and superiority in war at that time depended on cavalry; [20] indeed, without discipline, infantry are useless, and in ancient times there was no military knowledge or tactics, and therefore the strength of armies lay in their cavalry). But when cities

increased and the heavy-armed grew in strength, more had a share in the government; and this is the reason why the states which we call [25] constitutional governments have been hitherto called democracies. Ancient constitutions, as might be expected, were oligarchical and royal; their population being small they had no considerable middle class; the people were weak in numbers and organization, and were therefore more content to be governed.

I have explained why there are various forms of government, and why there are [30] more than is generally supposed; for democracy, as well as other constitutions, has more than one form: also what their differences are, and whence they arise, and what is the best form of government, speaking generally, and to whom the various forms of government are best suited; all this has now been explained.

[35] **14** · Having thus gained an appropriate basis of discussion we will proceed to speak of the points which follow next in order. We will consider the subject not only in general but with reference to particular constitutions. All constitutions have three elements, concerning which the good lawgiver has to regard what is expedient for each constitution. When they are well-ordered, the constitution is well-ordered, [40] and as they differ from one another, constitutions differ. There is one element which deliberates about public affairs; secondly that concerned with the magistracies—the [1298<sup>a</sup>1] questions being, what they should be, over what they should exercise authority, and what should be the mode of electing to them; and thirdly that which has judicial power.

The deliberative element has authority in matters of war and peace, in making [5] and unmaking alliances; it passes laws, inflicts death, exile, confiscation, elects magistrates and audits their accounts. These powers must be assigned either all to all the citizens or all to some of them (for example, to one or more magistracies, or different causes to different magistracies), or some of them to all, and others of [10] them only to some. That all things should be decided by all is characteristic of democracy; this is the sort of equality which the people desire. But there are various ways in which all may share in the government; they may deliberate, not all in one body, but by turns, as in the constitution of Telecles the Milesian. There are other constitutions in which the boards of magistrates meet and deliberate, but come into [15] office by turns, and are elected out of the tribes and the very smallest divisions of the state, until every one has obtained office in his turn. The citizens, on the other



hand, are assembled only for the purposes of legislation, and to consult about the constitution, and to hear the edicts of the magistrates. In another variety of [20] democracy the citizens form one assembly, but meet only to elect magistrates, to pass laws, to advise about war and peace, and to make scrutinies. Other matters are referred severally to special magistrates, who are elected by vote or by lot out of all the citizens. Or again, the citizens meet about election to offices and about [25] scrutinies, and deliberate concerning war or alliances while other matters are administered by the magistrates, who, as far as is possible, are elected by vote. I am speaking of those magistracies in which special knowledge is required. A fourth form of democracy is when all the citizens meet to deliberate about everything, and the magistrates decide nothing, but only make the preliminary inquiries; and that is [30] the way in which the last form of democracy, corresponding, as we maintain, to the close family oligarchy and to tyranny, is at present administered. All these modes are democratic.

On the other hand, that some should deliberate about all is oligarchical. This again is a mode which, like the democratic, has many forms. When the deliberative [35] class being elected out of those who have a moderate qualification are numerous and they respect and obey the prohibitions of the law without altering it, and anyone who has the required qualification shares in the government, then, just because of this moderation, the oligarchy inclines towards polity. But when only selected individuals and not the whole people share in the deliberations of the state, then, [1298<sup>b</sup>1] although, as in the former case, they observe the law, the government is a pure oligarchy. Or, again, when those who have the power of deliberation are self-elected, and son succeeds father, and they and not the laws are supreme—the government is of necessity oligarchical. Where, again, particular persons have [5] authority in particular matters—for example, when the whole people decide about peace and war and hold scrutinies, but the magistrates regulate everything else, and they are elected by vote or by lot—there the government is an aristocracy or a constitutional government. And if some questions are decided by magistrates elected by vote, and others by magistrates elected by lot, either absolutely or out of select candidates, or elected partly by vote, partly by lot—these practices are partly characteristic of an aristocratic government, and partly of a pure constitutional [10] government.

These are the various forms of the deliberative body; they correspond to the various forms of government. And the government of each state is

administered according to one or other of the principles which have been laid down. Now it is for the interest of democracy, according to the most prevalent notion of it (I am speaking of that extreme form of democracy in which the people are supreme even [15] over the laws), with a view to better deliberation to adopt the custom of oligarchies respecting courts of law. For in oligarchies the rich who are wanted to be judges are compelled to attend under pain of a fine, whereas in democracies the poor are paid to attend. And this practice of oligarchies should be adopted by democracies in their public assemblies, for they will advise better if they all deliberate together, the [20] people with the notables and the notables with the people. It is also a good plan that those who deliberate should be elected by vote or by lot in equal numbers out of the different classes; and that if the people greatly exceed in number those who have political training, pay should not be given to all, but only to as many as would [25] balance the number of the notables, or that the number in excess should be eliminated by lot. But in oligarchies either certain persons should be co-opted from the mass, or a class of officers should be appointed such as exist in some states, who are termed *Probuli* and guardians of the law; and the citizens should occupy [30] themselves exclusively with matters on which they have previously deliberated; for in that way the people will have a share in the deliberations of the state, but will not be able to disturb the principles of the constitution. Again, in oligarchies either the people ought to accept the measures of the government, or not to pass anything contrary to them; or, if all are allowed to share in counsel, the decision should rest [35] with the magistrates. The opposite of what is done in constitutional governments should be the rule in oligarchies; the veto of the majority should be final, their assent not final, but the proposal should be referred back to the magistrates. Whereas in constitutional governments they take the contrary course; the few have the negative, not the affirmative power; the affirmation of everything rests with the multitude.

[1299<sup>a</sup>1] These, then, are our conclusions respecting the deliberative, that is, the supreme element in states.

**15** · Next we will proceed to consider the distribution of offices; this, too, being a part of politics concerning which many questions arise:—What shall their [5] number be? Over what shall they preside, and what shall be their duration? Sometimes they last for six months, sometimes for less; sometimes they are annual, whilst in other cases offices are held for

still longer periods. Shall they be for life or for a long term of years; or, if for a short term only, shall the same persons hold them [10] over and over again, or once only? Also about the appointment to them—from whom are they to be chosen, by whom, and how? We should first be in a position to say what are the possible varieties of them, and then we may proceed to determine which are suited to different forms of government. But what are to be included [15] under the term ‘offices’? That is a question not quite so easily answered. For a political community requires many officers; and not every one who is chosen by vote or by lot is to be regarded as a ruler. In the first place there are the priests, who must be distinguished from political officers; masters of choruses and heralds, even ambassadors, are elected by vote. Some duties of superintendence again are [20] political, extending either to all the citizens in a single sphere of action, like the office of the general who superintends them when they are in the field, or to a section of them only, like the inspectorships of women or of youth. Other offices are concerned with household management, like that of the corn measurers who exist in many states and are elected officers. There are also menial offices which the rich [25] have executed by their slaves. Speaking generally, those are to be called offices to which the duties are assigned of deliberating about certain measures and of judging and commanding, especially the last; for to command is the especial duty of a magistrate. But the question is not of any importance in practice; no one has ever [30] brought into court the meaning of the word, although such problems have a speculative interest.

What kinds of offices, and how many, are necessary to the existence of a state, and which, if not necessary, yet conduce to its well-being, are much more important considerations, affecting all constitutions, but more especially small states. For in great states it is possible, and indeed necessary, that every office should have a [35] special function; where the citizens are numerous, many may hold office. And so it happens that some offices a man holds a second time only after a long interval, and others he holds once only; and certainly every work is better done which receives the sole and not the divided attention of the worker. But in small states it is necessary to [1299<sup>b</sup>1] combine many offices in a few hands, since the small number of citizens does not admit of many holding office—for who will there be to succeed them? And yet small states at times require the same offices and laws as large ones; the difference [5] is that the one want them often, the others only after long intervals. Hence there is no reason why the care of many offices should not be imposed on the

same person, for they will not interfere with each other. When the population is small, offices should be like the spits which also serve to hold a lamp. We must first ascertain how [10] many magistrates are necessary in every state, and also how many are not exactly necessary, but are nevertheless useful, and then there will be no difficulty in seeing what offices can be combined in one. We should also know over which matters several local tribunals are to have jurisdiction, and in which cases authority should [15] be centralized: for example, should one person keep order in the market and another in some other place, or should the same person be responsible everywhere? Again, should offices be divided according to the subjects with which they deal, or according to the persons with whom they deal: I mean to say, should one person see to good order in general, or one look after the boys, another after the women, and so [20] on? Further, under different constitutions, should the magistrates be the same or different? For example, in democracy, oligarchy, aristocracy, monarchy, should there be the same magistrates, although they are elected not out of equal or similar classes of citizens, but differently under different constitutions—in aristocracies, for example, they are chosen from the educated, in oligarchies from the wealthy, [25] and in democracies from the free—or are there certain differences in the offices answering to them as well, and may the same be suitable to some, but different offices to others? For in some states it may be convenient that the same office should have a more extensive, in other states a narrower sphere. Special offices are [30] peculiar to certain forms of government—for example that of Probuli, which is not a democratic office, although a council is democratic. There must be some body of men whose duty is to prepare measures for the people in order that they may not be diverted from their business; when these are few in number, the state inclines to an oligarchy: or rather the Probuli must always be few, and are therefore an [35] oligarchical element. But when both institutions exist in a state, the Probuli are a check on the council; for the counsellor is a democratic element, but the Probuli are oligarchical. Even the power of the council disappears when democracy has taken that extreme form in which the people themselves are always meeting and [1300<sup>a</sup>1] deliberating about everything. This the case when the members of the assembly receive abundant pay; for they have nothing to do and are always holding assemblies and deciding everything for themselves. A magistracy which controls the [5] boys or the women, or any similar office, is suited to an aristocracy rather than to a democracy; for how can the magistrates prevent the wives of the poor from going out of doors?

Neither is it an oligarchical office; for the wives of the oligarchs are too grand.

[10] Enough of these matters. I will now inquire into appointments to offices. The varieties depend on three terms, and the combinations of these give all possible modes: first, who appoints? secondly, from whom? and thirdly, how? Each of these [15] three admits of two varieties. For either all the citizens, or only some, appoint. Either the magistrates are chosen out of all or out of some who are distinguished either by a property qualification, or by birth, or excellence, or for some special reason, as at Megara only those were eligible who had returned from exile and fought together against the democracy. They may be appointed either by vote or by [20] lot. Again, these several varieties may be coupled, I mean that some officers may be elected by some, others by all, and some again out of some, and others out of all, and some by vote and others by lot. Each variety of these terms admits of four modes.

For either all may appoint from all by vote, or all from all by lot, or all from some by vote, or all from some by lot. Again, if it is only some who appoint, they [25] may do so from all by vote or from all by lot or from some by vote or from some by lot. And if from all, either by sections, as, for example, by tribes, and wards, and phratries, until all the citizens have been gone through; or the citizens may be in all cases eligible indiscriminately; or sometimes in one way, sometimes in the other—I [30] mean, from all by vote in some cases, by lot in others. Thus the modes that arise, apart from the two couplings, number twelve. Of these systems two are popular, that all should appoint from all by vote or by lot—or by both, some of the offices by lot, others by vote. That all should not appoint at once, but should appoint from all [35] or from some either by lot or by vote or by both, or appoint to some offices from all and to others from some ('by both' meaning to some offices by lot, to others by vote), is characteristic of a polity. [And that some should appoint from all, to some offices by vote, to others by lot or by both—some by lot, others by vote—is oligarchical; and it is more oligarchical to appoint by both. And to appoint to some offices from all, to others from some, is characteristic of a polity with a leaning [1300<sup>b</sup>1] towards aristocracy—or to appoint some by vote, others by lot.]<sup>5</sup> That some should appoint from some is oligarchical—even that some should appoint from some by lot (and if this does not actually occur, it is none the less oligarchical in character), or that some should appoint from some by both. That some should appoint from all, and that sometimes all should appoint from some, by vote, is aristocratic.

[5] These are the different modes of constituting magistrates, and these correspond to different forms of government:—which are proper to which, or how they ought to be established, will be evident when we determine the nature of their [10] powers. By powers I mean such powers as a magistrate exercises over the revenue or in defence of the country; for there are various kinds of power: the power of the general, for example, is not the same as that which regulates contracts in the market.

Of the three parts of government the judicial remains to be considered, and this we shall divide on the same principle. There are three points on which the varieties of law-courts depend: the persons from whom they are appointed, the [15] matters with which they are concerned, and the manner of their appointment. I mean, are the judges taken from all, or from some only? how many kinds of law-courts are there? are the judges chosen by vote or by lot?

First, let me determine how many kinds of law-courts there are. They are eight in number: one is the court of audits or scrutinies; a second takes cognizance of [20] ordinary offences against the state; a third is concerned with treason against the constitution; the fourth determines disputes respecting penalties, whether raised by magistrates or by private persons; the fifth decides the more important civil cases; the sixth tries cases of homicide, which are of various kinds, premeditated, [25] involuntary, and cases in which the guilt is confessed but the justice is disputed; and there may be a fourth court in which murderers who have fled from justice are tried after their return, such as the Court of Phreatto is said to be at Athens. But cases of this sort rarely happen at all even in large cities. The different kinds of homicide [30] may be tried either by the same or by different courts. There are courts for strangers:—of these there are two subdivisions, one for the settlement of their disputes with one another, the other for the settlement of disputes between them and the citizens. And besides all these there must be courts for small suits about sums of a drachma up to five drachmas, or a little more, which have to be determined, but do not require many judges. [35]

Nothing more need be said of these small suits, nor of the courts for homicide and for strangers:—I would rather speak of political cases, which, when mismanaged, create division and disturbances in constitutions.

Now if all the citizens judge, in all the different cases which I have distinguished, they may be appointed by vote or by lot, or sometimes by lot and [40] sometimes by vote. Or when a single class of causes are tried, the judges who decide them may be appointed, some by vote, and

some by lot. These then are the four modes of appointing judges from the whole people, and there will be likewise four [1301<sup>a</sup>1] modes, if they are elected from a part only; for they may be appointed from some by vote and judge in all causes; or they may be appointed from some by lot and judge in all causes; or they may be elected in some cases by vote, and in some cases taken by lot, or some courts, even when judging the same causes, may be composed of [5] members some appointed by vote and some by lot. These modes, then, as was said, answer to those previously mentioned.

Once more, the modes of appointment may be combined; I mean, that some may be chosen out of the whole people, others out of some, some out of both; for example, the same tribunal may be composed of some who were elected out of all, and of others who were elected out of some, either by vote or by lot or by both. [10]

In how many forms law-courts can be established has now been considered. The first form, viz. that in which the judges are taken from all the citizens, and in which all causes are tried, is democratic; the second, which is composed of a few only who try all causes, oligarchical; the third, in which some courts are taken from [15] all classes, and some from certain classes only, aristocratic and constitutional.

## BOOK V

1 · The design which we proposed to ourselves is now nearly completed. Next [20] in order follow the causes of revolution in states, how many, and of what nature they are; what modes of destruction apply to particular states, and out of what, and into what they mostly change; also what are the modes of preservation in states generally, or in a particular state, and by what means each state may be best preserved: these questions remain to be considered.

[25] In the first place we must assume as our starting-point that in the many forms of government which have sprung up there has always been an acknowledgement of justice and proportionate equality, although mankind fail in attaining them, as indeed I have already explained. Democracy, for example, arises out of the notion that those who are equal in any respect are equal in all respects; because men are [30] equally free, they claim to be absolutely equal. Oligarchy is based on the notion that those who are unequal in one respect are in all respects unequal; being unequal, that is, in property, they suppose themselves to be unequal absolutely. The democrats think that as they are equal they ought to be equal in all things; while the oligarchs, [35] under the idea that they are unequal, claim too much, which is one form of inequality. All these forms of government have a kind of justice, but, tried by an absolute standard, they are faulty; and, therefore, both parties, whenever their share in the government does not accord with their preconceived ideas, stir up revolution. Those who excel in excellence have the best right of all to rebel (for they [1301<sup>b</sup>1] alone can with reason be deemed absolutely unequal), but then they are of all men the least inclined to do so. There is also a superiority which is claimed by men of rank; for they are thought noble because they spring from wealthy and excellent [5] ancestors. Here then, so to speak, are opened the very springs and fountains of revolution; and hence arise two sorts of changes in governments; the one affecting the constitution, when men seek to change from an existing form into some other, for example, from democracy into oligarchy, and from oligarchy into democracy, or [10] from either of them into constitutional government or aristocracy, and conversely; the other not affecting the constitution, when, without disturbing the form of government, whether oligarchy, or monarchy, or



any other, they try to get the administration into their own hands. Further, there is a question of degree; an [15] oligarchy, for example, may become more or less oligarchical, and a democracy more or less democratic; and in like manner the characteristics of the other forms of government may be more or less strictly maintained. Or the revolution may be directed against a portion of the constitution only, e.g., the establishment or overthrow of a particular office: as at Sparta it is said that Lysander attempted to overthrow the monarchy, and king Pausanias, the ephoralty. At Epidamnus, too, [20] the change was partial. For instead of phylarchs or heads of tribes, a council was appointed; but to this day the magistrates are the only members of the ruling class who are compelled to go to the Heliæa when an election takes place, and the office [25] of the single archon was another oligarchical feature. Everywhere inequality is a cause of revolution, but an inequality in which there is no proportion—for instance, a perpetual monarchy among equals; and always it is the desire for equality which rises in rebellion.

Now equality is of two kinds, numerical and proportional; by the first I mean [30] sameness or equality in number or size; by the second, equality of ratios. For example, the excess of three over two is numerically equal to the excess of two over one; whereas four exceeds two in the same ratio in which two exceeds one, for two is the same part of four that one is of two, namely, the half. As I was saying before, [35] men agree that justice in the abstract is proportion, but they differ in that some think that if they are equal in any respect they are equal absolutely, others that if they are unequal in any respect they should be unequal in all. Hence there are two principal forms of government, democracy and oligarchy; for good birth and excellence are rare, but wealth and numbers are more common. In what city shall [1302<sup>a</sup>1] we find a hundred persons of good birth and of excellence? whereas the rich everywhere abound. That a state should be ordered, simply and wholly, according to either kind of equality, is not a good thing; the proof is the fact that such forms of government never last. They are originally based on a mistake, and, as they begin [5] badly, cannot fail to end badly. The inference is that both kinds of equality should be employed; numerical in some cases, and proportionate in others.

Still democracy appears to be safer and less liable to revolution than oligarchy. For in oligarchies there is the double danger of the oligarchs falling out among [10] themselves and also with the people; but in democracies there is only the danger of a quarrel with the oligarchs. No dissension worth mentioning arises among the people themselves. And we

may further remark that a government which is composed of the middle class more nearly approximates to democracy than to oligarchy, and is the safest of the imperfect forms of government. [15]

2 · In considering how dissensions and political revolutions arise, we must first of all ascertain the beginnings and causes of them which affect constitutions generally. They may be said to be three in number; and we have now to give an outline of each. We want to know what is the state of mind and what are the motives [20] of those who make them and whence arise political disturbances and quarrels. The universal and chief cause of this revolutionary feeling has been already mentioned; viz. the desire for equality, when men think that they are equal to others who have [25] more than themselves; or, again, the desire for inequality and superiority, when conceiving themselves to be superior they think that they have not more but the same or less than their inferiors; pretensions which may or may not be just. Inferiors revolt in order that they may be equal, and equals that they may be superior. Such is [30] the state of mind which creates revolutions. The motives for making them are the desire for gain and honour, or the fear of dishonour and loss; the authors of them want to divert punishment or dishonour from themselves or their friends. The causes and reasons of revolutions, whereby men are themselves affected in the way [35] described, and about the things which I have mentioned, viewed in one way may be regarded as seven, and in another as more than seven. Two of them have been already noticed; but they act in a different manner, for men are excited against one another by the love of gain and honour—not, as in the case which I have just [1302<sup>b</sup>1] supposed, in order to obtain them for themselves, but at seeing others, justly or unjustly, monopolising them. Other causes are insolence, fear, excessive predominance, contempt, disproportionate increase in some part of the state; causes of another sort are election intrigues, carelessness, neglect about trifles, dissimilarity of elements.

[5] 3 · What share insolence and avarice have in creating revolutions, and how they work, is plain enough. When the magistrates are insolent and grasping they conspire against one another and also against the constitution from which they derive their power, making their gains either at the expense of individuals or of the [10] public. It is evident, again, what an influence honour exerts and how it is a cause of revolution. Men who are themselves dishonoured and who see others

obtaining honours rise in rebellion; the honour or dishonour when undeserved is unjust; and [15] just when awarded according to merit. Again, superiority is a cause of revolution when one or more persons have a power which is too much for the state and the power of the government; this is a condition of affairs out of which there tends to arise a monarchy, or a family oligarchy. And therefore, in some places, as at Athens and Argos, they have recourse to ostracism. But how much better to provide from [20] the first that there should be no such pre-eminent individuals instead of letting them come into existence and then finding a remedy.

Another cause of revolution is fear. Either men have committed wrong, and are afraid of punishment, or they are expecting to suffer wrong and are desirous of anticipating their enemy. Thus at Rhodes the notables conspired against the people [25] through fear of the suits that were brought against them. Contempt is also a cause of insurrection and revolution; for example, in oligarchies—when those who have no share in the state are the majority, they revolt, because they think that they are the stronger. Or, again, in democracies, the rich despise the disorder and anarchy of the [30] state; at Thebes, for example, where, after the battle of Oenophyta, the bad administration of the democracy led to its ruin. At Megara the fall of the democracy was due to a defeat occasioned by disorder and anarchy. And at Syracuse the democracy aroused contempt before the tyranny of Gelo arose; at Rhodes, before the insurrection.

Political revolutions also spring from a disproportionate increase in any part of [35] the state. For as a body is made up of many members, and every member ought to grow in proportion so that symmetry may be preserved, but it loses its nature if the foot is four cubits long and the rest of the body two spans; and, should the abnormal increase be one of quality as well as of quantity, it may even take the form of another animal: even so a state has many parts, of which some one may often grow [1303<sup>a</sup>1] imperceptibly; for example, the number of poor in democracies and in constitutional states. And this disproportion may sometimes happen by an accident, as at Tarentum, from a defeat in which many of the notables were slain in a battle with the lapygians just after the Persian War, the constitutional government in [5] consequence becoming a democracy; or as was the case at Argos, where the Argives, after their army had been cut to pieces on the seventh day of the month by Cleomenes the Lacedaemonian, were compelled to admit to citizenship some of their serfs; and at Athens, when, after frequent defeats of their infantry at the time of the Peloponnesian War, the notables were reduced

in number, because the [10] soldiers had to be taken from the roll of citizens. Revolutions arise from this cause as well, in democracies as in other forms of government, but not to so great an extent. When the rich grow numerous or properties increase, the form of government changes into an oligarchy or a government of families. Forms of government also change—sometimes even without revolution, owing to election contests, as at Heraea (where, instead of electing their magistrates, they took them by lot, because [15] the electors were in the habit of choosing their own partisans); or owing to carelessness, when disloyal persons are allowed to find their way into the highest offices, as at Oreum, where, upon the accession of Heracleodorus to office, the oligarchy was overthrown, and changed by him into a constitutional and democratic [20] government.

Again, the revolution may be facilitated by the slightness of the change; I mean that a great change may sometimes slip into the constitution through neglect of a small matter; at Ambracia, for instance, the qualification for office, small at first, was eventually reduced to nothing. For the Ambraciots thought that a small qualification was much the same as none at all.

Another cause of revolution is difference of races which do not at once acquire [25] a common spirit; for a state is not the growth of a day, any more than it grows out of a multitude brought together by accident. Hence the reception of strangers in colonies, either at the time of their foundation or afterwards, has generally produced revolution; for example, the Achaeans who joined the Troezenians in the foundation of Sybaris, becoming later the more numerous, expelled them; hence the [30] curse fell upon Sybaris. At Thurii the Sybarites quarrelled with their fellow-colonists; thinking that the land belonged to them, they wanted too much of it and were driven out. At Byzantium the new colonists were detected in a conspiracy, and were expelled by force of arms; the people of Antissa, who had received the Chian exiles, fought with them, and drove them out; and the Zancleans, after having [35] received the Samians, were driven by them out of their own city. The citizens of Apollonia on the Euxine, after the introduction of a fresh body of colonists, had a revolution; the Syracusans, after the expulsion of their tyrants, having admitted strangers and mercenaries to the rights of citizenship, quarrelled and came to [1303<sup>b</sup>1] blows; the people of Amphipolis, having received Chalcidian colonists, were nearly all expelled by them.

Now, in oligarchies the masses make revolution under the idea that they are [5] unjustly treated, because, as I said before, they are equals, and have not an equal share, and in democracies the notables revolt,

because they are not equals, and yet have only an equal share.

Again, the situation of cities is a cause of revolution when the country is not naturally adapted to preserve the unity of the state. For example, the Chytians at [10] Clazomenae did not agree with the people of the island; and the people of Colophon quarrelled with the Notians; at Athens, too, the inhabitants of the Piraeus are more democratic than those who live in the city. For just as in war the impediment of a ditch, however small, may break a regiment, so every cause of difference makes a [15] breach in a city. The greatest opposition is confessedly that of excellence and badness; next comes that of wealth and poverty; and there are other antagonistic elements, greater or less, of which one is this difference of place.

4 · In revolutions the occasions may be trifling, but great interests are at stake. Even trifles are most important when they concern the rulers, as was the case [20] of old at Syracuse; for the Syracusan constitution was once changed by a love-quarrel of two young men, who were in the government. The story is that while one of them was away from home his beloved was gained over by his companion, [25] and he to revenge himself seduced the other's wife. They then drew the members of the ruling class into their quarrel and so split all the people into portions. We learn from this story that we should be on our guard against the beginnings of such evils, and should put an end to the quarrels of chiefs and mighty men. The mistake lies in the beginning—as the proverb says —‘Well begun is half done’; so an error at the [30] beginning, though quite small, bears the same ratio to the errors in the other parts. In general, when the notables quarrel, the whole city is involved, as happened in Hestiaea after the Persian War. The occasion was the division of an inheritance; one of two brothers refused to give an account of their father's property and the [35] treasure which he had found: so the poorer of the two quarrelled with him and enlisted in his cause the popular party, the other, who was very rich, the wealthy classes.

At Delphi, again, a quarrel about a marriage was the beginning of all the [1304+1] troubles which followed. In this case the bridegroom, fancying some occurrence to be of evil omen, came to the bride, and went away without taking her. Whereupon her relations, thinking that they were insulted by him, put some of the sacred treasure among his offerings while he was sacrificing, and then slew him, pretending that he had been robbing the temple. At Mytilene, too, a dispute about [5] heiresses was

the beginning of many misfortunes, and led to the war with the Athenians in which Paches took their city. A wealthy citizen, named Timophanes, left two daughters; Dexander, another citizen, wanted to obtain them for his sons; but he was rejected in his suit, whereupon he stirred up a revolution, and instigated the Athenians (of whom he was representative) to interfere. A similar quarrel about [10] an heiress arose at Phocis between Mnaseas the father of Mnason, and Euthycrates the father of Onomarchus; this was the beginning of the Sacred War. A marriage-quarrel was also the cause of a change in the government of Epidamnus. A certain man betrothed his daughter to a person whose father, having been made a magistrate, fined the father of the girl, and the latter, stung by the insult, conspired [15] with the unenfranchised classes to overthrow the state.

Governments also change into oligarchy or into democracy or into a constitutional government because the magistrates, or some other section of the state, increase in power or renown. Thus at Athens the reputation gained by the court of the Areopagus, in the Persian War, seemed to tighten the reins of government. On [20] the other hand, the victory of Salamis, which was gained by the common people who served in the fleet, and won for the Athenians the empire due to command of the sea, strengthened the democracy. At Argos, the notables, having distinguished [25] themselves against the Lacedaemonians in the battle of Mantinea, attempted to put down the democracy. At Syracuse, the people, having been the chief authors of the victory in the war with the Athenians, changed the constitutional government into democracy. At Chalcis, the people, uniting with the notables, killed Phoxus the [30] tyrant, and then seized the government. At Ambracia, the people, in like manner, having joined with the conspirators in expelling the tyrant Periander, transferred the government to themselves. And generally, it should be remembered that those who have secured power to the state, whether private citizens, or magistrates, or [35] tribes, or any other part or section of the state, are apt to cause revolutions. For either envy of their greatness draws others into rebellion, or they themselves, in their pride of superiority, are unwilling to remain on a level with others.

Revolutions also break out when opposite parties, e.g. the rich and the people, [1304<sup>b</sup>1] are equally balanced, and there is little or no middle class; for, if either party were manifestly superior, the other would not risk an attack upon them. And for this reason, those who are eminent in excellence usually do not stir up insurrections, being always a minority. Such in general are the beginnings and causes of the [5] disturbances and

revolutions to which every form of government is liable.

Revolutions are effected in two ways, by force and by fraud. Force may be applied either at the time of making the revolution or afterwards. Fraud, again, is of two kinds; for sometimes the citizens are deceived into acquiescing in a change of [10] government, and afterwards they are held in subjection against their will. This was what happened in the case of the Four Hundred, who deceived the people by telling them that the king would provide money for the war against the Lacedaemonians, and, having cheated the people, still endeavoured to retain the government. In other [15] cases the people are persuaded at first, and afterwards, by a repetition of the persuasion, their goodwill and allegiance are retained. The revolutions which affect constitutions generally spring from the above-mentioned causes.

5 · And now, taking each constitution separately, we must see what follows from the principles already laid down. [20]

Revolutions in democracies are generally caused by the intemperance of demagogues, who either in their private capacity lay information against rich men until they compel them to combine (for a common danger unites even the bitterest enemies), or coming forward in public stir up the people against them. The truth of this remark is proved by a variety of examples. At Cos the democracy was [25] overthrown because wicked demagogues arose, and the notables combined. At Rhodes the demagogues not only provided pay for the multitude, but prevented them from making good to the trierarchs the sums which had been expended by them; and they, in consequence of the suits which were brought against them, were [30] compelled to combine and put down the democracy. The democracy at Heraclea was overthrown shortly after the foundation of the colony by the injustice of the demagogues, which drove out the notables, who came back in a body and put an end [35] to the democracy. Much in the same manner the democracy at Megara was overturned; there the demagogues drove out many of the notables in order that they might be able to confiscate their property. At length the exiles, becoming numerous, returned, and, engaging and defeating the people, established the oligarchy. The same thing happened with the democracy of Cyme, which was overthrown by [1305<sup>a</sup>1] Thrasymachus. And we may observe that in most states the changes have been of this character. For sometimes the demagogues, in order to curry favour with the people, wrong the notables and so force them to combine—either

they make a [5] division of their property, or diminish their incomes by the imposition of public services, and sometimes they bring accusations against the rich so that they may have their wealth to confiscate.

Of old, the demagogue was also a general, and then democracies changed into tyrannies. Most of the ancient tyrants were originally demagogues. They are not so [10] now, but they were then; and the reason is that they were generals and not orators, for oratory had not yet come into fashion. Whereas in our day, when the art of rhetoric has made such progress, the orators lead the people, but their ignorance of military matters prevents them from usurping power; at any rate instances to the [15] contrary are few and slight. Tyrannies were more common formerly than now, for this reason also, that great power was placed in the hands of individuals; thus a tyranny arose at Miletus out of the office of the Prytanis, who had supreme authority in many important matters. Moreover, in those days, when cities were not [20] large, the people dwelt in the fields, busy at their work; and their chiefs, if they possessed any military talent, seized the opportunity, and winning the confidence of the masses by professing their hatred of the wealthy, they succeeded in obtaining the tyranny. Thus at Athens Peisistratus led a faction against the men of the plain, [25] and Theagenes at Megara slaughtered the cattle of the wealthy, which he found by the river side, where they had put them to graze. Dionysius, again, was thought worthy of the tyranny because he denounced Daphnaeus and the rich; his enmity to the notables won for him the confidence of the people. Changes also take place from the ancient to the latest form of democracy; for where there is a popular election of [30] the magistrates and no property qualification, the aspirants for office get hold of the people, and contrive at last even to set them above the laws. A more or less complete cure for this state of things is for the separate tribes, and not the whole people, to elect the magistrates.

[35] These are the principal causes of revolutions in democracies.

6 · There are two patent causes of revolutions in oligarchies: first, when the oligarchs oppress the people, for then anybody is good enough to be their champion, especially if he be himself a member of the oligarchy, as Lygdamis at Naxos, who afterwards came to be tyrant. But revolutions which commence outside the [1305<sup>b</sup>1] governing class may be further subdivided. Sometimes, when the government is very exclusive, the revolution is brought about by persons of the wealthy class



who are excluded, as happened at Massalia and Istros and Heraclea, and other cities. [5] Those who had no share in the government created a disturbance, until first the elder brothers, and then the younger, were admitted; for in some places father and son, in others, elder and younger brothers, do not hold office together. At Massalia [10] the oligarchy became more like a constitutional government, but at Istros ended in a democracy, and at Heraclea was enlarged to 600. At Cnidos, again, the oligarchy underwent a considerable change. For the notables fell out among themselves, because only a few shared in the government; there existed among them the rule already mentioned, that father and son could not hold office together, and, if there were several brothers, only the eldest was admitted. The people took advantage of [15] the quarrel, and choosing one of the notables to be their leader, attacked and conquered the oligarchs, who were divided, and division is always a source of weakness. The city of Erythrae, too, in old times was ruled, and ruled well, by the [20] Basilidae, but the people took offence at the narrowness of the oligarchy and changed the constitution.

Of internal causes of revolutions in oligarchies one is the personal rivalry of the oligarchs, which leads them to play the demagogue. Now, the oligarchical demagogue is of two sorts: either he practises upon the oligarchs themselves (for, although the oligarchy are quite a small number, there may be a demagogue among [25] them, as at Athens Charicles' party won power by courting the Thirty, that of Phrynichus by courting the Four Hundred); or the oligarchs may play the demagogue with the people. This was the case at Larissa, where the guardians of the citizens endeavoured to gain over the people because they were elected by them; [30] and such is the fate of all oligarchies in which the magistrates are elected, as at Abydos, not by the class in which they belong, but by the heavy-armed or by the people, although they may be required to have a high qualification, or to be members of a political club; or, again, where the law-courts are composed of persons outside the government, the oligarchs flatter the people in order to obtain a decision in their own favour, and so they change the constitution; this happened at Heraclea [35] in Pontus. Again, oligarchies change whenever any attempt is made to narrow them; for then those who desire equal rights are compelled to call in the people. Changes in the oligarchy also occur when the oligarchs waste their private property by extravagant living; for then they want to innovate, and either try to make themselves tyrants, or install some one else in the tyranny, as Hipparinus did [1306<sup>a</sup>1] Dionysius at Syracuse, and as at Amphipolis a man named Cleotimus

introduced Chalcidian colonists, and when they arrived, stirred them up against the rich. For a like reason in Aegina the person who carried on the negotiation with Chares endeavoured to revolutionize the state. Sometimes a party among the oligarchs try [5] directly to create a political change; sometimes they rob the treasury, and then either the thieves or, as happened at Apollonia in Pontus, those who resist them in [10] their thieving quarrel with the rulers. But an oligarchy which is at unity with itself is not easily destroyed from within; of this we may see an example at Pharsalus, for there, although the rulers are few in number, they govern a large city, because they have a good understanding among themselves.

Oligarchies, again, are overthrown when another oligarchy is created within [15] the original one, that is to say, when the whole governing body is small and yet they do not all share in the highest offices. Thus at Elis the governing body was a small senate; and very few ever found their way into it, because the senators were only ninety in number, and were elected for life and out of certain families in a manner [20] similar to the Lacedaemonian elders. Oligarchy is liable to revolutions alike in war and in peace; in war because, not being able to trust the people, the oligarchs are compelled to hire mercenaries, and the general who is in command of them often ends in becoming a tyrant, as Timophanes did at Corinth; or if there are more generals than one they make themselves into a junta. Sometimes the oligarchs, [25] fearing this danger, give the people a share in the government because their services are necessary to them. And in time of peace, from mutual distrust, the two parties hand over the defence of the state to the army and to an arbiter between the two factions, who often ends the master of both. This happened at Larissa when Simos [30] the Aleuad had the government, and at Abydos in the days of Iphiades and the political clubs. Revolutions also arise out of marriages or lawsuits which lead to the overthrow of one party among the oligarchs by another. Of quarrels about [35] marriages I have already mentioned some instances; another occurred at Eretria, where Diagoras overturned the oligarchy of the knights because he had been wronged about a marriage. A revolution at Heraclea, and another at Thebes, both arose out of decisions of law-courts upon a charge of adultery; in both cases the punishment was just, but executed in the spirit of party, at Heraclea upon Eurytion, [1306<sup>b</sup>1] and at Thebes upon Archias; for their enemies were jealous of them and so had them pilloried in the agora. Many oligarchies have been destroyed by some members of the ruling class taking offence at their excessive despotism; for [5] example, the

oligarchy at Cnidus and at Chios.

Changes of constitutional governments, and also of oligarchies which limit the office of counsellor, judge, or other magistrate to persons having a certain money qualification, often occur by accident. The qualification may have been originally [10] fixed according to the circumstances of the time, in such a manner as to include in an oligarchy a few only, or in a constitutional government the middle class. But after a time of prosperity, whether arising from peace or some other good fortune, the same property becomes many times as valuable, and then everybody participates [15] in every office; this happens sometimes gradually and insensibly, and sometimes quickly. These are the causes of changes and revolutions in oligarchies.

We must remark generally, both of democracies and oligarchies, that they sometimes change, not into the opposite forms of government, but only into another [20] variety of the same class; I mean to say, from those forms of democracy and oligarchy which are regulated by law into those which are arbitrary, and conversely.

7 · In aristocracies revolutions are stirred up when a few only share in the honours of the state; a cause which has been already shown to affect oligarchies; for an aristocracy is a sort of oligarchy, and, like an oligarchy, is the government of a [25] few, although few not for the same reason; hence the two are often confused. And revolutions will be most likely to happen, and must happen, when the mass of the people are of the high-spirited kind, and have a notion that they are as good as their rulers. Thus at Lacedaemon the so-called Partheniae, who were the sons of the [30] Spartan peers, attempted a revolution, and, being detected, were sent away to colonize Tarentum. Again, revolutions occur when great men who are at least of equal excellence are denied honours by those higher in office, as Lysander was by the kings of Sparta; or, when a brave man is excluded from the honours of the state, like Cinadon, who conspired against the Spartans in the reign of Agesilaus; or, [35] again, when some are very poor and others very rich, a state of society which is most often the result of war, as at Lacedaemon in the days of the Messenian War; this is proved from the poem of Tyrtaeus, entitled 'Good Order'; for he speaks of certain [1307<sup>a</sup>1] citizens who were ruined by the war and wanted to have a redistribution of the land. Again, revolutions arise when an individual who is great, and might be greater, wants to rule alone, as, at Lacedaemon, Pausanias, who was general in the Persian War,

or like Hanno at Carthage. [5]

Constitutional governments and aristocracies are commonly overthrown owing to some deviation from justice in the constitution itself; the cause of the downfall is, in the former, the ill-mingling of the two elements democracy and oligarchy; in the latter, of the three elements, democracy, oligarchy, and excellence, but especially democracy and oligarchy. For to combine these is the endeavour of constitutional [10] governments; and most of the so-called aristocracies have a like aim, but differ from polities in the mode of combination; hence some of them are more and some less permanent. Those which incline more to oligarchy are called aristocracies, and [15] those which incline to democracy constitutional governments. And therefore the latter are the safer of the two; for the greater the number, the greater the strength, and when men are equal they are contented. But the rich, if the constitution gives them power, are apt to be insolent and avaricious; and, in general, whichever way [20] the constitution inclines, in that direction it changes as either party gains strength, a constitutional government becoming a democracy, an aristocracy an oligarchy. But the process may be reversed, and aristocracy may change into democracy. This happens when the poor, under the idea that they are being wronged, force the [25] constitution to take an opposite form. In like manner constitutional governments change into oligarchies. The only stable principle of government is equality according to merit, and for every man to enjoy his own.

What I have just mentioned actually happened at Thurii, where the qualification for office, at first high, was therefore reduced, and the magistrates increased in number. The notables had previously acquired the whole of the land contrary to [30] law; for the government tended to oligarchy, and they were able to encroach. . . .<sup>1</sup> But the people, who had been trained by war, soon got the better of the guards kept by the oligarchs, until those who had too much gave up their land.

Again, since all aristocratic governments incline to oligarchy, the notables are [35] apt to be grasping; thus at Lacedaemon, where property tends to pass into few hands, the notables can do too much as they like, and are allowed to marry whom they please. The city of Locri was ruined by a marriage connexion with Dionysius, but such a thing could never have happened in a democracy, or in a well-balanced aristocracy.

I have already remarked that in all states revolutions are occasioned by trifles. [1307<sup>b</sup>1] In aristocracies, above all, they are of a gradual and imperceptible nature. The citizens begin by giving up some part of the constitution, and so with greater ease [5] the government change

something else which is a little more important, until they have undermined the whole fabric of the state. At Thurii there was a law that generals should only be re-elected after an interval of five years, and some young men who were popular with the soldiers of the guard for their military prowess, [10] despising the magistrates and thinking that they would easily gain their purpose, wanted to abolish this law and allow their generals to hold perpetual commands; for they well knew that the people would be glad enough to elect them. Whereupon the magistrates who had charge of these matters, and who are called councillors, at first [15] determined to resist, but they afterwards consented, thinking that, if only this one law was changed, no further inroad would be made on the constitution. But other changes soon followed which they in vain attempted to oppose; and the state passed into the hands of the revolutionists, who established a dynastic oligarchy.

[20] All constitutions are overthrown either from within or from without; the latter, when there is some government close at hand having an opposite interest, or at a distance, but powerful. This was exemplified by the Athenians and the Lacedaemonians; the Athenians everywhere put down the oligarchies, and the Lacedaemonians the democracies.

[25] I have now explained what are the chief causes of revolutions and dissensions in states.

8 · We have next to consider what means there are of preserving constitutions in general, and in particular cases. In the first place it is evident that if we know the causes which destroy constitutions, we also know the causes which preserve them; for opposites produce opposites, and destruction is the opposite of [30] preservation.

In all well-balanced governments there is nothing which should be more jealously maintained than the spirit of obedience to law, more especially in small matters; for transgression creeps in unperceived and at last ruins the state, just as [35] the constant recurrence of small expenses in time eats up a fortune. The expense does not take place all at once, and therefore is not observed; the mind is deceived, as in the fallacy which says that 'if each part is little, then the whole is little'. And this is true in one way, but not in another, for the whole and the all are not little, although they are made up of littles.

In the first place, then, men should guard against the beginning of change, and in the second place they should not rely upon the political devices of which I have already spoken, invented only to deceive the

people, for they are proved by [1308<sup>a</sup>1] experience to be useless. Further, we note that oligarchies as well as aristocracies may last, not from any inherent stability in such forms of government, but because the rulers are on good terms both with the unenfranchised and with the governing [5] classes, not maltreating any who are excluded from the government, but introducing into it the leading spirits among them. They should never wrong the ambitious in a matter of honour, or the common people in a matter of money; and they should [10] treat one another and their fellow-citizens in a spirit of equality. The equality which the friends of democracy seek to establish for the multitude is not only just but likewise expedient among equals. Hence, if the governing class are numerous, many democratic institutions are useful; for example, the restriction of the tenure of offices to six months, so that all those who are of equal rank may share in them. [15] Indeed, a group of equals is a kind of democracy, and therefore demagogues are very likely to arise among them, as I have already remarked. The short tenure of office prevents oligarchies and aristocracies from falling into the hands of families; it is not easy for a person to do any great harm when his tenure of office is short, [20] whereas long possession begets tyranny in oligarchies and democracies. For the aspirants to tyranny are either the principal men of the state, who in democracies are demagogues and in oligarchies members of ruling houses, or those who hold great offices, and have a long tenure of them.

Constitutions are preserved when their destroyers are at a distance, and [25] sometimes also because they are near, for the fear of them makes the government keep in hand the constitution. Wherefore the ruler who has a care of the constitution should invent terrors, and bring distant dangers near, in order that the citizens may be on their guard, and, like sentinels in a night-watch, never relax their [30] attention. He should endeavour too by help of the laws to control the contentions and quarrels of the notables, and to prevent those who have not hitherto taken part in them from catching the spirit of contention. No ordinary man can discern the beginning of evil, but only the true statesman.

As to the change produced in oligarchies and constitutional governments by [35] the alternation of the qualification, when this arises, not out of any variation in the qualification but only out of the increase of money, it is well to compare the new valuation of property with that of past years, annually in those cities in which the census is taken annually, and in larger cities every third or fifth year. If the whole is [1308<sup>b</sup>1] many times greater or many times less than when the ratings recognized by the constitution were fixed, there should be power given by law to

raise or lower the qualification as the amount is greater or less. Where this is not done a constitutional [5] government passes into an oligarchy, and an oligarchy is narrowed to a rule of families; or in the opposite case constitutional government becomes democracy, and oligarchy either constitutional government or democracy. [10]

It is a principle common to democracy, oligarchy, and every other form of government not to allow the disproportionate increase of any citizen, but to give moderate honour for a long time rather than great honour for a short time. For men [15] are easily spoiled; not every one can bear prosperity. But if this rule is not observed, at any rate the honours which are given all at once should be taken away by degrees and not all at once. Especially should the laws provide against any one having too much power, whether derived from friends or money; if he has, he should be sent [20] clean out of the country. And since innovations creep in through the private life of individuals also, there ought to be a magistracy which will have an eye to those whose life is not in harmony with the government, whether oligarchy or democracy [25] or any other. And for a like reason an increase of prosperity in any part of the state should be carefully watched. The proper remedy for this evil is always to give the management of affairs and offices of state to opposite elements; such opposites are the good and the many, or the rich and the poor. Another way is to combine the poor [30] and the rich in one body, or to increase the middle class: thus an end will be put to the revolutions which arise from inequality.

But above all every state should be so administered and so regulated by law that its magistrates cannot possibly make money. In oligarchies special precautions should be used against this evil. For the people do not take any great offence at [35] being kept out of the government—indeed they are rather pleased than otherwise at having leisure for their private business—but what irritates them is to think that their rulers are stealing the public money; then they are doubly annoyed; for they lose both honour and profit. If office brought no profit, then and then only could [1309<sup>a</sup>1] democracy and aristocracy be combined; for both notables and people might have their wishes gratified. All would be able to hold office, which is the aim of democracy, and the notables would be magistrates, which is the aim of aristocracy. And this result may be accomplished when there is no possibility of making money [5] out of the offices; for the poor will not want to have them when there is nothing to be gained from them—they would rather be attending to their own concerns; and the rich, who do not want money from the public treasury, will be able to

take them; and so the poor will keep to their work and grow rich, and the notables will not be [10] governed by the lower class. In order to avoid speculation of the public money, the transfer of the revenue should be made at a general assembly of the citizens, and duplicates of the accounts deposited with the different brotherhoods, companies, and tribes. And honours should be given by law to magistrates who have the [15] reputation of ruling without gain. In democracies the rich should be spared; not only should their property not be divided, but their incomes also, which in some states are taken from them imperceptibly, should be protected. It is a good thing to prevent the wealthy citizens, even if they are willing, from undertaking expensive and useless public services, such as the giving of choruses, torch-races, and the like. [20] In an oligarchy, on the other hand, great care should be taken of the poor, and lucrative offices should go to them; if any of the wealthy classes insult them, the offender should be punished more severely than if he had wronged one of his own class. Provision should be made that estates pass by inheritance and not by gift, and [25] no person should have more than one inheritance; for in this way properties will be equalized, and more of the poor rise to wealth. It is also expedient both in a democracy and in an oligarchy to assign to those who have less share in the government (i.e. to the rich in a democracy and to the poor in an oligarchy) an equality or preference in all but the principal offices of state. The latter should be [30] entrusted chiefly or only to members of the governing class.

9 · There are three qualifications required in those who have to fill the highest offices—first of all, loyalty to the established constitution; then the greatest [35] administrative capacity; and excellence and justice of the kind proper to each form of government; for, if what is just is not the same in all governments, the quality of justice must also differ. There may be a doubt, however, when all these qualities do not meet in the same person; suppose, for example, a good general is a bad man and [1309<sup>b</sup>1] not a friend to the constitution, and another man is loyal and just, which should we choose? In making the election ought we not to consider two points? what qualities are common, and what are rare. Thus in the choice of a general, we should regard his experience rather than his excellence; for few have military experience, but [5] many have excellence. In any office of trust or stewardship, on the other hand, the opposite rule should be observed; for more excellence than ordinary is required in the holder of such an office, but the necessary knowledge is of a sort which all men possess.



It may, however, be asked what a man wants with excellence if he has [10] political ability and is loyal, since these two qualities alone will make him do what is for the public interest. But may not men have both of them and yet be deficient in self-control?—If, knowing and loving their own interests, they do not always attend to them, may they not be equally negligent of the interests of the public?

Speaking generally, we may say that whatever legal enactments are held to be for the interest of various constitutions, all these preserve them. And the great [15] preserving principle is the one which has been repeatedly mentioned—to have a care that the loyal citizens should be stronger than the disloyal. Neither should we forget the mean, which at the present day is lost sight of in perverted forms of government; for many practices which appear to be democratic are the ruin of [20] democracies, and many which appear to be oligarchical are the ruin of oligarchies. Those who think that all excellence is to be found in their own party principles push matters to extremes; they do not consider that disproportion destroys a state. A nose which varies from the ideal of straightness to a hook or snub may still be of good shape and agreeable to the eye; but if the excess is very great, all symmetry is lost, [25] and the nose at last ceases to be a nose at all on account of some excess in one direction or defect in the other; and this is true of every other part of the human body. The same law of proportion equally holds in states. Oligarchy or democracy, [30] although a departure from the most perfect form, may yet be a good enough government, but if any one attempts to push the principles of either to an extreme, he will begin by spoiling the government and end by having none at all. Therefore the legislator and the statesman ought to know what democratic measures save and [35] what destroy a democracy, and what oligarchical measures save or destroy an oligarchy. For neither the one nor the other can exist or continue to exist unless both rich and poor are included in it. If equality of property is introduced, the state must of necessity take another form; for when by laws carried to excess one or other [1310<sup>a</sup>1] element in the state is ruined, the constitution is ruined.

There is an error common both to oligarchies and to democracies:—in the latter the demagogues, when the multitude are above the law, are always cutting [5] the city in two by quarrels with the rich, whereas they should always profess to be maintaining their cause; just as in oligarchies the oligarchs should profess to maintain the cause of the people, and should take oaths the opposite of those which they now take. For there are cities in which they swear—‘I will be an enemy to the [10] people,

and will devise all the harm against them which I can'; but they ought to exhibit and to entertain the very opposite feeling; in the form of their oath there should be an express declaration—'I will do no wrong to the people'.

But of all the things which I have mentioned that which most contributes to the permanence of constitutions is the adaptation of education to the form of government, and yet in our own day this principle is universally neglected. The best laws, [15] though sanctioned by every citizen of the state, will be of no avail unless the young are trained by habit and education in the spirit of the constitution, if the laws are democratic, democratically, or oligarchically, if the laws are oligarchical. For there may be a want of self-discipline in states as well as in individuals. Now, to have been [20] educated in the spirit of the constitution is not to perform the actions in which oligarchs or democrats delight, but those by which the existence of an oligarchy or of a democracy is made possible. Whereas among ourselves the sons of the ruling class in an oligarchy live in luxury, but the sons of the poor are hardened by exercise [25] and toil, and hence they are both more inclined and better able to make a revolution. And in democracies of the more extreme type there has arisen a false idea of freedom which is contradictory to the true interests of the state. For two principles are characteristic of democracy, the government of the majority and freedom. Men [30] think that what is just is equal; and that equality is the supremacy of the popular will; and that freedom means doing what one likes. In such democracies every one lives as he pleases, or in the words of Euripides, 'according to his fancy'. But this is all wrong; men should not think it slavery to live according to the rule of the [35] constitution; for it is their salvation.

I have now discussed generally the cause of the revolution and destruction of states, and the means of their preservation and continuance.

10 · I have still to speak of monarchy, and the causes of its destruction and preservation. What I have said already respecting forms of constitutional government [1310<sup>b</sup>1] applies almost equally to royal and to tyrannical rule. For royal rule is of the nature of an aristocracy, and a tyranny is a compound of oligarchy and democracy [5] in their most extreme forms; it is therefore most injurious to its subjects, being made up of two evil forms of government, and having the perversions and

errors of both. These two forms of monarchy are contrary in their very origin. The appointment of [10] a king is the resource of the better classes against the people, and he is elected by them out of their own number, because either he himself or his family excel in excellence and excellent actions; whereas a tyrant is chosen from the people to be their protector against the notables, and in order to prevent them from being injured. History shows that almost all tyrants have been demagogues who gained [15] the favour of the people by their accusation of the notables. At any rate this was the manner in which the tyrannies arose in the days when cities had increased in power. Others which were older originated in the ambition of kings wanting to overstep the limits of their hereditary power and become despots. Others again grew out of the class which were chosen to be chief magistrates; for in ancient times the people who [20] elected them gave the magistrates, whether civil or religious, a long tenure. Others arose out of the custom which oligarchies had of making some individual supreme over the highest offices. In any of these ways an ambitious man had no difficulty, if he desired, in creating a tyranny, since he had the power in his hands already, either [25] as king or as one of the officers of state. Thus Pheidon at Argos and several others were originally kings, and ended by becoming tyrants; Phalaris, on the other hand, and the Ionian tyrants, acquired the tyranny by holding great offices. Whereas Panaetius at Leontini, Cypselus at Corinth, Peisistratus at Athens, Dionysius at [30] Syracuse, and several others who afterwards became tyrants, were at first demagogues.

And so, as I was saying, royalty ranks with aristocracy, for it is based upon merit, whether of the individual or of his family, or on benefits conferred, or on these claims with power added to them. For all who have obtained this honour have benefited, or had in their power to benefit, states and nations; some, like Codrus, [35] have prevented the state from being enslaved in war; others, like Cyrus, have given their country freedom, or have settled or gained a territory, like the Lacedaemonian, Macedonian, and Molossian kings. The idea of a king is to be a protector of the rich against unjust treatment, of the people against insult and oppression. [1311<sup>a</sup>1] Whereas a tyrant, as has often been repeated, has no regard to any public interest, except as conducive to his private ends; his aim is pleasure, the aim of a king, honour. Therefore they differ also in their excesses; the tyrant accumulates riches, [5] the king seeks what brings honour. And the guards of a king are citizens, but of a tyrant mercenaries.

That tyranny has all the vices both of democracy and oligarchy is

evident. As of oligarchy so of tyranny, the end is wealth (for by wealth only can the tyrant [10] maintain his guard and his luxury). Both mistrust the people, and therefore deprive them of their arms. Both agree too in injuring the people and driving them out of the city and dispersing them. From democracy tyrants have borrowed the art of making war upon the notables and destroying them secretly or openly, or of exiling them [15] because they are rivals and stand in the way of their power; and also because plots against them are contrived by men of this class, who either want to rule or to escape subjection. Hence Periander advised Thrasybulus by cutting off the tops of the [20] tallest ears of corn, meaning that he must always put out of the way the citizens who overtop the rest. And so, as I have already intimated, the beginnings of change are the same in monarchies as in forms of constitutional government; subjects attack their sovereigns out of fear or contempt, or because they have been unjustly treated [25] by them. And of injustice the most common form is insult, another is confiscation of property.

The ends sought by conspiracies against monarchies, whether tyrannies or royalties, are the same as the ends sought by conspiracies against other forms of [30] government. Monarchs have great wealth and honour, which are objects of desire to all mankind. The attacks are made sometimes against their lives, sometimes against the office; where the sense of insult is the motive, against their lives. Any sort of insult (and there are many) may stir up anger, and when men are angry, they [35] commonly act out of revenge, and not from ambition. For example, the attempt made upon the Peisistratidae arose out of the public dishonour offered to the sister of Harmodius and the insult to himself. He attacked the tyrant for his sister's sake, and Aristogeiton joined in the attack for the sake of Harmodius. A conspiracy was also formed against Periander, the tyrant of Ambracia, because, when drinking [1311<sup>b</sup>1] with a favourite youth, he asked him whether by this time he was not with child by him. Philip, too, was attacked by Pausanias because he permitted him to be insulted by Attalus and his friends, and Amyntas the Little, by Derdas, because he boasted [5] of having enjoyed his youth. Evagoras of Cyprus, again, was slain by the eunuch to revenge an insult; for his wife had been carried off by Evagoras's son. Many conspiracies have originated in shameful attempts made by sovereigns on the persons of their subjects. Such was the attack of Crataeas upon Archelaus; he had always hated his intercourse with the king, and so, when Archelaus, having [10] promised him one of his two daughters in marriage, did not give him either of them, but broke his word and married the elder to the king of Elymeia,

when he was hard pressed in a war against Sirrhas and Arrhabaeus, and the younger to his own son Amyntas, under the idea that Amyntas would then be less likely to quarrel with his [15] son by Cleopatra—Crataeas made this slight a pretext for attacking Archelaus, though even a less reason would have sufficed, for the real cause of the estrangement was the disgust which he felt at his sexual subjection. And from a like motive Hellanocrates of Larissa conspired with him; for when Archelaus, who was his lover, did not fulfil his promise of restoring him to his country, he thought that [20] the intercourse between them had originated, not in sexual desire, but in the wish to insult him. Pytho, too, and Heracleides of Aenos, slew Cotys in order to avenge their father, and Adamas revolted from Cotys in revenge for the wanton outrage which he had committed in castrating him when a child.

Many, too, enraged by blows inflicted on the person which they deemed an [25] insult, have either killed or attempted to kill officers of state and royal princes by whom they have been injured. Thus, at Mytilene, Megacles and his friends attacked and slew the Penthilidae, as they were going about and striking people with clubs. At a later date Smerdis, who had been beaten and torn away from his wife by [30] Penthilus, slew him. In the conspiracy against Archelaus, Decamnichus stimulated the fury of the assassins and led the attack; he was enraged because Archelaus had delivered him to Euripides to be scourged; for the poet had been irritated at some remark made by Decamnichus on the foulness of his breath. Many other examples [35] might be cited of murders and conspiracies which have arisen from similar causes.

Fear is another motive which, as we have said, has caused conspiracies as well in monarchies as in more popular forms of government. Thus Artapanes conspired against Xerxes and slew him, fearing that he would be accused of hanging Darius against his orders—he having been under the impression that Xerxes would forget what he had said in the middle of a meal, and that the offence would be forgiven.

Another motive is contempt, as in the case of Sardanapalus, whom someone [1312<sup>a</sup>1] saw carding wool with his women, if the story-tellers say truly; and the tale may be true, if not of him, of someone else. Dion attacked the younger Dionysius because he despised him, and saw that he was equally despised by his own subjects, and that [5] he was always drunk. Even the friends of a tyrant will sometimes attack him out of contempt; for the confidence which he reposes in them breeds contempt, and they think that they will not be found out. The expectation of success is likewise a sort of contempt; the assailants are ready to strike, and think

nothing of the danger, [10] because they seem to have the power in their hands. Thus generals of armies attack monarchs; as, for example, Cyrus attacked Astyages, despising the effeminacy of his life, and believing that his power was worn out. Thus again, Seuthes the Thracian conspired against Amadocus, whose general he was.

And sometimes men are actuated by more than one motive, like Mithridates, [15] who conspired against Ariobarzanes, partly out of contempt and partly from the love of gain.

Bold natures, placed by their sovereigns in a high military position, are most likely to make the attempt in the expectation of success; for courage is emboldened [20] by power, and the union of the two inspires them with the hope of an easy victory.

Attempts of which the motive is ambition arise in a different way as well as in those already mentioned. There are men who will not risk their lives in the hope of gains and honours however great, but who nevertheless regard the killing of a tyrant [25] simply as an extraordinary action which will make them famous and notable in the world; they wish to acquire, not a kingdom, but a name. It is rare, however, to find [30] such men; he who would kill a tyrant must be prepared to lose his life if he fails. He must have the resolution of Dion, who, when he made war upon Dionysius, took [35] with him very few troops, saying 'that whatever measure of success he might attain would be enough for him, even if he were to die the moment he landed; such a death would be welcome to him'. But this is a temper to which few can attain.

Once more, tyrannies, like all other governments, are destroyed from without by some opposite and more powerful form of government. That such a government [1312b1] will have the will to attack them is clear; for the two are opposed in principle; and all men, if they can, do what they want to. Democracy is antagonistic to tyranny, on the principle of Hesiod, 'Potter hates Potter', because they are nearly akin, for the [5] extreme form of democracy is tyranny; and royalty and aristocracy are both alike opposed to tyranny, because they are constitutions of a different type. And therefore the Lacedaemonians put down most of the tyrannies, and so did the Syracusans during the time when they were well governed.

Again, tyrannies are destroyed from within, when the reigning family are divided among themselves, as that of Gelo was, and more recently that of Dionysius; [10] in the case of Gelo because Thrasybulus, the brother of Hiero, flattered the son of Gelo and led him into excesses in order that he might rule in his name. Whereupon the family got together a party to get rid of Thrasybulus and save the tyranny; but [15] those of

the people who conspired with them seized the opportunity and drove them all out. In the case of Dionysius, Dion, his own relative, attacked and expelled him with the assistance of the people; he afterwards perished himself.

There are two chief motives which induce men to attack tyrannies—hatred [20] and contempt. Hatred of tyrants is inevitable, and contempt is also a frequent cause of their destruction. Thus we see that most of those who have acquired, have retained their power, but those who have inherited, have lost it, almost at once; for, [25] living in luxurious ease, they have become contemptible, and offer many opportunities to their assailants. Anger, too, must be included under hatred, and produces the same effects. It is often even more ready to strike—the angry are more impetuous in making an attack, for they do not follow rational principle. And men are very apt to [30] give way to their passions when they are insulted. To this cause is to be attributed the fall of the Peisistratidae and of many others. Hatred is more reasonable, for anger is accompanied by pain, which is an impediment to reason, whereas hatred is painless.

[35] In a word, all the causes which I have mentioned as destroying the last and most unmixed form of oligarchy, and the extreme form of democracy, may be assumed to affect tyranny; indeed the extreme forms of both are only tyrannies distributed among several persons. Kingly rule is little affected by external causes, and is therefore lasting; it is generally destroyed from within. And there are two [1313<sup>a</sup>1] ways in which the destruction may come about; when the members of the royal family quarrel among themselves, and when the kings attempt to administer the state too much after the fashion of a tyranny, and to extend their authority contrary to the law. Royalties do not now come into existence; where such forms of [5] government arise, they are rather monarchies or tyrannies. For the rule of a king is over voluntary subjects, and he is supreme in all important matters; but in our own day men are more upon an equality, and no one is so immeasurably superior to others as to represent adequately the greatness and dignity of the office. Hence mankind will not, willingly, endure it, and any one who obtains power by force or [10] fraud is at once thought to be a tyrant. In hereditary monarchies a further cause of destruction is the fact that kings often fall into contempt, and, although possessing not tyrannical power, but only royal dignity, are apt to outrage others. Their overthrow is then readily effected; for there is an end to the king when his subjects [15] do not want to have him, but the tyrant lasts, whether they like him or not.

The destruction of monarchies is to be attributed to these and the like

causes.

11 · And they are preserved, to speak generally, by the opposite causes; or, if [20] we consider them separately, royalty is preserved by the limitation of its powers. The more restricted the functions of kings, the longer their power will last unimpaired; for then they are more moderate and not so despotic in their ways; and they are less envied by their subjects. This is the reason why the kingly office has lasted so long among the Molossians. And for a similar reason it has continued among the Lacedaemonians, because there it was always divided between two, and [25] afterwards further limited by Theopompus in various respects, more particularly by the establishment of the Ephoralty. He diminished the power of the kings, but established on a more lasting basis the kingly office, which was thus made in a certain sense not less, but greater. There is a story that when his wife once asked [30] him whether he was not ashamed to leave to his sons a royal power which was less than he had inherited from his father, 'No indeed', he replied, 'for the power which I leave to them will be more lasting'.

As to tyrannies, they are preserved in two quite opposite ways. One of them is the old traditional method in which most tyrants administer their government. Of [35] such arts Periander of Corinth is said to have been the great master, and many similar devices may be gathered from the Persians in the administration of their government. There are firstly the prescriptions mentioned some distance back, for the preservation of a tyranny, in so far as this is possible; viz. that the tyrant should [40] lop off those who are too high; he must put to death men of spirit; he must not allow common meals, clubs, education, and the like; he must be upon his guard against [1313<sup>b</sup>1] anything which is likely to inspire either courage or confidence among his subjects; he must prohibit schools or other meetings for discussion, and he must take every means to prevent people from knowing one another (for acquaintance begets [5] mutual confidence). Further, he must compel all persons staying in the city to appear in public and live at his gates; then he will know what they are doing: if they are always kept under, they will learn to be humble. In short, he should practise these and the like Persian and barbaric arts, which all have the same object. A [10] tyrant should also endeavour to know what each of his subjects says or does, and should employ spies, like the 'female detectives' at Syracuse, and the eavesdroppers whom Hiero was in the habit of sending to any place of resort or meeting; for



the [15] fear of informers prevents people from speaking their minds, and if they do, they are more easily found out. Another art of the tyrant is to sow quarrels among the citizens; friends should be embroiled with friends, the people with the notables, and the rich with one another. Also he should impoverish his subjects; he thus provides against the maintenance of a guard by the citizens, and the people, having to keep [20] hard at work, are prevented from conspiring. The Pyramids of Egypt afford an example of this policy; also the offerings of the family of Cypselus, and the building of the temple of Olympian Zeus by the Peisistratidae, and the great Polycratean monuments at Samos; all these works were alike intended to occupy the people and [25] keep them poor. Another practice of tyrants is to multiply taxes, after the manner of Dionysius at Syracuse, who contrived that within five years his subjects should bring into the treasury their whole property. The tyrant is also fond of making war in order that his subjects may have something to do and be always in want of a leader. And whereas the power of a king is preserved by his friends, the [30] characteristic of a tyrant is to distrust his friends, because he knows that all men want to overthrow him, and they above all have the power to do so.

Again, the practices of the last and worst form of democracy are all found in tyrannies. Such are the power given to women in their families in the hope that they [35] will inform against their husbands, and the licence which is allowed to slaves in order that they may betray their masters; for slaves and women do not conspire against tyrants; and they are of course friendly to tyrannies and also to democracies, since under them they have a good time. For the people too would fain be a monarch, and therefore by them, as well as by the tyrant, the flatterer is held in [40] honour; in democracies he is the demagogue; and the tyrant also has those who associate with him in a humble spirit, which is a work of flattery.

[1314<sup>a</sup>1] Hence tyrants are always fond of bad men, because they love to be flattered, but no man who has the spirit of a freeman in him will lower himself by flattery; good men love others, or at any rate do not flatter them. Moreover, the bad are [5] useful for bad purposes; 'nail knocks out nail', as the proverb says. It is characteristic of a tyrant to dislike every one who has dignity or independence; he wants to be alone in his glory, but anyone who claims a like dignity or asserts his independence encroaches upon his prerogative, and is hated by him as an enemy to his power. Another mark of a tyrant is that he likes foreigners better than citizens, and lives [10] with them and invites them to his

table; for the one are enemies, but the others enter into no rivalry with him.

Such are the marks of the tyrant and the arts by which he preserves his power; there is no wickedness too great for him. All that we have said may be summed up [15] under three heads, which answer to the three aims of the tyrant. These are, the humiliation of his subjects, for he knows that a mean-spirited man will not conspire against anybody: the creation of mistrust among them; for a tyrant is not overthrown until men begin to have confidence in one another; and this is the reason why tyrants are at war with the good; they are under the idea that their power is [20] endangered by them, not only because they will not be ruled despotically, but also because they are loyal to one another, and to other men, and do not inform against one another or against other men: the tyrant desires that his subjects shall be incapable of action, for no one attempts what is impossible, and they will not [25] attempt to overthrow a tyranny if they are powerless. Under these three heads the whole policy of a tyrant may be summed up, and to one or other of them all his ideas may be referred: he sows distrust among his subjects; he takes away their power; and he humbles them.

[30] This then is one of the two methods by which tyrannies are preserved; and there is another which proceeds upon an almost opposite principle of action. The nature of this latter method may be gathered from a comparison of the causes which destroy kingdoms, for as one mode of destroying kingly power is to make the office [35] of king more tyrannical, so the salvation of a tyranny is to make it more like the rule of a king. But of one thing the tyrant must be careful; he must keep power enough to rule over his subjects, whether they like him or not, for if he once gives this up he gives up his tyranny. But though power must be retained as the foundation, in all else the tyrant should act or appear to act in the character of a king. In the first [1314<sup>b</sup>1] place he should pretend concern for the public revenues, and not waste money in making presents of a sort at which the common people get excited when they see their hard-won earnings snatched from them and lavished on courtesans and foreigners and artists. He should give an account of what he receives and of what he [5] spends (a practice which has been adopted by some tyrants); for then he will seem to be a steward of the public rather than a tyrant; nor need he fear that, while he is the lord of the city, he will ever be in want of money. Such a policy is at all events much more advantageous for the tyrant when he goes from home, than to leave behind [10] him a hoard, for then the garrison who remain in the city

will be less likely to attack his power; and a tyrant, when he is absent from home, has more reason to fear the guardians of his treasure than the citizens, for the one accompany him, but the others remain behind. In the second place, he should be seen to collect taxes and to require public services only for state purposes, and so as to form a fund in case of [15] war, and generally he ought to make himself the guardian and treasurer of them, as if they belonged, not to him, but to the public. He should appear, not harsh, but dignified, and when men meet him they should look upon him with reverence, and [20] not with fear. Yet it is hard for him to be respected if he inspires no respect, and therefore whatever virtues he may neglect, at least he should maintain the character of a great soldier, and produce the impression that he is one. Neither he nor any of his associates should ever assault the young of either sex who are his subjects, and [25] the women of his family should observe a like self-control towards other women; the insolence of women has ruined many tyrannies. In the indulgence of pleasures he should be the opposite of our modern tyrants, who not only begin at dawn and pass [30] whole days in sensuality, but want other men to see them, so that they may admire their happy and blessed lot. In these things a tyrant should if possible be moderate, or at any rate should not parade his vices to the world; for a drunken and drowsy tyrant is soon despised and attacked; not so he who is temperate and wide awake. [35] His conduct should be the very reverse of nearly everything which has been said before about tyrants. He ought to adorn and improve his city, as though he were not a tyrant, but the guardian of the state. Also he should appear to be particularly earnest in the service of the gods; for if men think that a ruler is religious and has a [1315<sup>a1</sup>] reverence for the gods, they are less afraid of suffering injustice at his hands, and they are less disposed to conspire against him, because they believe him to have the very gods fighting on his side. At the same time his religion must not be thought foolish. And he should honour men of merit, and make them think that they would not be held in more honour by the citizens if they had a free government. The [5] honour he should distribute himself, but the punishment should be inflicted by officers and courts of law. It is a precaution which is taken by all monarchs not to make one person great; but if one, then two or more should be raised, that they may keep an eye on one another. If after all some one has to be made great, he should not be [10] a man of bold spirit; for such dispositions are ever most inclined to strike. And if any one is to be deprived of his power, let it be diminished gradually, not taken from him all at once. The tyrant should abstain from all outrage; in

particular from personal violence and from wanton conduct towards the young. He should be especially [15] careful of his behaviour to men who are lovers of honour; for as the lovers of money are offended when their property is touched, so are the lovers of honour and the good when their honour is affected. Therefore a tyrant ought either not to commit [20] such acts at all; or he should be thought only to employ fatherly correction, and not to trample upon others—and his acquaintance with youth should be supposed to arise from desire, and not from the insolence of power, and in general he should compensate the appearance of dishonour by the increase of honour.

[25] Of those who attempt assassination they are the most dangerous, and require to be most carefully watched, who do not care to survive, if they effect their purpose. Therefore special precaution should be taken about any who think that either they or those for whom they care have been insulted; for when men are led away by [30] passion to assault others they are regardless of themselves. As Heracleitus says, 'It is difficult to fight against anger; for a man will buy revenge with his soul'.

And whereas states consist of two classes, of poor men and of rich, the tyrant should lead both to imagine that they are preserved and prevented from harming [35] one another by his rule, and whichever of the two is stronger he should attach to his government; for, having this advantage, he has no need either to emancipate slaves or to disarm the citizens; either party added to the force which he already has, will [40] make him stronger than his assailants.

But enough of these details—what should be the general policy of the tyrant is [1315<sup>b</sup>1] obvious. He ought to show himself to his subjects in the light, not of a tyrant, but of a steward and a king. He should not appropriate what is theirs, but should be their guardian; he should be moderate, not extravagant in his way of life; he should win the notables by companionship, and the multitude by flattery. For then his rule will [5] of necessity be nobler and happier, because he will rule over better men whose spirits are not crushed, and who do not hate and fear him. His power too will be more lasting. His disposition will be virtuous, or at least half virtuous; and he will [10] not be wicked, but half wicked only.

12 · Yet no forms of government are so short-lived as oligarchy and tyranny. The tyranny which lasted longest was that of Orthagoras and his sons at Sicyon; this [15] continued for a hundred years. The reason was that they treated their subjects with moderation, and to a great extent

observed the laws; and in various ways gained the favour of the people by the care which they took of them. Cleisthenes, in particular, was respected for his military ability. If report may be believed, he crowned the [20] judge who decided against him in the games; and, as some say, the sitting statue in the Agora of Sicyon is the likeness of this person. (A similar story is told of Peisistratus, who is said on one occasion to have allowed himself to be summoned and tried before the Areopagus.)

Next in duration to the tyranny of Orthagoras was that of the Cypselidae at Corinth, which lasted seventy-three years and six months: Cypselus reigned thirty [25] years, Periander forty and a half, and Psammetichus the son of Gorgus three. Their continuance was due to similar causes: Cypselus was a popular man, who during the whole time of his rule never had a body-guard; and Periander, although he was a [30] tyrant, was a great soldier. Third in duration was the rule of the Peisistratidae at Athens, but it was interrupted; for Peisistratus was twice driven out, so that out of thirty-three years he reigned only seventeen; and his sons reigned eighteen—together thirty-five years. Of other tyrannies, that of Hiero and Gelo [35] at Syracuse was the most lasting. Even this, however, was short, not more than eighteen years in all; for Gelo continued tyrant for seven years, and died in the eighth; Hiero reigned for ten years, and Thrasybulus was driven out in the eleventh month. In fact, tyrannies generally have been of quite short duration.

I have now gone through almost all the causes by which constitutional [40] governments and monarchies are either destroyed or preserved.

In the *Republic* of Plato, Socrates treats of revolutions, but not well, for he [1316<sup>a</sup>1] mentions no cause of change which peculiarly affects the first or perfect state. He only says that the cause is that nothing is abiding, but all things change in a certain cycle; and that the origin of the change consists in those numbers of which 4 and 3, [5] married with 5, furnish two harmonies' (he means when the number of this figure becomes solid); he conceives that nature at certain times produces bad men who will not submit to education; in which latter particular he may very likely be not far [10] wrong, for there may well be some men who cannot be educated and made virtuous. But why is such a cause of change peculiar to his ideal state, and not rather common to all states, or indeed, to everything which comes into being at all? And is it by the agency of time, which, as he declares, makes all things change, that things which [15] did not begin together, change together? For example, if something has come into being the day before the completion of the cycle, will it

change with things that came into being before? Further, why should the perfect state change into the Spartan? For governments more often take an opposite form than one akin to them. The same remark is applicable to the other changes; he says that the Spartan [20] constitution changes into an oligarchy, and this into a democracy, and this again into a tyranny. And yet the contrary happens quite as often; for a democracy is even more likely to change into an oligarchy than into a monarchy. Further, he never says whether tyranny is, or is not, liable to revolutions, and if it is, what is the cause [25] of them, or into what form it changes. And the reason is, that he could not very well have told: for there is no rule; according to him it should revert to the first and best, and then there would be a complete cycle. But in point of fact a tyranny often changes into a tyranny, as that at Sicyon changed from the tyranny of Myron into [30] that of Cleisthenes; into oligarchy, as the tyranny of Antileon did at Chalcis; into democracy, as that of Gelo's family did at Syracuse; into aristocracy, as at Carthage, and the tyranny of Charilaus in Lacedaemon. Often an oligarchy changes into a tyranny, like most of the ancient oligarchies in Sicily; for example, [35] the oligarchy at Leontini changed into the tyranny of Panaetius; that at Gela into the tyranny of Cleander; that at Rhegium into the tyranny of Anaxilaus; the same thing has happened in many other states. And it is absurd to suppose that the state changes into oligarchy merely because the ruling class are lovers and makers of [1316<sup>b</sup>1] money, and not because the very rich think it unfair that the very poor should have an equal share in the government with themselves. Moreover, in many oligarchies there are laws against making money in trade. But at Carthage, which is a [5] democracy, there is no such prohibition; and yet to this day the Carthaginians have never had a revolution. It is absurd too for him to say that an oligarchy is two cities, one of the rich, and the other of the poor. Is not this just as much the case in the Spartan constitution, or in any other in which either all do not possess equal [10] property, or all are not equally good men? Nobody need be any poorer than he was before, and yet the oligarchy may change all the same into a democracy, if the poor form the majority; and a democracy may change into an oligarchy, if the wealthy class are stronger than the people, and the one are energetic, the other indifferent. [15] Once more, although the causes of the change are very numerous, he mentions only one, which is, that the citizens become poor through dissipation and debt, as though he thought that all, or the majority of them, were originally rich. This is not true: though it is true that when any of the leaders lose their property they are ripe for revolution; but,

when anybody else does, it is no great matter, and an oligarchy does [20] not even then more often pass into a democracy than into any other form of government. Again, if men are deprived of the honours of state, and are wronged, and insulted, they make revolutions, and change forms of government, even although they have not wasted their substance because they might do what they like—of which extravagance he declares excessive freedom to be the cause.

[25] Finally, although there are many forms of oligarchies and democracies, Socrates speaks of their revolutions as though there were only one form of either of them.

## BOOK VI

[30] 1 · We have now considered the varieties of the deliberative or supreme power in states, and the various arrangements of law-courts and state offices, and which of them are adapted to different forms of government. We have also spoken [35] of the destruction and preservation of constitutions, how and from what causes they arise.

Of democracy and all other forms of government there are many kinds; and it will be well to assign to them severally the modes of organization which are proper and advantageous to each, adding what remains to be said about them. Moreover, we ought to consider the various combinations of these modes themselves; for such [1317<sup>a</sup>1] combinations make constitutions overlap one another, so that aristocracies have an oligarchical character, and constitutional governments incline to democracies.

When I speak of the combinations which remain to be considered, and thus far [5] have not been considered by us, I mean such as these:—when the deliberative part of the government and the election of officers is constituted oligarchically, and the law-courts aristocratically, or when the courts and the deliberative part of the state are oligarchical, and the election of offices aristocratic, or when in any other way there is a want of harmony in the composition of a state.

[10] I have shown already what forms of democracy are suited to particular cities, and what forms of oligarchy to particular peoples, and to whom each of the other forms of government is suited. Further, we must not only show which of these governments is the best for each state, but also briefly proceed to consider how these and other forms of government are to be established. [15]

First of all let us speak of democracy, which will also bring to light the opposite form of government commonly called oligarchy. For the purposes of this inquiry we need to ascertain all the elements and characteristics of democracy, since from the combinations of these the varieties of democratic government arise. There are [20] several of these differing from each other, and the difference is due to two causes. One has been already mentioned—differences of population; for the popular element may consist of farmers, or of artisans, or of labourers, and if the first of [25] these is added to the second, or the third to the two others, not only does the democracy become better or worse, but its very nature is changed. A second cause remains to be mentioned: the various



properties and characteristics of democracy, when variously combined, make a difference. For one democracy will have less and [30] another will have more, and another will have all of these characteristics. There is an advantage in knowing them all, whether a man wishes to establish some new form of democracy, or only to remodel an existing one. Founders of states try to [35] bring together all the elements which accord with the ideas of the several constitutions; but this is a mistake of theirs, as I have already remarked when speaking of the destruction and preservation of states. We will now set forth the principles, characteristics, and aims of such states.

2 · The basis of a democratic state is liberty; which, according to the [40] common opinion of men, can only be enjoyed in such a state—this they affirm to be the great end of every democracy. One principle of liberty is for all to rule and be [1317<sup>b</sup>1] ruled in turn, and indeed democratic justice is the application of numerical not proportionate equality; whence it follows that the majority must be supreme, and [5] that whatever the majority approve must be the end and the just. Every citizen, it is said, must have equality, and therefore in a democracy the poor have more power than the rich, because there are more of them, and the will of the majority is supreme. This, then, is one note of liberty which all democrats affirm to be the [10] principle of their state. Another is that a man should live as he likes. This, they say, is the mark of liberty, since, on the other hand, not to live as a man likes is the mark of a slave. This is the second characteristic of democracy, whence has arisen the claim of men to be ruled by none, if possible, or, if this is impossible, to rule and be [15] ruled in turns; and so it contributes to the freedom based upon equality.

Such being our foundation and such the principle from which we start, the characteristics of democracy are as follows:—the election of officers by all out of all; and that all should rule over each, and each in his turn over all; that the [20] appointment to all offices, or to all but those which require experience and skill, should be made by lot; that no property qualification should be required for offices, or only a very low one; that a man should not hold the same office twice, or not often, or in the case of few except military offices; that the tenure of all offices, or of as many as possible, should be brief; that all men should sit in judgement, or that [25] judges selected out of all should judge, in all matters, or in most and in the greatest and most important—such as the scrutiny of

accounts, the constitution, and private contracts; that the assembly should be supreme over all causes, or at any rate over [30] the most important, and the magistrates over none or only over a very few. Of all magistracies, a council is the most democratic when there is not the means of paying all the citizens, but when they are paid even this is robbed of its power; for the people then draw all cases to themselves, as I said in the previous discussion. The [35] next characteristic of democracy is payment for services; assembly, law-courts, magistrates, everybody receives pay, when it is to be had; or when it is not to be had for all, then it is given to the law-courts and to the stated assemblies, to the council and to the magistrates, or at least to any of them who are compelled to have their meals together. [And whereas oligarchy is characterized by birth, wealth, and [40] education, the marks of democracy appear to be the opposite of these—low birth, poverty, mean employment.]<sup>1</sup> Another characteristic is that no magistracy is [1318<sup>a</sup>1] perpetual, but if any such have survived some ancient change in the constitution it should be stripped of its power, and the holders should be elected by lot and no longer by vote. These are the points common to all democracies; but democracy and demos in their truest form are based upon the recognized principle of democratic [5] justice, that all should count equally; for equality implies that the poor should have no more share in the government than the rich, and should not be the only rulers, but that all should rule equally according to their numbers. And in this way men [10] think that they will secure equality and freedom in their state.

3 · Next comes the question, how is this equality to be obtained? Are we to assign to a thousand poor men the property qualifications of five hundred rich men? and shall we give the thousand a power equal to that of the five hundred? or, if this [15] is not to be the mode, ought we, still retaining the same ratio, to take equal numbers from each and give them the control of the elections and of the courts?—Which, according to the democratic notion, is the juster form of the constitution—this or one based on numbers only? Democrats say that justice is that to which the [20] majority agree, oligarchs that to which the wealthier class agree; in their opinion the decision should be given according to the amount of property. In both principles there is some inequality and injustice. For if justice is the will of the few, any one person who has more wealth than all the rest of the rich put together, ought, upon the oligarchical principle, to have the sole power—but this would be tyranny; or if [25] justice is the will of the majority, as I was before saying, they will

unjustly confiscate the property of the wealthy minority. To find a principle of equality in which they both agree we must inquire into their respective ideas of justice.

Now they agree in saying that whatever is decided by the majority of the [30] citizens is to be deemed law. Granted, but not without some reserve; since there are two classes out of which a state is composed—the poor and the rich—that is to be deemed law, on which both or the greater part of both agree; and if they disagree, that which is approved by the greater number, and by those who have the higher qualification. For example, suppose that there are ten rich and twenty poor, and some measure is approved by six of the rich and is disapproved by fifteen of the [35] poor, and the remaining four of the rich join with the party of the poor, and the remaining five of the poor with that of the rich; in such a case the will of those whose qualifications, when both sides are added up, are the greatest, should prevail. If they turn out to be equal, there is no greater difficulty than at present, when, if the assembly or the courts are divided, recourse is had to the lot, or to some similar [1318<sup>b</sup>1] expedient. But, although it may be difficult in theory to know what is just and equal, the practical difficulty of inducing those to forbear who can, if they like, encroach, is far greater, for the weaker are always asking for equality and justice, but the stronger care for none of these things. [5]

4 · Of the four kinds of democracy, as was said in the previous discussion, the best is that which comes first in order; it is also the oldest of them all. I am speaking of them according to the natural classification of their inhabitants. For the best material of democracy is an agricultural population; there is no difficulty in forming a democracy where the mass of the people live by agriculture or tending of [10] cattle. Being poor, they have no leisure, and therefore do not often attend the assembly, and having the necessities of life they are always at work, and do not covet the property of others. Indeed, they find their employment pleasanter than the cares of government or office where no great gains can be made out of them, for the [15] many are more desirous of gain than of honour. A proof is that even the ancient tyrannies were patiently endured by them, as they still endure oligarchies, if they are allowed to work and are not deprived of their property; for some of them grow [20] quickly rich and the others are well enough off. Moreover, they have the power of electing the magistrates and calling them to account; their ambition, if they have any, is thus satisfied; and in some democracies, although they

do not all share in the appointment of offices, except through representatives elected in turn out of the whole people, as at Mantinea—yet, if they have the power of deliberating, the [25] many are contented. Even this form of government may be regarded as a democracy, and was such at Mantinea. Hence it is both expedient and customary in the aforementioned type of democracy that all should elect to offices, and conduct scrutinies, and sit in the law-courts, but that the great offices should be filled up by [30] election and from persons having a qualification; the greater requiring a greater qualification, or, if there are no offices for which a qualification is required, then those who are marked out by special ability should be appointed. Under such a form of government the citizens are sure to be governed well (for the offices will always be held by the best persons; the people are willing enough to elect them and are not jealous of the good). The good and the notables will then be satisfied, for they will [35] not be governed by men who are their inferiors, and the persons elected will rule justly, because others will call them to account. Every man should be responsible to others, nor should anyone be allowed to do just as he pleases; for where absolute freedom is allowed there is nothing to restrain the evil which is inherent in every [1319<sup>a</sup>1] man. But the principle of responsibility secures that which is the greatest good in states; the right persons rule and are prevented from doing wrong, and the people [5] have their due. It is evident that this is the best kind of democracy—and why? because the people are drawn from a certain class. Some of the ancient laws of most states were useful with a view to making the people husbandmen. They provided either that no one should possess more than a certain quantity of land, or that, if he did, the land should not be within a certain distance from the town or the acropolis. [10] Formerly in many states there was a law forbidding anyone to sell his original allotment of land. There is a similar law attributed to Oxylus, which is to the effect that there should be a certain portion of every man's land on which he could not borrow money. A useful corrective to the evil of which I am speaking would be the [15] law of the Aphytaeans, who, although they are numerous, and do not possess much land, are all of them farmers. For their properties are reckoned in the census, not entire, but only in such small portions that even the poor may have more than the amount required.

[20] Next best to an agricultural, and in many respects similar, are a pastoral people, who live by their flocks; they are the best trained of any for war, robust in [25] body and able to camp out. The people of whom other democracies consist are far inferior to them, for their life is inferior;

there is no room for excellence in any of their employments, whether they be artisans or traders or labourers. Besides, people [30] of this class can readily come to the assembly, because they are continually moving about in the city and in the agora; whereas farmers are scattered over the country and do not meet or feel the same need of assembling together. Where the territory also happens to extend to a distance from the city, there is no difficulty in making an [35] excellent democracy or constitutional government; for the people are compelled to settle in the country, and even if there is a town population the assembly ought not to meet, in democracies, when the country people cannot come. We have thus explained how the first and best form of democracy should be constituted; it is clear that the other or inferior sorts will deviate in a regular order, and the population [1319<sup>b</sup>1] which is excluded will at each stage be of a lower kind.

The last form of democracy, that in which all share alike, is one which cannot be borne by all states, and will not last long unless well regulated by laws and [5] customs. The more general causes which tend to destroy this or other kinds of government have been pretty fully considered. In order to constitute such a democracy and strengthen the people, the leaders have been in the habit of including as many as they can, and making citizens not only of those who are legitimate, but even of the illegitimate, and of those who have only one parent a [10] citizen, whether father or mother; for nothing of this sort comes amiss to such a democracy. This is the way in which demagogues proceed. Whereas the right thing would be to make no more additions when the number of the commonalty exceeds that of the notables and of the middle class and not to go beyond this. When in [15] excess of this point, the constitution becomes disorderly, and the notables grow excited and impatient of the democracy, as in the insurrection at Cyrene; for no notice is taken of a little evil, but when it increases it strikes the eye. Measures like [20] those which Cleisthenes passed when he wanted to increase the power of the democracy at Athens, or such as were taken by the founders of popular government at Cyrene, are useful in the extreme form of democracy. Fresh tribes and brotherhoods should be established; the private rites of families should be restricted and converted into public ones; in short, every contrivance should be adopted which will mingle the citizens with one another and get rid of old connexions. Again, the [25] measures which are taken by tyrants appear all of them to be democratic; such, for instance, as the licence permitted to slaves (which may be to a certain extent advantageous) and also to women and children, and the

allowing everybody to live [30] as he likes. Such a government will have many supporters, for most persons would rather live in a disorderly than in a sober manner.

5 · The mere establishment of a democracy is not the only or principal business of the legislator, or of those who wish to create such a state, for any state, however badly constituted, may last one, two, or three days; a far greater difficulty [35] is the preservation of it. The legislator should therefore endeavour to have a firm foundation according to the principles already laid down concerning the preservation and destruction of states; he should guard against the destructive elements, and should make laws, whether written or unwritten, which will contain all the [1320\*1] preservatives of states. He must not think the truly democratic or oligarchical measure to be that which will give the greatest amount of democracy or oligarchy, but that which will make them last longest. The demagogues of our own day often get property confiscated in the law-courts in order to please the people. Hence those [5] who have the welfare of the state at heart should counteract them, and make a law that the property of the condemned should not be public and go into the treasury but be sacred. Thus offenders will be as much afraid, for they will be punished all the same, and the people, having nothing to gain, will not be so ready to condemn the [10] accused. Care should also be taken that state trials are as few as possible, and heavy penalties should be inflicted on those who bring groundless accusations; for it is the practice to indict, not members of the popular party, but the notables, although the citizens ought to be all attached to the constitution as well, or at any rate should not [15] regard their rulers as enemies.

Now, since in the last form of democracy the citizens are very numerous, and can hardly be made to assemble unless they are paid, and to pay them when there are no revenues presses hardly upon the notables (for the money must be obtained by a property-tax and confiscations and corrupt practices of the courts, things [20] which have before now overthrown many democracies); where, I say, there are no revenues, the government should hold few assemblies, and the law-courts should consist of many persons, but sit for a few days only. This system has two advantages: first, the rich do not fear the expense, even though they are unpaid themselves when [25] the poor are paid; and secondly, cases are better tried, for wealthy persons, although they do not like to be long absent from their own affairs, do not mind going for a few days to the

law-courts. Where there are revenues the demagogues should not be allowed after their manner to distribute the surplus; the poor are always [30] receiving and always wanting more and more, for such help is like water poured into a leaky cask. Yet the true friend of the people should see that they are not too poor, for extreme poverty lowers the character of the democracy; measures therefore [35] should be taken which will give them lasting prosperity; and as this is equally the interest of all classes, the proceeds of the public revenues should be accumulated and distributed among its poor, if possible, in such quantities as may enable them to [1320<sup>b</sup>1] purchase a little farm, or, at any rate, make a beginning in trade or farming. And if this benevolence cannot be extended to all, money should be distributed in turn according to tribes or other divisions, and in the meantime the rich should pay the fee for the attendance of the poor at the necessary assemblies; and should in return be excused from useless public services. By administering the state in this spirit the [5] Carthaginians retain the affections of the people; their policy is from time to time to send some of them into their dependent towns, where they grow rich. It is also worthy of a generous and sensible nobility to divide the poor amongst them, and give them the means of going to work. The example of the people of Tarentum is also [10] well deserving of imitation, for, by sharing the use of their own property with the poor, they gain their good will. Moreover, they divide all their offices into two classes, some of them being elected by vote, the others by lot; the latter, so that the people may participate in them, and the former, so that the state may be better administered. A like result may be gained by dividing the same offices, so as to have [15] two classes of magistrates, one chosen by vote, the other by lot.

Enough has been said of the manner in which democracies ought to be constituted.

6 · From these considerations there will be no difficulty in seeing what [20] should be the constitution of oligarchies. We have only to reason from opposites and compare each form of oligarchy with the corresponding form of democracy.

The first and best balanced of oligarchies is akin to a constitutional government. In this there ought to be two standards of qualification; the one high, the other low—the lower qualifying for the humbler yet indispensable offices and the [25] higher for the superior ones. He who acquires the prescribed qualification should have the rights of citizenship.

The number of those admitted should be such as will make the entire governing body stronger than those who are excluded, and the new citizen should be always taken out of the better class of the people. The principle, [30] narrowed a little, gives another form of oligarchy; until at length we reach the most cliquish and tyrannical of them all, answering to the extreme democracy, which, being the worst, requires vigilance in proportion to its badness. For as healthy [35] bodies and ships well provided with sailors may undergo many mishaps and survive them, whereas sickly constitutions and rotten ill-manned ships are ruined by the very least mistake, so do the worst forms of government require the greatest care. [1321<sup>a</sup>1] The populousness of democracies generally preserves them (for number is to democracy in the place of justice based on merit); whereas the preservation of an oligarchy clearly depends on an opposite principle, viz. good order.

[5] 7 · As there are four chief divisions of the common people, farmers, artisans, traders, labourers; so also there are four kinds of military forces—the cavalry, the heavy infantry, the light-armed troops, the navy. When the country is adapted for cavalry, then a strong oligarchy is likely to be established. For the security of the [10] inhabitants depends upon a force of this sort, and only rich men can afford to keep horses. The second form of oligarchy prevails when the country is adapted to heavy infantry; for this service is better suited to the rich than to the poor. But the light-armed and the naval element are wholly democratic; and nowadays, where they are numerous, if the two parties quarrel, the oligarchy are often worsted by [15] them in the struggle. A remedy for this state of things may be found in the practice of generals who combine a proper contingent of light-armed troops with cavalry and heavy-armed. And this is the way in which the poor get the better of the rich in civil contests; being lightly armed, they fight with advantage against cavalry and heavy [20] infantry. An oligarchy which raises such a force out of the lower classes raises a power against itself. And therefore, since the ages of the citizens vary and some are older and some younger, the fathers should have their own sons, while they are still young, taught the agile movements of light-armed troops; and these, when they [25] have been taken out of the ranks of the youth, should become light-armed warriors in reality. The oligarchy should also yield a share in the government to the people, either, as I said before, to those who have a property qualification, or, as in the case of Thebes, to those who have abstained for a certain number of years from mean



employments, or, as at Massalia, to men of merit who are selected for their [30] worthiness, whether previously citizens or not. The magistracies of the highest rank, which ought to be in the hands of the governing body, should have expensive duties attached to them, and then the people will not desire them and will take no offence at the privileges of their rulers when they see that they pay a heavy fine for their dignity. It is fitting also that the magistrates on entering office should offer [35] magnificent sacrifices or erect some public edifice, and then the people who participate in the entertainments, and see the city decorated with votive offerings and buildings, will not desire an alteration in the government, and the notables will have memorials of their munificence. This, however, is anything but the fashion of [40] our modern oligarchs, who are as covetous of gain as they are of honour; oligarchies like theirs may be well described as petty democracies. Enough of the manner in [1321<sup>b</sup>1] which democracies and oligarchies should be organized.

8 · Next in order follows the right distribution of offices, their number, their [5] nature, their duties, of which indeed we have already spoken. No state can exist not having the necessary offices, and no state can be well administered not having the offices which tend to preserve harmony and good order. In small states, as we have [10] already remarked, there must not be many of them, but in larger states there must be a larger number, and we should carefully consider which offices may properly be united and which separated.

First among necessary offices is that which has the care of the market; a magistrate should be appointed to inspect contracts and to maintain order. For in every state there must inevitably be buyers and sellers who will supply one another's [15] wants; this is the readiest way to make a state self-sufficient and so fulfill the purpose for which men come together into one state. A second office of a similar [20] kind undertakes the supervision and embellishment of public and private buildings, the maintaining and repairing of houses and roads, the prevention of disputes about boundaries, and other concerns of a like nature. This is commonly called the office [25] of City-warden, and has various departments, which, in more populous towns, are shared among different persons, one, for example, taking charge of the walls, another of the fountains, a third of harbours. There is another equally necessary office, and of a similar kind, having to do with the same matters outside the walls [30] and in the country—the magistrates who hold this office are called Wardens of

the country, or Inspectors of the woods. Besides these three there is a fourth office of receivers of taxes, who have under their charge the revenue which is distributed among the various departments; these are called Receivers or Treasurers. Another [35] officer registers all private contracts, and decisions of the courts, all public indictments, and also all preliminary proceedings. This office again is sometimes subdivided; but in some places a single officer is responsible for all these matters. [40] These officers are called Recorders or Sacred Recorders, Presidents, and the like.

Next to these comes an office of which the duties are the most necessary and also the most difficult, viz. that to which is committed the execution of punishments, or the exaction of fines from those who are posted up according to the [1322<sup>a</sup>1] registers; and also the custody of prisoners. The difficulty of this office arises out of the odium which is attached to it; no one will undertake it unless great profits are to be made, and anyone who does is loath to execute the law. Still the office is [5] necessary; for judicial decisions are useless if they take no effect; and if society cannot exist without them, neither can it exist without the execution of them. It is an office which, being so unpopular, should not be entrusted to one person, but divided among several taken from different courts. In like manner an effort should [10] be made to distribute among different persons the writing up of those who are on the register of public debtors. Some sentences should be executed by the magistrates also, and in particular penalties due to the outgoing magistrates should be exacted by the incoming ones; and as regards those due to magistrates already in office, when one court has given judgement, another should exact the penalty; for example, the wardens of the city should exact the fines imposed by the wardens of the agora, and others again should exact the fines imposed by them. For penalties are more [15] likely to be exacted when less odium attaches to the exaction of them; but a double odium is incurred when the judges who have passed also execute the sentence, and if they are always the executioners, they will be the enemies of all.

In many places, while one magistracy executes the sentence, another has the [20] custody of the prisoners, as, for example, 'the Eleven' at Athens. It is well to separate off the jailorship also, and try by some device to render the office less unpopular. For it is quite as necessary as that of the executioners; but good men do all they can to avoid it, and worthless persons cannot safely be trusted with it; for [25] they themselves require a guard, and are not fit to guard others. There ought

not therefore to be a single or permanent officer set apart for this duty; but it should be entrusted to the young, wherever they are organized into a band or guard, and different magistrates acting in turn should take charge of it.

There are the indispensable officers, and should be ranked first—next in order [30] follow others, equally necessary, but of higher rank, and requiring great experience and trustworthiness. Such are the offices to which are committed the guard of the city, and other military functions. Not only in time of war but of peace their duty [35] will be to defend the walls and gates, and to muster and marshal the citizens. In some states there are many such offices; in others there are a few only, while small states are content with one; these officers are called generals or commanders. Again, if a state has cavalry or light-armed troops or archers or a naval force, it will [1322<sup>b</sup>1] sometimes happen that each of these departments has separate officers, who are called admirals, or generals of cavalry or of light-armed troops. And there are subordinate officers called naval captains, and captains of light-armed troops and of horse, having others under them—all these are included in the department of war. [5] Thus much of military command.

But since some, not to say all, of these offices handle the public money, there must of necessity be another office which examines and audits them, and has no other functions. Such officers are called by various names—Scrutineers, Auditors, [10] Accountants, Controllers. Besides all these offices there is another which is supreme over them; for the same office often deals with rates and taxes, or presides, in a democracy, over the assembly. For there must be a body which convenes the [15] supreme authority in the state. In some places they are called ‘probuli’, because they hold previous deliberations, but in a democracy more commonly ‘councillors’. These are the chief political offices.

Another set of officers is concerned with the maintenance of religion; priests and guardians see to the preservation and repair of the temples of the gods and to [20] other matters of religion. One office of this sort may be enough in small places, but in larger ones there are a great many besides the priesthood; for example superintendents of public worship, guardians of shrines, treasurers of the sacred [25] revenues. Nearly connected with these there are also the officers appointed for the performance of the public sacrifices, except any which the law assigns to the priests; such sacrifices derive their dignity from the public hearth of the city. They are sometimes called archons, sometimes kings, and sometimes prytanes.

These, then, are the necessary offices, which may be summed up as follows: [30] offices concerned with matters of religion, with war, with the revenue and expenditure, with the market, with the city, with the harbours, with the country; also with the courts of law, with the records of contracts, with execution of sentences, with custody of prisoners, with audits and scrutinies and accounts of [35] magistrates; lastly, there are those which preside over the public deliberations of the state. There are likewise magistracies characteristic of states which are peaceful and prosperous, and at the same time have a regard to good order: such as the offices of guardians of women, guardians of the laws, guardians of children, and directors of gymnastics; also superintendents of gymnastic and Dionysiac contests, [1323<sup>a</sup>1] and of other similar spectacles. Some of these are clearly not democratic offices; for example, the guardianships of women and children—the poor, not having any slaves, must employ both their women and children as servants. [5]

Once more: there are three offices according to whose directions the highest magistrates are chosen in certain states—guardians of the law, probuli, councillors—of these, the guardians of the law are an aristocratic, the probuli an [10] oligarchical, the council a democratic, institution. Enough, in outline, of the different kinds of offices.

## BOOK VII

[15] 1 · He who would duly inquire about the best form of a state ought first to determine which is the most eligible life; while this remains uncertain the best form of the state must also be uncertain; for, in the natural order of things, those men may be expected to lead the best life who are governed in the best manner of which [20] their circumstances admit. We ought therefore to ascertain, first of all, which is the most generally eligible life, and then whether the same life is or is not best for the state and for individuals.

Assuming that enough has been already said in discussions outside the school concerning the best life, we will now only repeat what is contained in them. Certainly no one will dispute the propriety of that partition of goods which [25] separates them into three classes, viz. external goods, goods of the body, and goods of the soul, or deny that the happy man must have all three. For no one would maintain that he is happy who has not in him a particle of courage or temperance or [30] justice or practical wisdom, who is afraid of every insect which flutters past him, and will commit any crime, however great, in order to gratify his lust for meat or drink, who will sacrifice his dearest friend for the sake of half a farthing, and is as feeble and false in mind as a child or a madman. These propositions are almost [35] universally acknowledged as soon as they are uttered, but men differ about the degree or relative superiority of this or that good. Some think that a very moderate amount of excellence is enough, but set no limit to their desires for wealth, property, power, reputation, and the like. To them we shall reply by an appeal to facts, which [40] easily prove that mankind does not acquire or preserve the excellences by the help of external goods, but external goods by the help of the excellences, and that [1323<sup>b</sup>1] happiness, whether consisting in pleasure or excellence, or both, is more often found with those who are most highly cultivated in their mind and in their character, and have only a moderate share of external goods, than among those who possess [5] external goods to a useless extent but are deficient in higher qualities; and this is not only a matter of experience, but, if reflected upon, will easily appear to be in accordance with reason. For, whereas external goods have a limit, like any other instrument, and all things useful are useful for a purpose, and where there is too much of them they must either do harm, or at any rate be of no use, to their [10] possessors, every good of the soul, the greater it is, is also of greater use, if the

epithet useful as well as noble is appropriate to such subjects. No proof is required to show that the best state of one thing in relation to another corresponds in degree of excellence to the interval between the natures of which we say that these very states are states: so that, if the soul is more noble than our possessions or our bodies, both absolutely and in relation to us, it must be admitted that the best state of either has a similar ratio to the other. Again, it is for the sake of the soul that goods [15] external and goods of the body are desirable at all, and all wise men ought to choose them for the sake of the soul, and not the soul for the sake of them.

Let us acknowledge then that each one has just so much of happiness as he has [20] of excellence and wisdom, and of excellent and wise action. The gods are a witness to us of this truth, for they are happy and blessed, not by reason of any external good, but in themselves and by reason of their own nature. And herein of necessity lies the difference between good fortune and happiness; for external goods come of [25] themselves, and chance is the author of them, but no one is just or temperate by or through chance. In like manner, and by a similar train of argument, the happy state may be shown to be that which is best and which acts rightly; and it cannot act [30] rightly without doing right actions, and neither individual nor state can do right actions without excellence and wisdom. Thus the courage, justice, and wisdom of a state have the same form and nature as the qualities which give the individual who possesses them the name of just, wise or temperate. [35]

Thus much may suffice by way of preface: for I could not avoid touching upon these questions, neither could I go through all the arguments affecting them; these are the business of another science.

Let us assume then that the best life, both for individuals and states, is the life of excellence, when excellence has external goods enough for the performance of good actions. If there are any who dispute our assertion, we will in this treatise pass [1324<sup>a</sup>1] them over, and consider their objections hereafter.

2 · There remains to be discussed the question, whether the happiness of the individual is the same as that of the state, or different. Here again there can be no doubt—no one denies that they are the same. For those who hold that the well-being of the individual consists in his wealth, also think that riches make the happiness of the whole state, and those who value most highly the life of a tyrant deem that city [10] the

happiest which rules over the greatest number; while they who approve an individual for his excellence say that the more excellent a city is, the happier it is. Two points here present themselves for consideration: first, which is the more desirable life, that of a citizen who is a member of a state, or that of an alien who has no political ties; and again, which is the best form of constitution or the best [15] condition of a state, either on the supposition that political privileges are desirable for all, or for a majority only? Since the good of the state and not of the individual is the proper subject of political thought and speculation, and we are engaged in a political discussion, while the first of these two points has a secondary interest for [20] us, the latter will be the main subject of our inquiry.

Now it is evident that that form of government is best in which every man, whoever he is, can act best and live happily. But even those who agree in thinking that the life of excellence is the most desirable raise a question, whether the life of [25] business and politics is or is not more desirable than one which is wholly independent of external goods, I mean than a contemplative life, which by some is maintained to be the only one worthy of a philosopher. For these two lives—the life [30] of the philosopher and the life of the statesman—appear to have been preferred by those who have been most keen in the pursuit of excellence, both in our own and in other ages. Which is the better is a question of no small moment; for the wise man, [35] like the wise state, will necessarily regulate his life according to the best end. There are some who think that while a despotic rule over others is the greatest injustice, to exercise a constitutional rule over them, even though not unjust, is a great impediment to a man's individual well-being. Others take an opposite view; they maintain that the true life of man is the practical and political, and that every [1324<sup>b</sup>1] excellence admits of being practised, quite as much by statesmen and rulers as by private individuals. Others, again, are of the opinion that arbitrary and tyrannical rule alone makes for happiness; indeed, in some states the entire aim both of the laws and of the constitution is to give men despotic power over their neighbours. [5] And, therefore, although in most cities the laws may be said generally to be in a chaotic state, still, if they aim at anything, they aim at the maintenance of power: thus in Lacedaemon and Crete the system of education and the greater part of the [10] laws are framed with a view to war. And in all nations which are able to gratify their ambition military power is held in esteem, for example among the Scythians and Persians and Thracians and Celts. In some nations there are even laws tending to

stimulate the warlike virtues, as at Carthage, where we are told that men obtain the [15] honour of wearing as many armlets as they have served campaigns. There was once a law in Macedonia that he who had not killed an enemy should wear a halter, and among the Scythians no one who had not slain his man was allowed to drink out of the cup which was handed round at a certain feast. Among the Iberians, a warlike nation, the number of enemies whom a man has slain is indicated by the number of [20] obelisks which are fixed in the earth round his tomb; and there are numerous practices among other nations of a like kind, some of them established by law and others by custom. Yet to a reflecting mind it must appear very strange that the statesman should be always considering how he can dominate and tyrannize over [25] others, whether they are willing or not. How can that which is not even lawful be the business of the statesman or the legislator? Unlawful it certainly is to rule without regard to justice, for there may be might where there is no right. The other arts and [30] sciences offer no parallel; a physician is not expected to persuade or coerce his patients, nor a pilot the passengers in his ship. Yet most men appear to think that the art of despotic government is statesmanship, and what men affirm to be unjust and inexpedient in their own case they are not ashamed of practising towards [35] others; they demand just rule for themselves, but where other men are concerned they care nothing about it. Such behaviour is irrational; unless the one party is, and the other is not, born to serve, in which case men have a right to command, not indeed all their fellows, but only those who are intended to be subjects; just as we [40] ought not to hunt men, whether for food or sacrifice, but only those animals which may be hunted for food or sacrifice, that is to say, such wild animals as are eatable. And surely there may be a city happy in isolation, which we will assume to be [1325<sup>a</sup>1] well-governed (for it is quite possible that a city thus isolated might be well-administered and have good laws); but such a city would not be constituted with any view to war or the conquest of enemies—all that sort of thing must be excluded. [5] Hence we see very plainly that warlike pursuits, although generally to be deemed honourable, are not the supreme end of all things, but only means. And the good lawgiver should inquire how states and races of men and communities may participate in a good life, and in the happiness which is attainable by them. His [10] enactments will not be always the same; and where there are neighbours he will have to see what sort of studies should be practised in relation to their several characters, or how the measures appropriate in relation to each are to be adopted. The end at which the



best form of government should aim may be properly made a [15] matter of future consideration.

3 · Let us now address those who, while they agree that the life of excellence is the most desirable, differ about the manner of practising it. For some renounce political power, and think that the life of the freeman is different from the life of the [20] statesman and the best of all; but others think the life of the statesman best. The argument of the latter is that he who does nothing cannot do well, and that acting well is identical with happiness. To both we say: 'you are partly right and partly wrong.' The first class are right in affirming that the life of the freeman is better than the life of the despot; for there is nothing noble in having the use of a slave, in [25] so far as he is a slave; or in issuing commands about necessary things. But it is an error to suppose that every sort of rule is despotic like that of a master over slaves, for there is as great a difference between rule over freemen and rule over slaves as there is between slavery by nature and freedom by nature, about which I have said [30] enough at the commencement of this treatise. And it is equally a mistake to place inactivity above action, for happiness is activity, and the actions of the just and wise are the realization of much that is noble.

But perhaps someone, accepting these premises, may still maintain that supreme power is the best of all things, because the possessors of it are able to [35] perform the greatest number of noble actions. If so, the man who is able to rule, instead of giving up anything to his neighbour, ought rather to take away his power; and the father should care nothing for his son, nor the son for his father, nor friend for friend; they should not bestow a thought on one another in comparison with this higher object, for the best is the most desirable and 'acting well' is the best. There might be some truth in such a view if we assume that robbers and plunderers attain [1325<sup>b</sup>1] the chief good. But this can never be; their hypothesis is false. For the actions of a ruler cannot really be honourable, unless he is as much superior to other men as a man is to a woman, or a father to his children, or a master to his slaves. And [5] therefore he who violates the law can never recover by any success, however great, what he has already lost in departing from excellence. For equals the honourable and the just consist in sharing alike, as is just and equal. But that the unequal should be given to equals, and the unlike to those who are like, is contrary to nature, and [10] nothing which is contrary to nature is good. If, therefore, there is anyone superior in excellence and in

the power of performing the best actions, he is the man we ought to follow and obey, but he must have the capacity for action as well as excellence.

If we are right in our view, and happiness is assumed to be acting well, the [15] active life will be the best, both for every city collectively, and for individuals. Not that a life of action must necessarily have relation to others, as some persons think, nor are those ideas only to be regarded as practical which are pursued for the sake of practical results, but much more the thoughts and contemplations which are [20] independent and complete in themselves; since acting well, and therefore a certain kind of action, is an end, and even in the case of external actions the directing mind is most truly said to act. Neither, again, is it necessary that states which are cut off from others and choose to live alone should be inactive; for activity, as well as other [25] things, may take place by sections; there are many ways in which the sections of a state act upon one another. The same thing is equally true of every individual. If this were otherwise, the gods and the universe, who have no external actions over and [30] above their own energies, would be far enough from perfection. Hence it is evident that the same life is best for each individual, and for states and for mankind collectively.

4 · Thus far by way of introduction. In what has preceded I have discussed [35] other forms of government; in what remains the first point to be considered is what should be the conditions of the ideal or perfect state; for the perfect state cannot exist without a due supply of the means of life. And therefore we must presuppose many purely imaginary conditions, but nothing impossible. There will be a certain number of citizens, a country in which to place them, and the like. As the weaver or [1326<sup>a</sup>1] shipbuilder or any other artisan must have the material proper for his work (and in proportion as this is better prepared, so will the result of his art be nobler), so the statesman or legislator must also have the materials suited to him.

[5] First among the materials required by the statesman is population: he will consider what should be the number and character of the citizens, and then what should be the size and character of the country. Most persons think that a state in [10] order to be happy ought to be large; but even if they are right, they have no idea what is a large and what a small state. For they judge of the size of the city by the number of the inhabitants; whereas they ought to regard, not their

number, but their power. A city too, like an individual, has a work to do; and that city which is best adapted to the fulfilment of its work is to be deemed greatest, in the same sense [15] of the word great in which Hippocrates might be called greater, not as a man, but as a physician, than some one else who was taller. And even if we reckon greatness by numbers, we ought not to include everybody, for there must always be in cities a [20] multitude of slaves and resident aliens and foreigners; but we should include those only who are members of the state, and who form an essential part of it. The number of the latter is a proof of the greatness of a city; but a city which produces numerous artisans and comparatively few soldiers cannot be great, for a great city is not the [25] same as a populous one. Moreover, experience shows that a very populous city can rarely, if ever, be well governed; since all cities which have a reputation for good government have a limit of population. We may argue on grounds of reason, and the same result will follow. For law is order, and good law is good order; but a very great [30] multitude cannot be orderly: to introduce order into the unlimited is the work of a divine power—of such a power as holds together the universe. Beauty is realized in number and magnitude, and the state which combines magnitude with good order must necessarily be the most beautiful. To the size of states there is a limit, as there [35] is to other things, plants, animals, implements; for none of these retain their natural power when they are too large or too small, but they either wholly lose their nature, or are spoiled. For example, a ship which is only a span long will not be a ship at all, nor a ship a quarter of a mile long; yet there may be a ship of a certain size, either [1326<sup>b</sup>1] too large or too small, which will still be a ship, but bad for sailing. In like manner a state when composed of too few is not, as a state ought to be, self-sufficient; when of too many, though self-sufficient in all mere necessities, as a nation may be, it is not a state, being almost incapable of constitutional government. For who can be the [5] general of such a vast multitude, or who the herald, unless he have the voice of a Stentor?

A state, then, only begins to exist when it has attained a population sufficient for a good life in the political community: it may indeed, if it somewhat exceeds this number, be a greater state. But, as I was saying, there must be a limit. What the [10] limit should be will be easily ascertained by experience. For both governors and governed have duties to perform; the special functions of a governor are to command and to judge. But if the citizens of a state are to judge and to distribute offices according to merit, then they must know each other's characters; where

they [15] do not possess this knowledge, both the election to offices and the decision of lawsuits will go wrong. When the population is very large they are manifestly settled at haphazard, which clearly ought not to be. Besides, in an over-populous [20] state foreigners and resident aliens will readily acquire the rights of citizens, for who will find them out? Clearly then the best limit of the population of a state is the largest number which suffices for the purposes of life, and can be taken in at a single view. Enough concerning the size of a state. [25]

5 · Much the same principle will apply to the territory of the state: everyone would agree in praising the territory which is most self-sufficient; and that must be the territory which can produce everything necessary, for to have all things and to want nothing is sufficiency. In size and extent it should be such as may enable the [30] inhabitants to live at once temperately and liberally in the enjoyment of leisure. Whether we are right or wrong in laying down this limit we will inquire more precisely hereafter, when we have occasion to consider what is the right use of property and wealth—a matter which is much disputed, because men are inclined [35] to rush into one of two extremes, some into meanness, others into luxury.

It is not difficult to determine the general character of the territory which is required (there are, however, some points on which military authorities should be [40] heard); it should be difficult of access to the enemy, and easy of egress to the [1327<sup>a</sup>1] inhabitants. Further, we require that the land as well as the inhabitants of whom we were just now speaking should be taken in at a single view, for a country which is easily seen can be easily protected. As to the position of the city, if we could have [5] what we wish, it should be well situated in regard both to sea and land. This then is one principle, that it should be a convenient centre for the protection of the whole country: the other is, that it should be suitable for receiving the fruits of the soil, and also for the bringing in of timber and any other products that are easily [10] transported.

6 · Whether a communication with the sea is beneficial to a well-ordered state or not is a question which has often been asked. It is argued that the introduction of strangers brought up under other laws, and the increase of [15] population, will be adverse to good order; the increase arises from their using the sea and having a crowd of merchants coming and going, and is inimical to good government. Apart from these

considerations, it would be undoubtedly better, both with a view to safety and to the provision of necessities, that the city and territory [20] should be connected with the sea; the defenders of a country, if they are to maintain themselves against an enemy, should be easily relieved both by land and by sea; and even if they are not able to attack by sea and land at once, they will have less [25] difficulty in doing mischief to their assailants on one element, if they themselves can use both. Moreover, it is necessary that they should import from abroad what is not found in their own country, and that they should export what they have in excess; for a city ought to be a market, not indeed for others, but for herself.

Those who make themselves a market for the world only do so for the sake of [30] revenue, and if a state ought not to desire profit of this kind it ought not to have such an emporium. Nowadays we often see in countries and cities dockyards and harbours very conveniently placed outside the city, but not too far off; and they are [35] kept in dependence by walls and similar fortifications. Cities thus situated manifestly reap the benefit of intercourse with their ports; and any harm which is likely to accrue may be easily guarded against by the laws, which will pronounce and determine who may hold communication with one another, and who may not.

There can be no doubt that the possession of a moderate naval force is advantageous to a city; the city should be formidable not only to its own citizens but [1327<sup>b</sup>1] to some of its neighbours, or, if necessary, able to assist them by sea as well as by land. The proper number or magnitude of this naval force is relative to the [5] character of the state; for if her function is to take a leading part in politics, her naval power should be commensurate with the scale of her enterprises. The population of the state need not be much increased, since there is no necessity that the sailors should be citizens: the marines who have the control and command will [10] be freemen, and belong also to the infantry; and wherever there is a dense population of country people and farmers, there will always be sailors more than enough. Of this we see instances at the present day. The city of Heraclea, for [15] example, although small in comparison with many others, can man a considerable fleet. Such are our conclusions respecting the territory of the state, its harbours, its towns, its relations to the sea, and its maritime power.

7 · Having spoken of the number of the citizens, we will proceed to speak of what should be their character. This is a subject which can be

easily understood by [20] anyone who casts his eye on the more celebrated states of Greece, and generally on the distribution of races in the habitable world. Those who live in a cold climate and in Europe are full of spirit, but wanting in intelligence and skill; and therefore they [25] retain comparative freedom, but have no political organization, and are incapable of ruling over others. Whereas the natives of Asia are intelligent and inventive, but they are wanting in spirit, and therefore they are always in a state of subjection and slavery. But the Hellenic race, which is situated between them, is likewise intermediate in character, being high-spirited and also intelligent. Hence it [30] continues free, and is the best-governed of any nation, and, if it could be formed into one state, would be able to rule the world. There are also similar differences in the different tribes of Greece; for some of them are of a one-sided nature, and are [35] intelligent or courageous only, while in others there is a happy combination of both qualities. And clearly those whom the legislator will most easily lead to excellence may be expected to be both intelligent and courageous. Some say that the guardians should be friendly towards those whom they know, fierce towards those whom they do not know. Now, passion is the quality of the soul which begets friendship and enables us to love; notably the spirit within us is more stirred against our friends and [1328<sup>a1</sup>] acquaintances than against those who are unknown to us, when we think that we are despised by them; for which reason Archilochus, complaining of his friends, very naturally addresses his spirit in these words, 'For surely thou art plagued on [5] account of friends.'

The power of command and the love of freedom are in all men based upon this quality, for passion is commanding and invincible. Nor is it right to say that the guardians should be fierce towards those whom they do not know, for we ought not to be out of temper with anyone; and a lofty spirit is not fierce by nature, but only when excited against evil-doers. And this, as I was saying before, is a feeling which [10] men show most strongly towards their friends if they think they have received a wrong at their hands: as indeed is reasonable; for, besides the actual injury, they seem to be deprived of a benefit by those who owe them one. Hence the saying, 'Cruel is the strife of brethren', and again, 'They who love in excess also hate in [15] excess'.

Thus we have nearly determined the number and character of the citizens of our state, and also the size and nature of their territory. I say 'nearly', for we ought not to require the same accuracy in theory as in the facts given by perception. [20]

8 · As in other natural compounds the conditions of a composite whole are not necessarily organic parts of it, so in a state or in any other combination forming [25] a unity not everything is a part which is a necessary condition. The members of an association have necessarily some one thing the same and common to all, in which they share equally or unequally; for example, food or land or any other thing. But where there are two things of which one exists for the sake of the other, they have [30] nothing in common except that the one receives what the other produces. Such, for example, is the relation in which workmen and tools stand to their work; the house and the builder have nothing in common, but the art of the builder is for the sake of [35] the house. And so states require property, but property, even though living beings are included in it, is no part of a state; for a state is a community of equals, aiming at the best life possible. Now, whereas happiness is the highest good, being a realization and perfect practice of excellence, which some can attain, while others [40] have little or none of it, the various qualities of men are clearly the reason why there are various kinds of states and many forms of government; for different men seek after happiness in different ways and by different means, and so make for [1328<sup>b</sup>1] themselves different modes of life and forms of government. We must see also how many things are indispensable to the existence of a state, for what we call the parts of a state will be found among the indispensable things. Let us then enumerate the [5] functions of a state, and we shall easily elicit what we want.

First, there must be food; secondly, arts, for life requires many instruments; thirdly, there must be arms, for the members of a community have need of them, and in their own hands, too, in order to maintain authority both against disobedient [10] subjects and against external assailants; fourthly, there must be a certain amount of revenue, both for internal needs, and for the purposes of war; fifthly, or rather first, there must be a care of religion, which is commonly called worship; sixthly, and most necessary of all, there must be a power of deciding what is for the public interest, and what is just in men's dealings with one another.

[15] These are the services which every state may be said to need. For a state is not a mere aggregate of persons, but, as we say, a union of them sufficing for the purposes of life; and if any of these things is wanting, it is impossible that the community can be absolutely self-sufficient. A state then should be framed with a [20] view to the

fulfilment of these functions. There must be farmers to procure food, and artisans, and a warlike and a wealthy class, and priests, and judges to decide what is necessary and expedient.

9 · Having determined these points, we have in the next place to consider [25] whether all ought to share in every sort of occupation. Shall every man be at once farmer, artisan, councillor, judge, or shall we suppose the several occupations just mentioned assigned to different persons? or, thirdly, shall some employments be assigned to individuals and others common to all? The same arrangement, however, [30] does not occur in every constitution; as we were saying, all may be shared by all, or not all by all, but only some by some; and hence arise the differences of constitutions, for in democracies all share in all, in oligarchies the opposite practice prevails. Now, since we are here speaking of the best form of government, i.e. that [35] under which the state will be most happy (and happiness, as has been already said, cannot exist without excellence), it clearly follows that in the state which is best governed and possesses men who are just absolutely, and not merely relatively to the principle of the constitution, the citizens must not lead the life of artisans or tradesmen, for such a life is ignoble and inimical to excellence. Neither must they be farmers, since leisure is necessary both for the development of excellence and the [1329<sup>a</sup>1] performance of political duties.

Again, there is in a state a class of warriors, and another of councillors, who advise about the expedient and determine matters of law, and these seem in an especial manner parts of a state. Now, should these two classes be distinguished, or [5] are both functions to be assigned to the same persons? Here again there is no difficulty in seeing that both functions will in one way belong to the same, in another, to different persons. To different persons in so far as these employments are suited to different primes of life, for the one requires wisdom and the other strength. But on the other hand, since it is an impossible thing that those who are able to use or to resist force should be willing to remain always in subjection, from [10] this point of view the persons are the same; for those who carry arms can always determine the fate of the constitution. It remains therefore that both functions should be entrusted by the ideal constitution to the same persons, not, however, at the same time, but in the order prescribed by nature, who has given to young men strength and to older men wisdom. Such a distribution of duties will be



expedient [15] and also just, and is founded upon a principle of conformity to merit. Besides, the ruling class should be the owners of property, for they are citizens, and the citizens of a state should be in good circumstances; whereas artisans or any other class which is not a producer of excellence have no share in the state. This follows from [20] our first principle, for happiness cannot exist without excellence, and a city is not to be termed happy in regard to a portion of the citizens, but in regard to them all. And clearly property should be in their hands, since the farmers will of necessity be [25] slaves or barbarian country people.

Of the classes enumerated there remain only the priests, and the manner in which their office is to be regulated is obvious. No farmer or artisan should be appointed to it; for the gods should receive honour from the citizens only. Now since the body of the citizens is divided into two classes, the warriors and the councillors, [30] and it is fitting that the worship of the gods should be duly performed, and also a rest provided in their service for those who from age have given up active life, to the old men of these two classes should be assigned the duties of the priesthood.

We have shown what are the necessary conditions, and what the parts of a [35] state: farmers, artisans, and labourers of all kinds are necessary to the existence of states, but the parts of the state are the warriors and councillors. And these are distinguished severally from one another, the distinction being in some cases permanent, in others not.

10 · It is no new or recent discovery of political philosophers that the state ought to be divided into classes, and that the warriors should be separated from the [1329<sup>b</sup>1] farmers. The system has continued in Egypt and in Crete to this day, and was established, as tradition says, by a law of Sesostris in Egypt and of Minos in Crete. [5] The institution of common tables also appears to be of ancient date, being in Crete as old as the reign of Minos, and in Italy far older. The Italian historians say that [10] there was a certain Italus king of Oenotria, from whom the Oenotrians were called Italians, and who gave the name of Italy to the promontory of Europe lying within the Scylletic and Lametic Gulfs, which are distant from one another only half a [15] day's journey. They say that this Italus converted the Oenotrians from shepherds into farmers, and besides other laws which he gave them, was the founder of their common meals; even in our day some who are derived from him retain this institution and certain other laws of his. On the side of Italy towards Tyrrhenia [20] dwelt the Opici, who are now, as of old, called Ausones; and on the side

towards Iapygia and the Ionian Gulf, in the district called Siritis, the Chones, who are likewise of Oenotrian race. From this part of the world originally came the institution of common tables; the separation into castes from Egypt, for the reign of [25] Sesostris is of far greater antiquity than that of Minos. It is true indeed that these and many other things have been invented several times over in the course of ages, or rather times without number; for necessity may be supposed to have taught men the inventions which were absolutely required, and when these were provided, it was natural that other things which would adorn and enrich life should grow up by [30] degrees. And we may infer that in political institutions the same rule holds. Egypt witnesses to the antiquity of all these things, for the Egyptians appear to be of all people the most ancient; and they have laws and a regular constitution existing from time immemorial. We should therefore make the best use of what has been already [35] discovered, and try to supply defects.

I have already remarked that the land ought to belong to those who possess arms and have a share in the government, and that the farmers ought to be a class distinct from them; and I have determined what should be the extent and nature of the territory. Let me proceed to discuss the distribution of the land, and the character of the agricultural class; for I do not think that property ought to be [1330<sup>a</sup>1] common, as some maintain, but only that by friendly consent there should be a common use of it; and that no citizen should be in want of subsistence.

As to common meals, there is a general agreement that a well-ordered city [5] should have them; and we will hereafter explain what are our own reasons for taking this view. They ought, however, to be open to all the citizens. And yet it is not easy for the poor to contribute the requisite sum out of their private means, and to provide also for their household. The expense of religious worship should likewise be [10] a public charge. The land must therefore be divided into two parts, one public and the other private, and each part should be subdivided, part of the public land being appropriated to the service of the gods, and the other part used to defray the cost of the common meals; while of the private land, part should be near the border, and the [15] other near the city, so that, each citizen having two lots, they may all of them have land in both places; there is justice and fairness in such a division and it tends to inspire unanimity among the people in their border wars. Where there is not this arrangement, some of them are too ready to come to blows with their neighbours, [20] while others are so cautious that they quite lose the sense of honour. For this reason there is a law in some places which

forbids those who dwell near the border to take part in public deliberations about wars with neighbours, on the ground that their interests will pervert their judgement. For the reasons already mentioned, then, the land should be divided in the manner described. The very best thing of all would be that the farmers should be slaves taken from among men who are not all of the same [25] race and not spirited, for if they have no spirit they will be better suited for their work, and there will be no danger of their making a revolution. The next best thing would be that they should be barbarian country people, and of a like inferior nature; some of them should be the slaves of individuals, and employed on the private [30] estates of men of property, the remainder should be the property of the state and employed on the common land. I will hereafter explain what is the proper treatment of slaves, and why it is expedient that liberty should be always held out to them as the reward of their services.

11 · We have already said that the city should be open to the land and to the sea, and to the whole country as far as possible. In respect of the place itself our wish [35] would be that its situation should be fortunate in four things. The first, health—this is a necessity: cities which lie towards the east, and are blown upon by winds coming from the east, are the healthiest; next in healthiness are those which are sheltered from the north wind, for they have a milder winter. The site of the city should likewise be convenient both for political administration and for war. With a view to [1330<sup>b</sup>1] the latter it should afford easy egress to the citizens, and at the same time be inaccessible and difficult of capture to enemies. There should be a natural abundance of springs and fountains in the town, or, if there is a deficiency of them, great reservoirs may be established for the collection of rain-water, such as will not [5] fail when the inhabitants are cut off from the country by war. Special care should be taken of the health of the inhabitants, which will depend chiefly on the healthiness of the locality and of the quarter to which they are exposed, and secondly, on the use [10] of pure water; this latter point is by no means a secondary consideration. For the elements which we use most and oftenest for the support of the body contribute most to health, and among these are water and air. For this reason, in all wise states, [15] if there is a want of pure water, and the supply is not all equally good, the drinking water ought to be separated from that which is used for other purposes.

As to strongholds, what is suitable to different forms of government varies: thus an acropolis is suited to an oligarchy or a monarchy, but a plain to a democracy; neither to an aristocracy, but rather a number of strong places. The [20] arrangement of private houses is considered to be more agreeable and generally more convenient if the streets are regularly laid out after the modern fashion which Hippodamus introduced, but for security in war the antiquated mode of building, which made it difficult for strangers to get out of a town and for assailants to find [25] their way in, is preferable. A city should therefore adopt both plans of building: it is possible to arrange the houses irregularly, as farmers plant their vines in what are called 'clumps'. The whole town should not be laid out in straight lines, but only [30] certain quarters and regions; thus security and beauty will be combined.

As to walls, those who say that cities making any pretension to military virtue should not have them, are quite out of date in their notions; and they may see the cities which prided themselves on this fancy confuted by facts. True, there is little [35] courage shown in seeking for safety behind a rampart when an enemy is similar in character and not much superior in number; but the superiority of the besiegers may be and often is too much both for ordinary human valour and for that which is found only in a few; and if they are to be saved and to escape defeat and outrage, the strongest wall will be the truest soldierly precaution, more especially now that [1331<sup>a</sup>1] missiles and siege engines have been brought to such perfection. To have no walls would be as foolish as to choose a site for a town in an exposed country, and to level [5] the heights; or as if an individual were to leave his house unwall'd, lest the inmates should become cowards. Nor must we forget that those who have their cities surrounded by walls may either take advantage of them or not, but cities which are [10] unwall'd have no choice.

If our conclusions are just, not only should cities have walls, but care should be taken to make them ornamental, as well as useful for warlike purposes, and adapted [15] to resist modern inventions. For as the assailants of a city do all they can to gain an advantage, so the defenders should make use of any means of defence which have been already discovered, and should devise and invent others, for when men are well prepared no enemy even thinks of attacking them.

at [20] suitable intervals, and the body of citizens must be distributed at common tables, the idea will naturally occur that we should establish some of the common tables in the guard-houses. These might be arranged as has been suggested; while the [25] principal common tables of the magistrates will occupy a suitable place, and there also will be the buildings appropriated to religious worship except in the case of those rites which the law or the Pythian oracle has restricted to a special locality. The site should be a spot seen far and wide, which gives due elevation to excellence<sup>1</sup> [30] and towers over the neighbourhood. Below this spot should be established an agora, such as that which the Thessalians call the 'freemen's agora'; from this all trade should be excluded, and no artisan, farmer, or any such person allowed to enter, [35] unless he be summoned by the magistrates. It would be a pleasing use of the place, if the gymnastic exercises of the elder men were performed there. For in this noble practice different ages should be separated, and some of the magistrates should stay with the boys, while the grown-up men remain with the magistrates; for the presence of the magistrates is the best mode of inspiring true modesty and [1331<sup>b1</sup>] ingenuous fear. There should also be a traders' agora, distinct and apart from the other, in a situation which is convenient for the reception of goods both by sea and land.

But we must not forget another section of the citizens, viz. the priests, for [5] whom public tables should likewise be provided in their proper place near the temples. The magistrates who deal with contracts, indictments, summonses, and the like, and those who have the care of the agora and of the city respectively, ought to [10] be established near an agora and some public place of meeting; the neighbourhood of the traders' agora will be a suitable spot; the upper agora we devote to the life of leisure, the other is intended for the necessities of trade.

The same order should prevail in the country, for there too the magistrates, called by some 'Inspectors of Forests' and by others 'Wardens of the Country', must [15] have guard-houses and common tables while they are on duty; temples should also be scattered throughout the country, dedicated some to gods and some to heroes.

But it would be a waste of time for us to linger over details like these. The difficulty is not in imagining but in carrying them out. We may talk about them as [20] much as we like, but the execution of them will depend upon fortune. Therefore let us say no more about these matters for the present.

13 · Returning to the constitution itself, let us seek to determine out of what and what sort of elements the state which is to be happy and well-governed should [25] be composed. There are two things in which all well-being consists: one of them is the choice of a right end and aim of action, and the other the discovery of the actions which contribute towards it; for the means and the end may agree or disagree. [30] Sometimes the right end is set before men, but in practice they fail to attain it; in other cases they are successful in all the contributory factors, but they propose to themselves a bad end; and sometimes they fail in both. Take, for example, the art of medicine; physicians do not always understand the nature of health, and also the [35] means which they use may not effect the desired end. In all arts and sciences both the end and the means should be equally within our control.

The happiness and well-being which all men manifestly desire, some have the power of attaining, but to others, from some accident or defect of nature, the attainment of them is not granted; for a good life requires a supply of external [1332<sup>a</sup>1] goods, in a less degree when men are in a good state, in a greater degree when they are in a lower state. Others again, who possess the conditions of happiness, go utterly wrong from the first in the pursuit of it. But since our object is to discover the best form of government, that, namely, under which a city will be best governed, [5] and since the city is best governed which has the greatest opportunity of obtaining happiness, it is evident that we must clearly ascertain the nature of happiness.

We maintain, and have said in the *Ethics*, if the arguments there adduced are of any value, that happiness is the realization and perfect exercise of excellence, and this not conditional, but absolute. And I use the term 'conditional' to express that [10] which is indispensable, and 'absolute' to express that which is good in itself. Take the case of just actions; just punishments and chastisements do indeed spring from a good principle, but they are good only because we cannot do without them—it would be better that neither individuals nor states should need anything of the [15] sort—but actions which aim at honour and advantage are absolutely the best. The conditional action is only the choice of a lesser evil; whereas these are the foundation and creation of good. A good man may make the best even of poverty and disease, and the other ills of life; but he can only attain happiness under the [20] opposite conditions (for this also has been determined in the *Ethics*, that the good man is he for whom, because he is excellent, the things that are absolutely good are

good; it is also plain that his use of these goods must be excellent and in the absolute [25] sense good). This makes men fancy that external goods are the cause of happiness, yet we might as well say that a brilliant performance on the lyre was to be attributed to the instrument and not to the skill of the performer.

It follows then from what has been said that some things the legislator must find ready to his hand in a state, others he must provide. And therefore we can only [30] say: may our state be constituted in such a manner as to be blessed with the goods of which fortune disposes (for we acknowledge her power): whereas excellence and goodness in the state are not a matter of chance but the result of knowledge and choice. A city can be excellent only when the citizens who have a share in the government are excellent, and in our state all the citizens share in the government; [35] let us then inquire how a man becomes excellent. For even if we could suppose the citizen body to be excellent, without each of them being so, yet the latter would be better, for in the excellence of each the excellence of all is involved.

There are three things which make men good and excellent; these are nature, [40] habit, reason. In the first place, every one must be born a man and not some other animal; so, too, he must have a certain character, both of body and soul. But some [1332<sup>b</sup>1] qualities there is no use in having at birth, for they are altered by habit, and there are some gifts which by nature are made to be turned by habit to good or bad. Animals lead for the most part a life of nature, although in lesser particulars some [5] are influenced by habit as well. Man has reason, in addition, and man only. For this reason nature, habit, reason must be in harmony with one another; for they do not always agree; men do many things against habit and nature, if reason persuades them that they ought. We have already determined what natures are likely to be [10] most easily moulded by the hands of the legislator. All else is the work of education; we learn some things by habit and some by instruction.

14 · Since every political society is composed of rulers and subjects, let us consider whether the relations of one to the other should interchange or be [15] permanent. For the education of the citizens will necessarily vary with the answer given to this question. Now, if some men excelled others in the same degree in which gods and heroes are supposed to excel mankind in general (having in the first place a great advantage even in their bodies, and secondly in their minds), so that the [20]

superiority of the governors was undisputed and patent to their subjects, it would clearly be better that once for all the one class should rule and the others serve. But since this is unattainable, and kings have no marked superiority over their subjects, [25] such as Scylax affirms to be found among the Indians, it is obviously necessary on many grounds that all the citizens alike should take their turn of governing and being governed. Equality consists in the same treatment of similar persons, and no government can stand which is not founded upon justice. For if the government is [30] unjust everyone in the country unites with the governed in the desire to have a revolution, and it is an impossibility that the members of the government can be so numerous as to be stronger than all their enemies put together. Yet that governors should be better than their subjects is undeniable. How all this is to be effected, and in what way they will respectively share in the government, the legislator has to [35] consider. The subject has been already mentioned. Nature herself has provided the distinction when she made a difference between old and young within the same species, of whom she fitted the one to govern and the other to be governed. No one takes offence at being governed when he is young, nor does he think himself better than his governors, especially if he will enjoy the same privilege when he reaches the [40] required age.

We conclude that from one point of view governors and governed are identical, and from another different. And therefore their education must be the same and [1333a1] also different. For he who would learn to command well must, as men say, first of all learn to obey. As I observed in the first part of this treatise, there is one rule which is for the sake of the rulers and another rule which is for the sake of the ruled; the former is a despotic, the latter a free government. Some commands differ not in the [5] thing commanded, but in the intention with which they are imposed. That is why many apparently menial offices are an honour to the free youth by whom they are performed; for actions do not differ as honourable or dishonourable in themselves so [10] much as in the end and intention of them. But since we say that the excellence of the citizen and ruler is the same as that of the good man, and that the same person must first be a subject and then a ruler, the legislator has to see that they become good men, and by what means this may be accomplished, and what is the end of the [15] perfect life.

Now the soul of man is divided into two parts, one of which has a rational principle in itself, and the other, not having a rational principle in itself, is able to obey such a principle. And we call a man in any way



good because he has the excellences of these two parts. In which of them the end is more likely to be found is [20] no matter of doubt to those who adopt our division; for in the world both of nature and of art the inferior always exists for the sake of the superior, and the superior is that which has a rational principle. This principle, too, in our ordinary way of making the division, is divided into two kinds, for there is a practical and a [25] speculative principle. This part, then, must evidently be similarly divided. And there must be a corresponding division of actions; the actions of the naturally better part are to be preferred by those who have it in their power to attain to two out of the three or to all, for that is always to everyone the most desirable which is the highest [30] attainable by him. The whole of life is further divided into two parts, business and leisure, war and peace, and of actions some aim at what is necessary and useful, and some at what is honourable. And the preference given to one or the other class of actions must necessarily be like the preference given to one or other part of the soul and its actions over the other; there must be war for the sake of peace, business for [35] the sake of leisure, things useful and necessary for the sake of things honourable. All these points the statesman should keep in view when he frames his laws; he should consider the parts of the soul and their functions, and above all the better and the end; he should also remember the diversities of human lives and actions. For [1333<sup>b</sup>1] men must be able to engage in business and go to war, but leisure and peace are better; they must do what is necessary and indeed what is useful, but what is honourable is better. On such principles children and persons of every age which requires education should be trained. Whereas even the Greeks of the present day [5] who are reputed to be best governed, and the legislators who gave them their constitutions, do not appear to have framed their governments with a regard to the best end, or to have given them laws and education with a view to all the excellences, [10] but in a vulgar spirit have fallen back on those which promised to be more useful and profitable. Many modern writers have taken a similar view: they commend the Lacedaemonian constitution, and praise the legislator for making conquest and war [15] his sole aim, a doctrine which may be refuted by argument and has long ago been refuted by facts. For most men desire empire in the hope of accumulating the goods of fortune; and on this ground Thibron and all those who have written about the [20] Lacedaemonian constitution have praised their legislator, because the Lacedaemonians, by being trained to meet dangers, gained great power. But surely they are not a happy people now that their empire has passed

away, nor was their legislator right. How ridiculous is the result, if, while they are continuing in the observance of [25] his laws and no one interferes with them, they have lost the better part of life! These writers further err about the sort of government which the legislator should approve, for the government of freemen is nobler and implies more excellence than despotic government. Neither is a city to be deemed happy or a legislator to be [30] praised because he trains his citizens to conquer and obtain dominion over their neighbours, for there is great harm in this. On a similar principle any citizen who could, should obviously try to obtain the power in his own state—the crime which [35] the Lacedaemonians accuse king Pausanias of attempting, although he had such great honour already. No such principle and no law having this object is either statesmanlike or useful or right. For the same things are best both for individuals and for states, and these are the things which the legislator ought to implant in the minds of his citizens. Neither should men study war with a view to the enslavement [40] of those who do not deserve to be enslaved; but first of all they should provide against their own enslavement, and in the second place obtain empire for the good [1334<sup>a</sup>1] of the governed, and not for the sake of exercising a general despotism, and in the third place they should seek to be masters only over those who deserve to be slaves. Facts, as well as arguments, prove that the legislator should direct all his military [5] and other measures to the provision of leisure and the establishment of peace. For most of these military states are safe only while they are at war, but fall when they have acquired their empire; like unused iron they lose their edge in time of peace. And for this the legislator is to blame, he never having taught them how to lead the [10] life of peace.

15 · Since the end of individuals and of states is the same, the end of the best man and of the best constitution must also be the same; it is therefore evident that there ought to exist in both of them the excellences of leisure; for peace, as has been [15] often repeated, is the end of war, and leisure of toil. But leisure and cultivation may be promoted not only by those excellences which are practised in leisure, but also by some of those which are useful to business. For many necessities of life have to be supplied before we can have leisure. Therefore a city must be temperate and brave, and able to endure: for truly, as the proverb says, ‘There is no leisure for [20] slaves,’ and those who cannot face danger like men are the slaves of any invader. Courage and endurance are required for business and philosophy for leisure, temperance and justice for both, and

more especially in times of peace and leisure, [25] for war compels men to be just and temperate, whereas the enjoyment of good fortune and the leisure which comes with peace tend to make them insolent. Those then who seem to be the best-off and to be in the possession of every good, have [30] special need of justice and temperance—for example, those (if such there be, as the poets say) who dwell in the Islands of the Blest; they above all will need philosophy and temperance and justice, and all the more the more leisure they have, living in the midst of abundance. There is no difficulty in seeing why the state that would be [35] happy and good ought to have these excellences. If it is disgraceful in men not to be able to use the goods of life, it is peculiarly disgraceful not to be able to use them in time of leisure—to show excellent qualities in action and war, and when they have peace and leisure to be no better than slaves. That is why we should not practise excellence after the manner of the Lacedaemonians. For they, while agreeing with [40] other men in their conception of the highest goods, differ from the rest of mankind in thinking that they are to be obtained by the practice of a single excellence. And [1334<sup>b</sup>1] since these goods and the enjoyment of them are greater than the enjoyment derived from the excellences . . .<sup>2</sup> and that for its own sake, is evident from what has been said; we must now consider how and by what means it is to be attained. [5]

We have already determined that nature and habit and reason are required, and, of these, the proper nature of the citizens has also been defined by us. But we have still to consider whether the training of early life is to be that of reason or habit, for these two must accord, and when in accord they will then form the best of [10] harmonies. Reason may be mistaken and fail in attaining the highest ideal of life, and there may be a like influence of habit. Thus much is clear in the first place, that, as in all other things, birth implies an antecedent beginning, and that there are beginnings whose end is relative to a further end. Now, in men reason and mind are [15] the end towards which nature strives, so that the birth and training in custom of the citizens ought to be ordered with a view to them. In the second place, as the soul and body are two, we see also that there are two parts of the soul, the rational and the irrational, and two corresponding states—reason and appetite. And as the body is [20] prior in order of generation to the soul, so the irrational is prior to the rational. The proof is that anger and wishing and desire are implanted in children from their very birth, but reason and understanding are developed as they grow older. For this reason, the care of the body ought to precede that of the soul, and the training of the [25] appetitive part should follow: none

the less our care of it must be for the sake of the reason, and our care of the body for the sake of the soul.

16 · Since the legislator should begin by considering how the bodies of the [30] children whom he is rearing may be as good as possible, his first care will be about marriage—at what age should his citizens marry, and who are fit to marry? In legislating on this subject he ought to consider the persons and the length of their life, that their procreative life may terminate at the same period, and that they may [35] not differ in their bodily powers, as will be the case if the man is still able to beget children while the woman is unable to bear them, or the woman able to bear while the man is unable to beget, for from these causes arise quarrels and differences between married persons. Secondly, he must consider the time at which the children will succeed to their parents; there ought not to be too great an interval of age, for [1335<sup>a</sup>1] then the parents will be too old to derive any pleasure from their affection, or to be of any use to them. Nor ought they to be too nearly of an age; to youthful marriages there are many objections—the children will be lacking in respect for the parents, who will seem to be their contemporaries, and disputes will arise in the management of the household. Thirdly, and this is the point from which we digressed, the [5] legislator must mould to his will the bodies of newly-born children. Almost all these objects may be secured by attention to one point. Since the time of generation is commonly limited within the age of seventy years in the case of a man, and of fifty [10] in the case of a woman, the commencement of the union should conform to these periods. The union of male and female when too young is bad for the procreation of children; in all other animals the offspring of the young are small and ill-developed, and with a tendency to produce female children, and therefore also in man, as is [15] proved by the fact that in those cities in which men and women are accustomed to marry young, the people are small and weak; in childbirth also younger women suffer more, and more of them die; some persons say that this was the meaning of [20] the response once given to the Troezenians—the oracle really meant that many died because they married too young; it had nothing to do with the gathering of the harvest. It also conduces to temperance not to marry too soon; for women who [25] marry early are apt to be wanton; and in men too the bodily frame is stunted if they marry while the seed is growing (for there is a time when the growth of the seed, also, ceases, or continues to but a slight extent). Women should marry when they are about eighteen years of age, and men at thirty-seven; then they

are in the prime [30] of life, and the decline in the powers of both will coincide. Further, the children, if their birth takes place soon, as may reasonably be expected, will succeed in the beginning of their prime, when the fathers are already in the decline of life, and [35] have nearly reached their term of three-score years and ten.

Thus much of the age proper for marriage: the season of the year should also be considered; according to our present custom, people generally limit marriage to the season of winter, and they are right. The precepts of physicians and natural [40] philosophers about generation should also be studied by the parents themselves; the physicians give good advice about the favourable conditions of the body, and the [1335<sup>b1</sup>] natural philosophers about the winds; of which they prefer the north to the south.

What constitution in the parent is most advantageous to the offspring is a subject which we will consider more carefully when we speak of the education of children, and we will only make a few general remarks at present. The constitution [5] of an athlete is not suited to the life of a citizen, or to health, or to the procreation of children, any more than the valetudinarian or exhausted constitution, but one which is in a mean between them. A man's constitution should be inured to labour, but not to labour which is excessive or of one sort only, such as is practised by athletes; he [10] should be capable of all the actions of a freeman. These remarks apply equally to both parents.

Women who are with child should take care of themselves; they should take exercise and have a nourishing diet. The first of these prescriptions the legislator will easily carry into effect by requiring that they shall take a walk daily to some [15] temple, where they can worship the gods who preside over birth. Their minds, however, unlike their bodies, they ought to keep quiet, for the offspring derive their natures from their mothers as plants do from the earth.

As to the exposure and rearing of children, let there be a law that no deformed [20] child shall live. But as to an excess in the number of children, if the established customs of the state forbid the exposure of any children who are born, let a limit be set to the number of children a couple may have; and if couples have children in excess, let abortion be procured before sense and life have begun; what may or may [25] not be lawfully done in these cases depends on the question of life and sensation.

And now, having determined at what ages men and women are to begin their union, let us also determine how long they shall continue to beget and bear offspring for the state; men who are too old, like men who

are too young, produce children [30] who are defective in body and mind; the children of very old men are weakly. The limit, then, should be the age which is the prime of their intelligence, and this in most persons, according to the notion of some poets who measure life by periods of seven years, is about fifty; at four or five years later, they should cease from having [35] families; and from that time forward only cohabit with one another for the sake of health, or for some similar reason.

As to adultery, let it be held disgraceful, in general, for any man or woman to be found in any way unfaithful when they are married, and called husband and wife. If during the time of bearing children anything of the sort occur, let the guilty [1336<sup>a</sup>1] person be punished with a loss of privileges in proportion to the offence.

17 · After the children have been born, the manner of rearing them may be supposed to have a great effect on their bodily strength. It would appear from the [5] example of animals, and of those nations who desire to create the military habit, that the food which has most milk in it is best suited to human beings; but the less wine the better, if they would escape diseases. Also all the motions to which children can be subjected at their early age are very useful. But in order to preserve their tender limbs from distortion, some nations have had recourse to mechanical [10] appliances which straighten their bodies. To accustom children to the cold from their earliest years is also an excellent practice, which greatly conduces to health, and hardens them for military service. Hence many barbarians have a custom of [15] plunging their children at birth into a cold stream; others, like the Celts, clothe them in a light wrapper only. For human nature should be early habituated to endure all which by habit it can be made to endure; but the process must be gradual. [20] And children, from their natural warmth, may be easily trained to bear cold. Such care should attend them in the first stage of life.

The next period lasts to the age of five; during this no demand should be made [25] upon the child for study or labour, lest its growth be impeded; and there should be sufficient motion to prevent the limbs from being inactive. This can be secured, among other ways, by play, but the play should not be vulgar or tiring or effeminate. [30] The Directors of Education, as they are termed, should be careful what tales or stories the children hear, for all such things are designed to prepare the way for the business of later life, and should be for the most part imitations of the occupations which they will hereafter pursue in earnest. Those are wrong

who in their *Laws* [35] attempt to check the loud crying and screaming of children, for these contribute towards their growth, and, in a manner, exercise their bodies. Straining the voice has a strengthening effect similar to that produced by the retention of the breath in [40] violent exertions. The Directors of Education should have an eye to their bringing up, and in particular should take care that they are left as little as possible with [1336<sup>b</sup>1] slaves. For until they are seven years old they must live at home; and therefore, even at this early age, it is to be expected that they should acquire a taint of meanness from what they hear and see. Indeed, there is nothing which the legislator should be [5] more careful to drive away than indecency of speech; for the light utterance of shameful words leads soon to shameful actions. The young especially should never be allowed to repeat or hear anything of the sort. A freemen who is found saying or doing what is forbidden, if he be too young as yet to have the privilege of reclining at [10] the public tables, should be disgraced and beaten, and an elder person degraded as his slavish conduct deserves. And since we do not allow improper language, clearly we should also banish pictures or speeches from the stage which are indecent. Let [15] the rulers take care that there be no image or picture representing unseemly actions, except in the temples of those gods at whose festivals the law permits even ribaldry, and whom the law also permits to be worshipped by persons of mature age on behalf of themselves, their children, and their wives. But the legislator should not allow [20] youth to be spectators of iambi or of comedy until they are of an age to sit at the public tables and to drink strong wine; by that time education will have armed them against the evil influences of such representations.

We have made these remarks in a cursory manner—they are enough for the [25] present occasion; but hereafter we will return to the subject and after a fuller discussion determine whether such liberty should or should not be granted, and in what way granted, if at all. Theodorus, the tragic actor, was quite right in saying [30] that he would not allow any other actor, not even if he were quite second-rate, to enter before himself, because the spectators grew fond of the voices which they first heard. And the same principle applies universally to association with things as well as with persons, for we always like best whatever comes first. And therefore youth should be kept strangers to all that is bad, and especially to things which suggest [35] vice or hate. When the five years have passed away, during the two following years they must look on at the pursuits which they are hereafter to learn. There are two periods of life

with reference to which education has to be divided, from seven to the age of puberty, and onwards to the age of twenty-one. The poets who divide ages by [40] sevens are in the main right: but we should observe the divisions actually made by nature; for the deficiencies of nature are what art and education seek to fill up. [1337<sup>a</sup>1]

Let us then first inquire if any regulations are to be laid down about children, and secondly, whether the care of them should be the concern of the state or of [5] private individuals, which latter is in our own day the common custom, and in the third place, what these regulations should be.



## BOOK VIII

1 · No one will doubt that the legislator should direct his attention above all [10] to the education of youth; for the neglect of education does harm to the constitution. The citizen should be moulded to suit the form of government under which he lives. For each government has a peculiar character which originally formed and which continues to preserve it. The character of democracy creates democracy, and the [15] character of oligarchy creates oligarchy; and always the better the character, the better the government.

Again, for the exercise of any faculty or art a previous training and habituation [20] are required; clearly therefore for the practice of excellence. And since the whole city has one end, it is manifest that education should be one and the same for all, and that it should be public, and not private—not as at present, when everyone looks after his own children separately, and gives them separate instruction of the [25] sort which he thinks best; the training in things which are of common interest should be the same for all. Neither must we suppose that anyone of the citizens belongs to himself, for they all belong to the state, and are each of them a part of the state, and the care of each part is inseparable from the care of the whole. In this [30] particular as in some others the Lacedaemonians are to be praised, for they take the greatest pains about their children, and make education the business of the state.

2 · That education should be regulated by law and should be an affair of state is not to be denied, but what should be the character of this public education, and how young persons should be educated, are questions which remain to be [35] considered. As things are, there is disagreement about the subjects. For men are by no means agreed about the things to be taught, whether we look to excellence or the best life. Neither is it clear whether education is more concerned with intellectual or with moral excellence. The existing practice is perplexing; no one knows on what [40] principle we should proceed—should the useful in life, or should excellence, or should the higher knowledge, be the aim of our training?—all three opinions have been entertained. Again, about the means there is no agreement; for different [1337<sup>b</sup>1] persons, starting with different ideas about the nature of excellence, naturally disagree about the practice of it. There can be no doubt that children should be taught

those useful things which are really necessary, but not all useful things; for [5] occupations are divided into liberal and illiberal; and to young children should be imparted only such kinds of knowledge as will be useful to them without making mechanics of them. And any occupation, art, or science, which makes the body or [10] soul or mind of the freeman less fit for the practice or exercise of excellence, is mechanical; wherefore we call those arts mechanical which tend to deform the body, and likewise all paid employments, for they absorb and degrade the mind. [15] There are also some liberal arts quite proper for a freeman to acquire, but only in a certain degree, and if he attends to them too closely, in order to attain perfection in them, the same harmful effects will follow. The object also which a man sets before him makes a great difference; if he does or learns anything for his own sake or for the sake of his friends, or with a view to excellence, the action will not appear [20] illiberal; but if done for the sake of others, the very same action will be thought menial and servile. The received subjects of instruction, as I have already remarked, are partly of a liberal and partly of an illiberal character.

3 · The customary branches of education are in number four; they are—reading and writing, gymnastic exercises, and music, to which is sometimes added [25] drawing. Of these, reading and writing and drawing are regarded as useful for the purposes of life in a variety of ways, and gymnastic exercises are thought to infuse courage. Concerning music a doubt may be raised—in our own day most men cultivate it for the sake of pleasure, but originally it was included in education, [30] because nature herself, as has been often said, requires that we should be able, not only to work well, but to use leisure well; for, as I must repeat once again, the first principle of all action is leisure. Both are required, but leisure is better than occupation and is its end; and therefore the question must be asked, what ought we [35] to do when at leisure? Clearly we ought not to be playing, for then play would be the end of life. But if this is inconceivable, and play is needed more amid serious occupations than at other times (for he who is hard at work has need of relaxation, and play gives relaxation, whereas occupation is always accompanied with exertion [40] and effort), we should introduce amusements only at suitable times, and they should be our medicines, for the emotion which they create in the soul is a [1338<sup>a</sup>1] relaxation, and from the pleasure we obtain rest. But leisure of itself gives pleasure and happiness and enjoyment of life, which are experienced, not by the busy

man, but by those who have leisure. For he who is occupied has in view some end which he [5] has not attained; but happiness is an end, since all men deem it to be accompanied with pleasure and not with pain. This pleasure, however, is regarded differently by different persons, and varies according to the habit of individuals; the pleasure of the best man is the best, and springs from the noblest sources. It is clear then that [10] there are branches of learning and education which we must study merely with a view to leisure spent in intellectual activity, and these are to be valued for their own sake; whereas those kinds of knowledge which are useful in business are to be deemed necessary, and exist for the sake of other things. And therefore our fathers admitted music into education, not on the ground either of its necessity or utility, for it is not necessary, nor indeed useful in the same manner as reading and writing, [15] which are useful in money-making, in the management of a household, in the acquisition of knowledge and in political life, nor like drawing, useful for a more correct judgement of the works of artists, nor again like gymnastic, which gives health and strength; for neither of these is to be gained from music. There remains, [20] then, the use of music for intellectual enjoyment in leisure; which is in fact evidently the reason of its introduction, this being one of the ways in which it is thought that a freeman should pass his leisure; as Homer says—

But he who alone should be called to the pleasant feast, [25]

and afterwards he speaks of others whom he describes as inviting

The bard who would delight them all.

And in another place Odysseus says there is no better way of passing life than when men's hearts are merry and

The banqueters in the hall, sitting in order, hear the voice of the minstrel. [30]

It is evident, then, that there is a sort of education in which parents should train their sons, not as being useful or necessary, but because it is liberal or noble. Whether this is of one kind only, or of more than one, and if so, what they are, and how they are to be imparted, must hereafter be determined. Thus much we are already in a position to say; for the ancients bear witness to us—their opinion may [35] be gathered from the fact that music is one of the received and traditional branches of education. Further, it is clear that children should be instructed in some

useful things—for example, in reading and writing—not only for their usefulness, but also because many other sorts of knowledge are acquired through them. With a like view [40] they may be taught drawing, not to prevent their making mistakes in their own purchases, or in order that they may not be imposed upon in the buying or selling of articles, but perhaps rather because it makes them judges of the beauty of the [1338<sup>b</sup>1] human form. To be always seeking after the useful does not become free and exalted souls. Now it is clear that in education practice must be used before theory, and the body be trained before the mind; and therefore boys should be handed over to the [5] trainer, who creates in them the proper habit of body, and to the wrestling-master, who teaches them their exercises.

4 · Of those states which in our own day seem to take the greatest care of children, some aim at producing in them an athletic habit, but they only injure their [10] bodies and stunt their growth. Although the Lacedaemonians have not fallen into this mistake, yet they brutalize their children by laborious exercises which they think will make them courageous. But in truth, as we have often repeated, education should not be exclusively, or principally, directed to this end. And even if we [15] suppose the Lacedaemonians to be right in their end, they do not attain it. For among barbarians and among animals courage is found associated, not with the greatest ferocity, but with a gentle and lion-like temper. There are many races who [20] are ready enough to kill and eat men, such as the Achaeans and Heniochi, who both live about the Black Sea; and there are other mainland tribes, as bad or worse, who all live by plunder, but have no courage. It is notorious that the Lacedaemonians [25] themselves, while they alone were assiduous in their laborious drill, were superior to others, but now they are beaten both in war and gymnastic exercises. For their ancient superiority did not depend on their mode of training their youth, but only on the circumstance that they trained them when their only rivals did not. Hence we [30] may infer that what is noble, not what is brutal, should have the first place; no wolf or other wild animal will face a really noble danger; such dangers are for the brave man. And parents who devote their children to gymnastics while they neglect their necessary education, in reality make them mechanics; for they make them useful to [35] the art of statesmanship in one quality only, and even in this the argument proves them to be inferior to others. We should judge the Lacedaemonians not from what they have been, but from what they are; for now they have rivals who

compete with their education; formerly they had none.

It is an admitted principle that gymnastic exercises should be employed in [40] education, and that for children they should be of a lighter kind, avoiding severe diet or painful toil, lest the growth of the body be impaired. The evil of excessive training [1339<sup>a</sup>1] in early years is strikingly proved by the example of the Olympic victors; for not more than two or three of them have gained a prize both as boys and as men; their early training and severe gymnastic exercises exhausted their constitutions. When [5] boyhood is over, three years should be spent in other studies; the period of life which follows may then be devoted to hard exercise and strict diet. Men ought not to labour at the same time with their minds and with their bodies; for the two kinds of [10] labour are opposed to one another; the labour of the body impedes the mind, and the labour of the mind the body.

5 · Concerning music there are some questions which we have already raised; these we may now resume and carry further; and our remarks will serve as a [15] prelude to this or any other discussion of the subject. It is not easy to determine the nature of music, or why anyone should have a knowledge of it. Shall we say, for the sake of amusement and relaxation, like sleep or drinking, which are not good in themselves, but are pleasant, and at the same time ‘make care to cease’, as [20] Euripides says? And for this end men also appoint music, and make use of all three alike—sleep, drinking, music—to which some add dancing. Or shall we argue that music conduces to excellence, on the ground that it can form our minds and habituate us to true pleasures as our bodies are made by gymnastic to be of a certain [25] character? Or shall we say that it contributes to the enjoyment of leisure and mental cultivation, which is a third alternative? Now obviously youths are not to be instructed with a view to their amusement, for learning is no amusement, but is [30] accompanied with pain. Neither is intellectual enjoyment suitable to boys of that age, for it is the end, and that which is imperfect cannot attain the end. But perhaps it may be said that boys learn music for the sake of the amusement which they will have when they are grown up. If so, why should they learn themselves, and not, like the Persian and Median kings, enjoy the pleasure and instruction which is derived [35] from hearing others? (for surely persons who have made music the business and profession of their lives will be better performers than those who practise only long enough to learn). If they must learn music, on the same

principle they should learn cookery, which is absurd. And even granting that music may form the character, [40] the objection still holds: why should we learn ourselves? Why cannot we attain true pleasure and form a correct judgement from hearing others, as the Lacedaemonians [1339<sup>b</sup>1] do?—for they, without learning music, nevertheless can correctly judge, as they say, of good and bad melodies. Or again, if music should be used to promote cheerfulness and refined intellectual enjoyment, the objection still remains—why [5] should we learn ourselves instead of enjoying the performances of others? We may illustrate what we are saying by our conception of the gods; for in the poets Zeus does not himself sing or play on the lyre. Indeed we call professional performers artisans; no freeman would play or sing unless he were intoxicated or in jest. But these matters may be left for the present. [10]

The first question is whether music is or is not to be a part of education. Of the three things mentioned in our discussion, which does it produce—education or amusement or intellectual enjoyment?—for it may be reckoned under all three, and seems to share in the nature of all of them. Amusement is for the sake of relaxation, [15] and relaxation is of necessity sweet, for it is the remedy of pain caused by toil; and intellectual enjoyment is universally acknowledged to contain an element not only of the noble but of the pleasant, for happiness is made up of both. All men agree that music is one of the pleasantest things, whether with or without song; as Musaeus [20] says,

Song is to mortals of all things the sweetest.

Hence and with good reason it is introduced into social gatherings and entertainments, because it makes the hearts of men glad: so that on this ground alone we may assume that the young ought to be trained in it. For innocent pleasures are not only [25] in harmony with the end of life, but they also provide relaxation. And whereas men rarely attain the end, but often rest by the way and amuse themselves, not only with a view to a further end, but also for the pleasure's sake, it may be well at times to let [30] them find a refreshment in music. It sometimes happens that men make amusement the end, for the end probably contains some element of pleasure, though not any ordinary pleasure; but they mistake the lower for the higher, and in seeking for the one find the other, since every pleasure has a likeness to the end of action. For the [35] end is not desirable for the sake of any future good, nor do the pleasures which we have described exist for the sake of any future good but of the past, that

is to say, they are the alleviation of past toils and pains. And we may infer this to be the reason why men seek happiness from these pleasures. But music is pursued, not only [40] as an alleviation of past toil, but also as providing recreation. And who can say whether, having this use, it may not also have a nobler one? In addition to this [1340<sup>a</sup>1] common pleasure, felt and shared in by all (for the pleasure given by music is natural, and therefore adapted to all ages and characters), may it not have also [5] some influence over the character and the soul? It must have such an influence if characters are affected by it. And that they are so affected is proved in many ways, and not least by the power which the songs of Olympus exercise; for beyond [10] question they inspire enthusiasm, and enthusiasm is an emotion of the character of the soul. Besides, when men hear imitations, even apart from the rhythms and tunes themselves, their feelings move in sympathy. Since then music is a pleasure, and [15] excellence consists in rejoicing and loving and hating rightly, there is clearly nothing which we are so much concerned to acquire and to cultivate as the power of forming right judgements, and of taking delight in good dispositions and noble actions. Rhythm and melody supply imitations of anger and gentleness, and also of [20] courage and temperance, and of all the qualities contrary to these, and of the other qualities of character, which hardly fall short of the actual affections, as we know from our own experience, for in listening to such strains our souls undergo a change. The habit of feeling pleasure or pain at mere representations is not far removed [25] from the same feeling about realities; for example, if any one delights in the sight of a statue for its beauty only, it necessarily follows that the sight of the original will be pleasant to him. The objects of no other sense, such as taste or touch, have any [30] resemblance to moral qualities; in visible objects there is only a little, for there are figures which are of a moral character, but only to a slight extent, and all do not participate in the feeling about them. Again, figures and colours are not imitations, but signs, of character, indications which the body gives of states of feeling. The [35] connexion of them with morals is slight, but in so far as there is any, young men should be taught to look, not at the works of Pauson, but at those of Polygnotus, or any other painter or sculptor who expresses character. On the other hand, even in [40] mere melodies there is an imitation of character, for the musical modes differ essentially from one another, and those who hear them are differently affected by [1340<sup>b</sup>1] each. Some of them make men sad and grave, like the so-called Mixolydian, others enfeeble the mind, like the relaxed modes, another, again, produces a

moderate and [5] settled temper, which appears to be the peculiar effect of the Dorian; the Phrygian inspires enthusiasm. The whole subject has been well treated by philosophical writers on this branch of education, and they confirm their arguments by facts. The same principles apply to rhythms; some have a character of rest, others of motion, [10] and of these latter again, some have a more vulgar, others a nobler movement. Enough has been said to show that music has a power of forming the character, and should therefore be introduced into the education of the young. The study is suited [15] to the stage of youth, for young persons will not, if they can help, endure anything which is not sweetened by pleasure, and music has a natural sweetness. There seems to be in us a sort of affinity to musical modes and rhythms, which makes some philosophers say that the soul is a harmony, others, that it possesses harmony.

[20] **6** · And now we have to determine the question which has been already raised, whether children should be themselves taught to sing and play or not. Clearly there is a considerable difference made in the character by the actual practice of the art. It is difficult, if not impossible, for those who do not perform to [25] be good judges of the performance of others. Besides, children should have something to do, and the rattle of Archytas, which people give to their children in order to amuse them and prevent them from breaking anything in the house, was a capital invention, for a young thing cannot be quiet. The rattle is a toy suited to the infant mind, and education is a rattle or toy for children of a larger growth. We [30] conclude then that they should be taught music in such a way as to become not only critics but performers.

The question what is or is not suitable for different ages may be easily answered; nor is there any difficulty in meeting the objection of those who say that the study of music is mechanical. We reply in the first place, that they who are to be [35] judges must also be performers, and that they should begin to practise early, although when they are older they may be spared the execution; they must have learned to appreciate what is good and to delight in it, thanks to the knowledge which they acquired in their youth. As to the vulgarizing effect which music is [40] supposed to exercise, this is a question which we shall have no difficulty in determining when we have considered to what extent freemen who are being trained to political excellence should pursue the art, what melodies and what [1341<sup>a</sup>1] rhythms they should be allowed to use, and what



instruments should be employed in teaching them to play; for even the instrument makes a difference. The answer to the objection turns upon these distinctions; for it is quite possible that certain methods of teaching and learning music do really have a degrading effect. It is [5] evident then that the learning of music ought not to impede the business of riper years, or to degrade the body or render it unfit for civil or military training, whether for bodily exercises at the time or for later studies.

The right measure will be attained if students of music stop short of the arts [10] which are practised in professional contests, and do not seek to acquire those fantastic marvels of execution which are now the fashion in such contests, and from these have passed into education. Let the young practise even such music as we have prescribed, only until they are able to feel delight in noble melodies and rhythms, and not merely in that common part of music in which every slave or child and even [15] some animals find pleasure.

From these principles we may also infer what instruments should be used. The flute, or any other instrument which requires great skill, as for example the harp, ought not to be admitted into education, but only such as will make men intelligent students of music or of the other parts of education. Besides, the flute is not an [20] instrument which is expressive of character; it is too exciting. The proper time for using it is when the performance aims not at instruction, but at the relief of the passions. And there is a further objection; the impediment which the flute presents to the use of the voice detracts from its educational value. The ancients therefore [25] were right in forbidding the flute to youths and freemen, although they had once allowed it. For when their wealth gave them a greater inclination to leisure, and they had loftier notions of excellence, being also elated with their success, both before and after the Persian War, with more zeal than discernment they pursued [30] every kind of knowledge, and so they introduced the flute into education. In Lacedaemon there was a choragus who led the chorus with a flute, and at Athens the instrument became so popular that most freemen could play upon it. The [35] popularity is shown by the tablet which Thrasippus dedicated when he furnished the chorus to Ecphantides. Later experience enabled men to judge what was or was not really conducive to excellence, and they rejected both the flute and several other old-fashioned instruments, such as the Lydian harp, the many-stringed lyre, the [1341b1] ‘heptagon’, ‘triangle’, ‘sambuca’, and the like—which are intended only to give pleasure to the hearer, and require extraordinary skill of hand. There is a meaning also in the myth of the ancients, which

tells how Athene invented the flute and then threw it away. It was not a bad idea of theirs that the Goddess disliked the [5] instrument because it made the face ugly; but with still more reason may we say that she rejected it because the acquirement of flute-playing contributes nothing to the mind, since to Athene we ascribe both knowledge and art.

Thus then we reject the professional instruments and also the professional [10] mode of education in music (and by professional we mean that which is adopted in contests), for in this the performer practises the art, not for the sake of his own improvement, but in order to give pleasure, and that of a vulgar sort, to his hearers. For this reason the execution of such music is not the part of a freeman but of a paid [15] performer, and the result is that the performers are vulgarized, for the end at which they aim is bad. The vulgarity of the spectator tends to lower the character of the music and therefore of the performers; they look to him—he makes them what they are, and fashions even their bodies by the movements which he expects them to exhibit.

[20] **7** · We have also to consider rhythms and modes, and their use in education. Shall we use them all or make a distinction? and shall the same distinction be made for those who practise music with a view to education, or shall it be some other? Now we see that music is produced by melody and rhythm, and we ought to know [25] what influence these have respectively on education, and whether we should prefer excellence in melody or excellence in rhythm. But as the subject has been very well treated by many musicians of the present day, and also by philosophers who have had considerable experience of musical education, to these we would refer the more [30] exact student of the subject; we shall only speak of it now after the manner of the legislator, stating the general principles.

We accept the division of melodies proposed by certain philosophers into melodies of character, melodies of action, and passionate or inspiring melodies, [35] each having, as they say, a mode corresponding to it. But we maintain further that music should be studied, not for the sake of one, but of many benefits, that is to say, with a view to education, or purgation (the word 'purgation' we use at present without explanation, but when hereafter we speak of poetry, we will treat the subject with more precision); music may also serve for intellectual enjoyment, for [1342<sup>a</sup>1] relaxation and for recreation after exertion. It is clear, therefore, that all the modes must be employed by us, but not all of them in the

same manner. In education the modes most expressive of character are to be preferred, but in listening to the performances of others we may admit the modes of action and passion also. For [5] feelings such as pity and fear, or, again, enthusiasm, exist very strongly in some souls, and have more or less influence over all. Some persons fall into a religious frenzy, and we see them restored as a result of the sacred melodies—when they have used the melodies that excite the soul to mystic frenzy—as though they had found [10] healing and purgation. Those who are influenced by pity or fear, and every emotional nature, must have a like experience, and others in so far as each is susceptible to such emotions, and all are in a manner purged and their souls lightened and delighted. The melodies which purge the passions likewise give an [15] innocent pleasure to mankind. Such are the modes and the melodies in which those who perform music at the theatre should be invited to compete. But since the spectators are of two kinds—the one free and educated, and the other a vulgar crowd composed of artisans, labourers, and the like—there ought to be contests and [20] exhibitions instituted for the relaxation of the second class also. And the music will correspond to their minds; for as their minds are perverted from the natural state, so there are perverted modes and highly strung and unnaturally coloured melodies. A man receives pleasure from what is natural to him, and therefore professional [25] musicians may be allowed to practise this lower sort of music before an audience of a lower type. But, for the purposes of education, as I have already said, those modes and melodies should be employed which are expressive of character, such as the Dorian, as we said before; though we may include any others which are approved by [30] philosophers who have had a musical education. The Socrates of the *Republic* is wrong in retaining only the Phrygian mode along with the Dorian, and the more so because he rejects the flute; for the Phrygian is to the modes what the flute is to [1342<sup>b</sup>1] musical instruments—both of them are exciting and emotional. Poetry proves this, for Bacchic frenzy and all similar emotions are most suitably expressed by the flute, [5] and are better set to the Phrygian than to any other mode. The dithyramb, for example, is acknowledged to be Phrygian, a fact of which the connoisseurs of music offer many proofs, saying, among other things, that Philoxenus, having attempted to compose his *Mysians* as a dithyramb in the Dorian mode, found it impossible, [10] and fell back by the very nature of things into the more appropriate Phrygian. All men agree that the Dorian music is the gravest and manliest. And whereas we say that the extremes should be avoided and the mean followed, and whereas the Dorian [15] is a

mean between the other modes, it is evident that our youth should be taught the Dorian music.

Two principles have to be kept in view, what is possible, and what is becoming: at these every man ought to aim. But even these are relative to age; the old, who [20] have lost their powers, cannot very well sing the high-strung modes, and nature herself seems to suggest that their songs should be of the more relaxed kind. That is why the musicians too blame Socrates, and with justice, for rejecting the relaxed modes in education under the idea that they are intoxicating, not in the ordinary [25] sense of intoxication (for wine rather tends to excite men), but because they have no strength in them. And so, with a view also to the time of life when men begin to grow old, they ought to practise the gentler modes and melodies as well as the others, and, [30] further, any mode, such as the Lydian above all others appears to be, which is suited to children of tender age, and possesses the elements both of order and of education. Thus it is clear that education should be based upon three principles—the mean, the possible, the becoming, these three.

**\*\*TEXT:** A. Dreizehnter, Munich, 1970

<sup>1</sup>Reading λόγου.

<sup>2</sup>Reading τὸ . . . εὖνοιαν δοκεῖν.

<sup>3</sup>Retaining ζῶα τῶν ἀνθρώπων.

<sup>4</sup>Reading αὖ for οὖ.

<sup>1</sup>The text is uncertain.

<sup>2</sup>Reading οἰκίαις

<sup>1</sup>*Iliad* IX 648.

<sup>2</sup>The text of this sentence is corrupt.

<sup>3</sup>Omitting συμβάλλοιτο.

<sup>4</sup>*Iliad* II 391–393.

<sup>1</sup>*Iliad* II 204.

<sup>2</sup>Reading ταύτην for τήν.

<sup>3</sup>Omitting ἔξωθεν.

<sup>4</sup>Excised by Dreizehnter.

<sup>5</sup>Excised by Dreizehnter. The text is uncertain throughout this paragraph.

<sup>1</sup>Dreizehnter marks a lacuna.

<sup>1</sup>Excised by Dreizehnter.

<sup>1</sup>Text uncertain.

<sup>2</sup>Dreizehnter marks a lacuna.

# ECONOMICS\*\*

E.S. Forster

*(Book III by G. C. Armstrong)*

## BOOK I

[1343<sup>a</sup>1] **1** · The sciences of politics and economics differ not only as widely as a household and a city (the subject-matter with which they severally deal), but also in the fact that the science of politics involves a number of rulers, whereas the sphere of economics is a monarchy.

[5] Now certain of the arts fall into sub-divisions, and it does not pertain to the same art to manufacture and to use the article manufactured, for instance, a lyre or pipes; but the function of political science is both to constitute a city in the beginning and also when it has come into being to make a right use of it. It is clear, therefore, that it must be the function of economic science too both to found a household and also to make use of it.

[10] Now a city is an aggregate made up of households and land and property, self-sufficient with regard to a good life. This is clear from the fact that, if men cannot attain this end, the community is dissolved. Further, it is for this end that they associate together; and that for the sake of which any particular thing exists and has come into being is its substance. It is evident, therefore, that economics is [15] prior in origin to politics; for its function is prior, since a household is part of a city. We must therefore examine economics and see what its function is.

**2** · The parts of a household are man and property. But since the nature of any given thing is most quickly seen by taking its smallest parts, this would apply [20] also to a household. So, according to Hesiod, it would be necessary that there should be

for the first point concerns subsistence, the second free men. We should have, therefore, to organize properly the association of husband and wife; and this involves providing what sort of a woman she ought to be.

In regard to property the first care is that which comes naturally. Now in the [25] course of nature the art of agriculture is prior, and next come those arts which extract the products of the earth, mining and the like. Agriculture ranks first because of its justice; for it does not take anything away from men, either with their consent, as do retail trading and the mercenary arts, or against their will, as do the warlike arts. Further, agriculture is natural; for by nature all derive their [1343<sup>b</sup>1] sustenance from their mother, and so men derive it from the earth. In addition to this it also conduces greatly to bravery; for it does not make men's bodies unserviceable, as do the illiberal arts, but it renders them able to lead an open-air life and work hard; furthermore it makes them adventurous against the foe, for [5] husbandmen are the only citizens whose property lies outside the fortifications.

3 · As regards the human part of the household, the first care is concerning a wife; for a common life is above all things natural to the female and to the male. For we have elsewhere laid down the principle that nature aims at producing many such forms of association, just as also it produces the various kinds of animals. But it is [10] impossible for the female to accomplish this without the male or the male without the female, so that their common life has necessarily arisen. Now in the other animals this intercourse is not based on reason, but depends on the amount of natural instinct which they possess and is entirely for the purpose of procreation. [15] But in the civilized and more intelligent animals the bond of unity is more complex (for in them we see more mutual help and goodwill and co-operation), above all in the case of man, because the female and the male co-operate to ensure not merely existence but a good life. And the production of children is not only a way of serving [20] nature but also of securing advantage; for the trouble which parents bestow upon their helpless children when they are themselves vigorous is repaid to them in old age when they are helpless by their children, who are then in their full vigour. At the same time also nature thus periodically provides for the perpetuation of mankind as a species, since she cannot do so individually. Thus the nature both of the man and [25] of the woman has been preordained by the will of heaven

to live a common life. For they are distinguished in that the powers which they possess are not applicable to purposes in all cases identical, but in some respects their functions are opposed to one another though they all tend to the same end. For nature has made the one sex stronger, the other weaker, that the latter through fear may be the more cautious, [1344<sup>a</sup>1] while the former by its courage is better able to ward off attacks; and that the one may acquire possessions outside the house, the other preserve those within. In the performance of work, she made one sex able to lead a sedentary life and not strong enough to endure exposure, the other less adapted for quiet pursuits but well [5] constituted for outdoor activities; and in relation to offspring she has made both share in the procreation of children, but each render its peculiar service towards them, the woman by nurturing, the man by educating them.

4 · First, then, he must not do her any wrong; for thus a man is less likely himself to be wronged. This is inculcated by the general law, as the Pythagoreans [10] say, that one least of all should injure a wife as being ‘a suppliant and taken from her hearth’. Now wrong inflicted by a husband is the formation of connexions outside his own house. As regards association, she ought not to need him when he is present or be incapacitated in his absence, but should be accustomed to be [15] competent whether he is present or not. The saying of Hesiod is a good one:

A man should marry a maiden, that habits discreet he may teach her.<sup>2</sup>

For dissimilarity of habits tends more than anything to destroy affection. As regards adornment, husband and wife ought not to approach one another with false [20] affectation in their person any more than in their manners; for if the society of husband and wife requires such embellishment, it is no better than play-acting on the tragic stage.

5 · Of possessions, that which is the best and the worthiest subject of economics comes first and is most essential—I mean, man. It is necessary therefore [25] first to provide oneself with good slaves. Now slaves are of two kinds, the overseer and the worker. And since we see that methods of education produce a certain character in the young, it is necessary when one has procured slaves to bring up carefully those to whom the higher duties are to be entrusted. The intercourse of a master with his slaves



should be such as to allow them to be neither insolent nor [30] uncontrolled. To the higher class of slaves he ought to give some share of honour, and to the workers abundance of nourishment. And since the drinking of wine makes even freemen insolent, and many nations even of freemen abstain therefrom (the Carthaginians, for instance, when they are on military service), it is clear that wine ought never to be given to slaves, or at any rate very seldom. Three things make up the life of a slave, work, punishment, and food. To give them food but no [1344<sup>b</sup>1] punishment and no work makes them insolent; and that they should have work and punishment but no food is tyrannical and destroys their efficiency. It remains therefore to give them work and sufficient food; for it is impossible to rule without offering rewards, and a slave's reward is his food. And just as all other men become [5] worse when they get no advantage by being better and there are no rewards for virtue and vice, so also is it with servants. Therefore we must take careful notice and bestow or withhold everything, whether food or clothing or leisure or punishments, according to merit, in word and deed following the practice adopted by physicians in [10] the matter of medicine, remembering at the same time that food is not medicine because it must be given continually.

The slave who is best suited for his work is the kind that is neither too cowardly nor too courageous. Slaves who have either of these characteristics are injurious to their owners; those who are too cowardly lack endurance, while the high-spirited are [15] not easy to control. All ought to have a definite end in view; for it is just and beneficial to offer slaves their freedom as a prize, for they are willing to work when a prize is set before them and a limit of time is defined. One ought to bind slaves to one's service by letting them have children, and not to have many persons of the same race in a household, any more than in a state. One ought to provide sacrifices and pleasures more for the sake of slaves than for freemen; for in the case of the [20] former there are present more of the reasons why such things have been instituted.

6 · The householder has four roles in relation to wealth. He ought to be able to acquire it, and to guard it; otherwise there is no advantage in acquiring it, but it is a case of drawing water with a sieve, or the proverbial jar with a hole in it. Further, [25] he ought to be able to order his possessions aright and make a proper use of them; for it is for these purposes that we require wealth. The various kinds of property ought to

be distinguished, and those which are productive ought to be more numerous than the unproductive, and the sources of income ought to be so distributed that they may not run a risk with all their possessions at the same time. For the preservation of wealth it is best to follow both the Persian and the Laconian [30] methods. The Attic system of economy is also useful; for they sell their produce and buy what they want, and thus there is not the need of a storehouse in the smaller establishments. The Persian system was that everything should be organized and that the master should superintend everything personally, as Dio said of Dionysius; [35] for no one looks after the property of others as well as he looks after his own, so that, as far as possible, a man ought to attend to everything himself. The sayings of the [1345 a1] Persian and the Libyan may not come amiss; the former of whom, when asked what was the best thing to fatten a horse, replied, 'His master's eye' while the Libyan, when asked what was the best manure, answered, 'The master's foot-prints'. Some [5] things should be attended to by the master others by his wife, according to the sphere allotted to each in the economy of the household. Inspections need only be made occasionally in small establishments, but should be frequent where overseers are employed. For good imitation is impossible unless a good example is set, [10] especially when trust is delegated to others; for unless the master is careful, it is impossible for his overseers to be careful. And since it is good for the formation of character and useful in the interests of economy, masters ought to rise earlier than their slaves and retire to rest later, and a house should never be left unguarded any more than a city, and when anything needs doing it ought not to be left undone, [15] whether it be day or night. There are occasions when a master should rise while it is still night; for this helps to make a man healthy and wealthy and wise. On small estates the Attic system of disposing of the produce is a useful one; but on large estates, where a distinction is made between yearly and monthly expenditure and [20] likewise between the daily and the occasional use of household appliances, such matters must be entrusted to overseers. Furthermore, a periodical inspection should be made, in order to ascertain what is still existing and what is lacking.

The house must be arranged both with a view to one's possessions and for the [25] health and well-being of its inhabitants. By possessions I mean the consideration of what is suitable for produce and clothing, and in the case of produce what is suitable for dry and what for moist produce, and amongst other possessions what is suitable for property whether animate or inanimate, for slaves and freemen, women and [30]

men, strangers and citizens. With a view to well-being and health, the house ought to be airy in summer and sunny in winter. This would be best secured if it faces north and is not as wide as it is long. In large establishments a man who is no use for other purposes seems to be usefully employed as a doorkeeper to safeguard what is [1345<sup>b</sup>1] brought into and out of the house. For the ready use of household appliances the Laconian method is a good one; for everything ought to have its own proper place and so be ready for use and not require to be searched for.

## BOOK II

1 · He who intends to practise economy aright ought to be fully acquainted with the places in which his labour lies and to be naturally endowed with good parts and by choice industrious and upright; for if he is lacking in any of these respects, he [10] will make many mistakes in the business which he takes in hand.

Now there are four kinds of economy, that of the king, that of the provincial governor, that of the city, and that of the individual. This is a broad method of division; and we shall find that the other forms of economy fall within it.

[15] Of these that of the king is the most important and the simplest, . . . ,<sup>3</sup> that of the city is the most varied and the easiest, that of the individual the least important and the most varied. They must necessarily have most of their characteristics in common; but it is the points which are peculiar to each kind that we must consider. Let us therefore examine royal economy first. It is universal in its scope, but has [20] four special departments—the coinage, exports, imports, and expenditure. To take each of these separately: in regard to the coinage, I mean the question as to what coin should be struck and when; in the matter of exports and imports, what [25] commodities it will be advantageous to receive from the satraps in tax and dispose of and when; in regard to expenditure, what expenses ought to be curtailed and when, and whether one should pay what is expended in coin or in commodities which have an equivalent value.

Let us next take satrapic economy. Here we find six kinds of revenue —[from [30] land, from the peculiar products of the district, from merchandise, from taxes, from cattle, and from all other sources].<sup>4</sup> Of these the first and most important is that which comes from land (which some call tax on land-produce, others tithe); next in importance is the revenue from peculiar products, from gold, or silver, or copper, or anything else which is found in a particular locality; thirdly comes that derived from [1346<sup>a</sup>1] merchandise; fourthly, the revenue from the cultivation of the soil and from market-dues; fifthly, that which comes from cattle, which is called tax on animal produce or tithe; and sixthly, that which is derived from men, which is called the poll-tax or tax on artisans.

Thirdly, let us examine the economy of the city. Here the most important [5] source of revenue is from the peculiar products of the country, next comes that derived from merchandise and customs, and lastly that which comes from the ordinary taxes.

Fourthly and lastly, let us take individual economy. Here we find wide divergences, because economy is not necessarily always practised with one aim in view. It is the least important kind of economy, because the incomings and expenses [10] are small. Here the main source of revenue is the land, next other kinds of regular activity, and thirdly investments of money.

Further, there is a consideration which is common to all branches of economy and which calls for the most careful attention, especially in individual economy, [15] namely, that the expenditure must not exceed the income.

Now that we have mentioned the divisions of the subject, we must next consider whether the satrapy or city with which we are dealing can produce all, or the most important revenues which we have just distinguished; if it can, it should [20] use them. Next we must consider which sources of revenue do not exist at all but can be introduced, or are at present small but can be augmented; and which of the expenses at present incurred, and to what amount, can be dispensed with without doing any harm to the whole. [25]

We have now mentioned the various kinds of economy and their constituent parts. We have further made a collection of all the methods that we conceived to be worth mentioning, which men of former days have employed or cunningly devised in order to provide themselves with money. For we conceived that this information [30] also might be useful; for a man will be able to apply some of these instances to such business as he himself takes in hand.

2 · Cypselus, the Corinthian, having vowed to Zeus that, if he made himself master of the city, he would dedicate to him all the property of the Corinthians, ordered them to draw up a list of their possessions. When they had done so, he took a [1346<sup>b</sup>1] tenth part from each citizen and told them to trade with the remainder. As each year came round, he did the same thing again, with the result that in ten years he had all that he had consecrated to the god, while the Corinthians had acquired other [5] property.

Lygdamis, the Naxian, having driven certain men into exile, when no

one was willing to buy their possessions except at a low price, sold them to the exiles themselves. And offerings belonging to them which were lying half finished in [10] certain workshops he sold to the exiles and any one else who wished to buy them, allowing the name of the purchaser to be inscribed upon them.

The Byzantines being in need of money sold the sacred enclosures belonging to the state. Those which were fertile they sold on lease, and those which were unproductive in perpetuity. They treated in the same way the enclosures which belonged to associations and clans and all which were situated on private estates; for [15] the owners of the rest of the property bought them at a high price. To the associations they sold other lands, viz. the public lands round the gymnasium, or the [20] market-place, or the harbour; and they sold the places where markets were held at which various commodities were sold, and the rights over the sea-fisheries and the sale of salt, and . . .<sup>5</sup> of jugglers, and soothsayers, and druggists, and other such persons plied their trades; but they ordered them to pay over a third of their profits. And they sold the right of changing money to a single bank, and no one else might [25] either give money in exchange to anyone, or receive it in exchange from anyone, under penalty of forfeiting the money. And whereas there was a law amongst them that no one should have political rights who was not born of parents who were both citizens, being in want of money they passed a decree that a man who was sprung from a citizen on one side only should become a citizen if he paid down thirty minae. [30] And as they were suffering from want of food and lack of money, they made the ships from the Black Sea put in; but, as time went on, the merchants protested and so they paid them interest at ten per cent, and ordered those who purchased anything to pay the ten per cent, in addition to the price. And whereas certain [1347<sup>a</sup>1] resident aliens had lent money on security of property, because these had not the right to hold property, they passed a decree that any one who wished could obtain a title to the property by paying a third of the loan to the state.

Hippias, the Athenian, put up for sale the parts of the upper rooms which [5] projected into the public streets, and the steps and fences in front of the houses, and the doors which opened outwards. The owners of the property therefore bought them, and a large sum was thus collected. He also declared the coinage then current in Athens to be base, and fixing a price for it ordered it to be brought to him; but [10] when they met to consider the striking of a new type of coin, he gave them back the same money again. And if anyone was about to equip a trireme or a division of

cavalry or to provide a tragic chorus or incur expense on any other such state-service, he fixed a moderate fine and allowed him, if he liked, to pay this and be enrolled amongst those who had performed state services. He also ordered that a measure of barley, and another of wheat, and an obol should be brought to the [15] priestess of Athena-on-the-Acropolis on behalf of anyone who died, and that the same offering should be made by anyone to whom a child was born.

The Athenians who dwell in Potidaea, being in need of money to carry on war, ordered all the citizens to draw up a list of their property, each man enrolling not his [20] whole property collectively in his own deme, but each piece of property separately in the place where it was situated, in order that the poor might give in an assessment; anyone who possessed no property was to assess his own person at two minae. On the basis of this assessment they each contributed the amount enjoined.

[25] Sosipolis of Antissa, when the city was in want of money, since the citizens were wont to celebrate the feast of Dionysus with great splendour and every year went to great expense in providing, amongst other things, very costly victims, persuaded them, when the festival was near at hand, to vow to Dionysus that they [30] would give double offerings the next year and collect and sell the dedications for the current year. Thus a substantial sum was collected for the needs of the moment.

The people of Lampsacus, expecting a large fleet of triremes to come against them, ordered the dealers to sell a *medimnus* of barley-meal, of which the market price was four *drachmae*, at six *drachmae*, and a *chous* of oil, the price of which was three *drachmae*, at four *drachmae* and a half, and likewise wine and the other commodities. The individual seller thus received the old price, while the city gained [1347<sup>b</sup>1] the surplus and so was well provided with money.

The people of Heraclea, when they were sending forty ships against the tyrants on the Bosphorus, not being well provided with money, bought up from the merchants all their corn and oil and wine and the rest of their stores, fixing a date in [5] the future at which they were to make the payment. Now it suited the merchants better to sell their cargoes wholesale rather than retail. So the people of Heraclea, giving the soldiers two months' pay, took the provisions with them on board [10] merchant-vessels and put an official in charge of each of the ships. When they reached the enemies' territory, the soldiers bought up all the provisions from them. Thus money was collected before the generals had to pay the soldiers again, and so the same money was distributed time after time until they returned home. [15]

When the Samians begged for money for their return home, the Lacedaemonians passed a decree that they would fast for one day, themselves and their domestics and their beasts of burden, and would give to the Samians the amount that each of them usually expended.

The Chalcedonians, having a large number of foreign mercenaries in their city, [20] owed them pay which they could not give them. They therefore proclaimed that if any citizen or resident alien had any right of seizure against any state or individual and wished to exercise it, they should give in their names. When many did so, they seized the ships which sailed into the Black Sea on a plausible pretext, and [25] appointed a time at which they promised to give an account of their captures. When a large sum of money had been collected they dismissed the soldiers and submitted themselves to trial for their reprisals, and the state out of its revenues made restitution to those who had been unjustly plundered. [30]

When the people of Cyzicus were at variance and the popular party had gained the upper hand and the wealthy citizens had been imprisoned, they passed a decree, since they owed money to their soldiers, that they would not put their prisoners to death, but would exact money from them and send them into exile.

The Chians, who have a law that a public register of debts should be kept, [35] being in want of money decreed that debtors should pay their debts to the state and that the state should disburse the interest from its revenues to the creditors until [1348<sup>a</sup>1] they should be able to restore the principal.

Mausolus, tyrant of Caria, when the king of Persia sent and ordered him to pay his tribute, collected together the richest men in the country and told them that the [5] king was demanding the tribute, but he himself could not provide it. And certain men, who had been suborned to do so, immediately promised to contribute and named the amount that each would give. Upon this the wealthier men, partly through shame and partly from fear, promised and actually contributed far larger [10] sums.

On another occasion when he was in need of money, he called together the Mylassians and told them that this city of his, though it was their mother-city, was unfortified and that the king of Persia was marching against him. He therefore ordered the Mylassians each to contribute as much money as possible, saying that [15] by what they paid now they would save the rest of their possessions. When a large contribution had been made, he kept the money and told them that at the moment the god would not allow them to build the wall.



Conдалus, a governor under Mausolus, whenever during his passage through the country anyone brought him a sheep or a pig or a calf, used to make a record of [20] the donor and the date and order him to take it back home and keep it until he returned. When he thought that sufficient time had elapsed, he used to ask for the animal which was being kept for him, and reckoned up and demanded the produce-tax on it as well. And any trees which projected over or fell into the royal [25] roads he used to sell . . . the produce-taxes.<sup>6</sup> And if any soldier died, he demanded a drachma as a toll for the corpse passing the gates; and so he not only received money from this source, but also the officers could not deceive him as to the date of the soldier's death. Also, noticing that the Lycians were fond of wearing their hair long, he said that a dispatch had come from the king of Persia ordering him to send hair [30] to make false fringes and that he was therefore commanded by Mausolus to cut off their hair. He therefore said that, if they would pay him a fixed poll-tax, he would have hair sent from Greece. They gladly gave him what he asked, and a large sum of money was collected from a great number of them.

[35] Aristotle, the Rhodian, who was governor of Phocaea, was in want of money. Perceiving therefore that there were two parties amongst the Phocaeans, he made [1348<sup>b</sup>1] secret overtures to one party saying that the other faction was offering him money on condition that he would turn the scale in their favour, but that for his own part he would rather receive money from *them* and give the direction of affairs into their [5] hands. When they heard this, those who were present immediately gave him the money, supplying him with all he asked for. He then went to the other party and showed them what he had received from their opponents; whereupon they also professed their willingness to give him an equal sum. So he took the money from both parties and reconciled them one with another. Also, noticing that there was [10] much litigation among the citizens and that there were grievances of long standing among them owing to war, he established a court of law and proclaimed that unless they submitted their cases to judgement within a period which he appointed, there would be no further settlement of their former claims. Then getting control of a number of suits and of the cases which were subject to appeal with damages, and [15] receiving money from both parties by other means, he collected a large sum.

The Clazomenians, when they were suffering from famine and were in want of money, decreed that private individuals who had any olive oil should lend it to the state, which would pay them interest. Now olives are abundant in this country. [20] When the owners had lent them the oil,

they hired ships and sent it to the marts from which their corn came, giving the value of the oil as a pledge. And when they owed pay to their soldiers to the amount of twenty talents and could not provide it, they paid the generals four talents a year as interest. But finding that they did not reduce the principal and that they were continually spending money to no purpose, [25] they struck an iron coinage to represent a sum of twenty talents of silver, and then distributing it among the richest citizens in proportion to their wealth they received in exchange an equivalent sum in silver. Thus the individual citizens had money to disburse for their daily needs and the state was freed from debt. They then paid [30] them interest out of their revenues and continually divided it up and distributed it in proper proportions, and called in the iron coinage.

The Selymbrians were once in need of money: they had a law which forbade the export of corn; when a famine occurred and they had a supply of last season's [35] corn, they passed a decree that private persons should hand over their corn to the state at a fixed price, each reserving a year's supply; they then allowed anyone who [1349a1] wished to export his supply, fixing a price which they thought would give them a profit.

The people of Abydos, when their land was untilld owing to political dissensions and the resident aliens were paying them nothing because they still owed them money, passed a decree that anyone who was willing should lend money [5] to the farmers in order that they might till the soil, providing that they should enjoy the first-fruits of the crop and that the others should have what remained.

The Ephesians, being in need of money, made a law that their women should not wear gold ornaments, but should lend to the state what they already possessed; [10] and fixing the amount which was to be paid they allowed the name of any one who presented that sum to be inscribed as that of the dedicator on certain of the pillars in the temple.

Dionysius of Syracuse, wishing to collect money, called together an assembly and declared that Demeter had appeared to him and bade him bring the ornaments [15] of the women to her temple. He had therefore, he said, done so with the ornaments of the women of his own household; and he demanded that everyone else should do the same, lest vengeance from the goddess should fall upon them. Anyone who refused would, he said, be guilty of sacrilege. When all had brought what they [20] possessed through fear of the goddess and dread of Dionysius, after dedicating the ornaments to the goddess he then appropriated them, saying that they were lent to him by her. And when some time had

elapsed and the women began wearing ornaments again, he ordered that any women who wished to wear jewellery of gold should dedicate a fixed sum in the temple.

And when he was intending to build triremes, he knew that he would be in [25] want of money. He therefore called together an assembly and said that a certain city was to be betrayed to him and that he needed money for this purpose. He therefore asked the citizens to contribute two staters each; and they did so. He then let two or three days elapse, and pretending that he had failed in his attempt, after commending their generosity he gave every man his contribution back again. By [30] this action he won the hearts of the citizens. And so they again contributed, thinking that they would receive their money back again; but he took the money and kept it for building his ships.

And when he was in need of money he struck a coinage of tin, and calling an assembly together he spoke at great length in favour of the money which had been [35] coined; and they, even against their will, decreed that everyone should regard any of it that he accepted as silver and not as tin.

[1349<sup>b</sup>1] On another occasion, being in want of money, he asked the citizens to give him contributions; but they declared that they had nothing to give. Accordingly he brought out his own household goods and offered them for sale, as though compelled to do so by poverty. When the Syracusans bought them, he kept a record [5] of what each had bought, and when they had paid the price, he ordered each of them to bring back the articles which he had bought.

And when the citizens owing to the taxes could not keep cattle, he said that he had enough up to the present; those therefore who acquired cattle should now be free from a tax on them. But since many soon acquired a large number of cattle, [10] thinking that they could keep them without paying a tax on them, when he thought that a fitting moment had come he gave orders that they should assess their value and then imposed a tax. Accordingly the citizens, angry at having been deceived, slew their cattle and sold them. And when, to prevent this, he ordered them to kill only as many as were needed for daily use, they next devoted them for sacrifice to the gods. Dionysius then forbade them to sacrifice any female beast.

On another occasion when he was in need of money, he ordered all families of [15] orphans to enrol themselves; and when they<sup>7</sup> had done so, he enjoyed their property until each came of age.

And after he had captured Rhegium he called an assembly of the inhabitants together and informed them that he would be quite justified in enslaving them, but under the circumstances he would let them go free if he received the amount which [20] he had spent on the war and three *minae* a head from all of them. The Rhegians then brought to light the wealth which before had been hidden, and the poor borrowed from the richer citizens and from foreigners and provided the sum which [25] he demanded. When he had received it from them he nevertheless sold them all as slaves, and seized all the treasures which had before been hidden and were now brought to light.

Also having borrowed money from the citizens under promise of repayment, when they demanded it back he ordered them to bring him whatever money any of them possessed, threatening them with death as the penalty if they failed to do so. [30] When the money had been brought, he issued it again after stamping it afresh so that each *drachma* had the value of two *drachmae*, and paid back the original debt and the money which they brought him on this occasion.<sup>8</sup>

And when he sailed against Tyrrhenia with a hundred ships he took much gold and silver and a considerable quantity of other ornaments of all kinds from the [35] temple of Leucothea. And knowing that the sailors too were keeping many things for themselves, he made a proclamation that everyone should bring him the half of [1350a1] what he had and might retain the other half; and he threatened with death anyone who failed to deliver up the half. The sailors, supposing that if they gave up the half they would be allowed undisturbed possession of the rest, did so; but Dionysius, [5] when he had received it, ordered them to go back and bring him the other half. [5]

The Mendaeanes used the proceeds of their harbour customs and their other dues for the administration of their city, but did not exact the taxes on land and houses; but they kept a register of property-owners, and whenever they needed money, they paid as though they owed taxes. They thus profited during the time [10] which elapsed by having full use of the money without paying interest.

When they were at war with the Olynthians and needed money, seeing that they had slaves they decreed that a female and a male slave should be left to each citizen and the rest sold, so that private individuals might lend money to the state. [15]

Callistratus the Athenian, when the harbour-dues in Macedonia were usually sold at twenty talents, made them fetch double that price. For, noticing that the richer men always bought them because it was necessary

that the sureties provided for the twenty talents should be possessed of one talent, he proclaimed that anyone [20] who liked could purchase them and that sureties should be provided for only a third or any other proportion which each could guarantee.

Timotheus, the Athenian, when he was at war with the Olynthians, and in need of money, struck a bronze coinage and distributed it to the soldiers. When they protested, he told them that the merchants and retailers would all sell their goods on [25] the same terms as before. He then told the merchants, if they received any bronze money, to use it again to buy the commodities sent in for sale from the country and anything which was brought in as plunder, and said that, if they brought him any bronze money which they had left over, they should receive silver for it.

When he was making war in the neighbourhood of Corcyra and was in [30] difficulties, and the soldiers were demanding their pay and refusing to obey him and threatening to go over to the enemy, he called together an assembly and told them that no money could reach him owing to the stormy weather—though he had, he declared, such an abundance of supplies that he offered them as a free gift the three months' rations which they had already received. They, supposing that Timotheus [1350<sup>b</sup>1] would never have made such a valuable concession unless he really expected the money, kept silence about the pay; and he meanwhile achieved the objects which he had in view.

When he was besieging Samos he actually sold to the inhabitants the fruits and [5] the produce of their lands, and so had abundance of money to pay his soldiers. And when there was a shortage of provisions in the camp owing to the arrival of newcomers, he forbade the sale of corn ready ground, and of any smaller measure than a *medimnus*, and of any liquid in a smaller quantity than a *metreta*. Accordingly the commanders of divisions and companies bought up provisions [10] wholesale and distributed them to the soldiers, while the newcomers brought their own provisions with them and, when they departed, sold anything that they had left. The result was that the soldiers had an abundance of provisions. [15]

Datames, the Persian, having soldiers under his command, could supply their daily needs from the enemy's country, but having no money to give them, and being requested to pay them, when the time came at which it was due he devised the following plan. He called together an assembly and told them that he had no lack of [20] money, but that it was in a certain place which he named. He therefore moved his camp and

started to march thither. Then when he was near the place, he went in advance to it and took from the temples there all the embossed silver plate which they contained. He then loaded his mules so that the silver plate was visible and they looked as though they were carrying silver, and continued the march. The soldiers, [25] when they saw it, thought that the loads were all solid silver and were encouraged, thinking that they would receive their pay. But Datames told them that he must go to Amisus and have the silver minted. Now the journey to Amisus was one of many days and exposed to the weather. So all this time he made use of the army, merely [30] giving them their rations.

He kept in his personal service all the skilled artificers in the army and the retailers who carried on traffic in any commodity; and no one else was permitted to do any of these things.

Chabrias, the Athenian, advised Taus, king of Egypt, when he was starting on an expedition and was in need of money, to say to the priests that owing to the expense some of the temples and the majority of the priests must be dispensed with. [1351<sup>a</sup>1] When the priests heard this, each wishing to retain his own temple and to remain a priest himself, they offered him money. And when Taus had accepted money from all of them, Chabrias advised him to order them to expend a tenth part of the amount which they formerly spent on their temple and themselves, and to lend the [5] rest to him until the war against the king of Persia should come to an end. And he advised him to fix the necessary amount and demand a contribution from each household and likewise from each individual; and that, when corn was sold, the buyer and the seller should give an obol for each *artabe* over and above the price; and that he should demand the payment of a tenth part of the profits derived from [10] shipping and manufactures and any other form of industry. And he advised him, when he was leaving the country on an expedition, to order that any unminted silver or gold which anyone possessed should be brought to him: and when most people [15] brought it, he advised him to make use of it and to commend the lenders to the provincial governors so that they might repay them out of the taxes.

Iphicrates, the Athenian, when Cotys had collected an army, provided him with money in the following way. He advised him to order the men under his [20] command to sow land for him with three *medimni* of corn. The result of this was that a great quantity of corn was collected. Accordingly he brought it down to the markets and sold it, and thus gained an abundance of money.

Cotys, the Thracian, tried to borrow money from the Peirinthians so

that he [25] might pay his soldiers; but the Peirinthians refused to give him any. He therefore begged them at any rate to grant him some men from among their citizens to act as a garrison for certain strongholds, in order that he might make full use of the soldiers who were at present on duty there. To this request they promptly acceded, thinking that they would thus obtain possession of these strongholds. But Cotys [30] threw into prison those who were sent and ordered the Peirinthians to recover them by sending him the money which he wished to borrow from them.

Mentor, the Rhodian, having arrested Hermeias and seized his estates, allowed the overseers whom Hermeias had appointed to retain their positions. But when they all felt secure and took steps to recover anything which had been hidden [35] or deposited for safety elsewhere, he arrested them and deprived them of all they had.

Memnon, the Rhodian, after making himself master of Lampsacus, was in [1351<sup>b1</sup>] need of money. He therefore exacted a heavy tribute from the richest citizens, telling them that they could collect it from the rest of the citizens. But when the latter had contributed, he ordered them to lend him this sum as well, fixing a period [5] within which he would pay them back.

On another occasion when he was in need of money, he demanded contributions from them, saying that they should be repaid out of the revenues. They therefore contributed, thinking that they would soon receive their money back. But when the time was at hand for the payment of the revenues, he told them that he [10] needed these revenues as well, but would repay them later with interest.

He also excused himself from paying the rations and wages of those who were serving under him for six days in the year, declaring that on these days they had no watch to keep, no marching and no expenses, meaning the 'omitted' days.<sup>9</sup> As he [15] was already giving the soldiers their rations on the second day of the new month, he thus passed over three days in the first month and five by the following month, and so on till he reached a total of thirty days.

Charidemus of Orus, who held certain places in Aeolia, when Artabazus was [20] marching against him needed money to pay his soldiers. At first, then, the citizens gave him contributions, but afterwards they declared that they had nothing left to give. Charidemus then ordered the inhabitants of the place which he thought was richest to send away to another place any coin or other valuable treasure which they possessed, and he promised to give them an escort; at the same time it was clear that [25] he himself was also removing his valuables. When they had obeyed

him, he led them a little way outside the city and, after examining what they had, took all that he needed and sent them back again. He also made a proclamation in the cities over which he ruled that no one was to keep any arms in his house, the penalty for so [30] doing being a fine which he specified. He then took no further action and paid no attention to the matter. The citizens, thinking that he had not meant the proclamation to be taken seriously, continued to keep the arms which they happened to possess. But Charidemus suddenly instituted a house to house search and exacted the fine from those in whose houses he found any arms. [35]

A certain Philoxenus, a Macedonian who was satrap of Caria, being in need of money, said that he intended to celebrate the Dionysia, and he nominated the richest of the Carians to defray the cost of the choruses and gave directions as to [1352<sup>a</sup>1] what they had to supply. But seeing that they were annoyed, he sent to them secretly and asked them what they were willing to give to be released from serving. They declared their readiness to give considerably more than they thought it would cost them, in order to be freed from the trouble and the neglect of their private [5] affairs which it would entail. Philoxenus accepted what they offered and put others on the list, until he had received even more than he had wanted . . .<sup>10</sup>

Evaeses, the Syrian, being satrap of Egypt, discovering that the provincial [10] governors were on the point of revolting from him, summoned them to the palace and hanged them all, and ordered that their relatives should be told that they were in prison. Their relatives therefore severally began to negotiate on their behalf and tried to buy the release of the captives. Evaeses made an agreement in each case [15] and, after receiving the sums for which he had stipulated, restored them to their relatives—dead.

Cleomenes, an Alexandrian who was satrap of Egypt, when there was a severe famine everywhere else while Egypt was less seriously affected, forbade the export of corn, and when the provincial governors declared that they would not be able to [20] pay the tribute because corn could not be exported, he cancelled the prohibition, but put a heavy tax on the corn. The result was that, if he did not . . .<sup>11</sup> he received a large tax at the cost of a small exportation and the provincial governors lost their excuse.

As he was sailing through the district in which the crocodile is regarded as a deity, one of his slaves was carried off. He therefore summoned the priests and told [25] them that since he had been injured without provocation he intended to take vengeance on the crocodiles, and gave orders to hunt them. The priests, in order that their god might not



be held in contempt, collected all the gold that they possessed and presented it to him, with the result that he desisted.

[30] When king Alexander commanded him to found a city near the Pharos and to establish there the mart which was formerly held at Canopus, he sailed to Canopus and told the priests and the owners of property there that he had come to transfer them. The priests and inhabitants collected and gave him a sum of money to induce [35] him to leave their mart undisturbed. This he accepted and for the moment left them alone, but afterwards, when he had the material for building ready, he sailed to [1352b1] Canopus and demanded an excessive amount of money from them, which he said represented the difference to him between having the mart near the Pharos and at Canopus. And when they said that they would not be able to give him the money he made them move their city.

And when he had sent someone to make a purchase and discovered that his [5] messenger had got what he wanted cheaply but intended to charge him an excessive price, he told the friends of the purchaser that he had heard that he had made his purchases at an excessive price and therefore he would go there himself; at the same time with assumed wrath he railed against his stupidity. When they heard this they [10] told Cleomenes that he ought not to believe those who spoke against the messenger until he came himself and rendered his account. When the purchaser arrived they told him what Cleomenes had said; and he, wishing to make a good impression on them and on Cleomenes, submitted the prices at which he had actually bought the goods.

When corn was being sold in the country at ten *drachmae*, he summoned the [15] dealers and asked them at what price they would do business with him. They named a lower price than that at which they were selling to the merchants. However, he ordered them to hand over their corn at the same price as they were selling to everyone else; and fixing the price of corn at thirty-two *drachmae* he then sold it himself.

He also called the priests together and told them that the expenditure on the [20] temples in the country was excessive; consequently some of the temples and the majority of the priests must be abolished. The priests individually and collectively gave him the sacred treasures, thinking that he really intended to carry out his threat and because each wished that his own temple should be undisturbed and himself continue to be priest. [25]

When Alexander was in the region of Babylon, Antimenes the Rhodian *hêmiolios* raised money in the following way. An ancient law

existed in Babylonia that anything which was brought into the country should pay a duty of ten per cent., but no one ever enforced it. Antimenēs, waiting till all the satraps and soldiers were expected and no small number of ambassadors and craftsmen . . .<sup>12</sup> and persons [30] travelling on their own private affairs, and many gifts were being brought up, exacted the ten per cent. duty according to the existing law.

On another occasion, when providing the slaves who were to look after the camp, he commanded that any owner who wished should register the value which he [35] put upon them, and they were to pay eight *drachmae* a year; if the slave ran away the owner was to receive the price which he had registered. Many slaves being registered, he amassed a considerable sum of money. And whenever any slave ran [1353<sup>a</sup>1] away he ordered the satrap of the country<sup>13</sup> in which the camp was situated to recover the runaway or else to pay the price to the owner.

Ophēlas, the Olynthian, having appointed a superintendent over the province [5] of Athribis, when the provincial governors of that district came to him and expressed their willingness to pay of their own accord a much larger sum and begged him to dismiss the superintendent whom he had just appointed, asked them if they would be able to pay what they promised; when they answered in the affirmative he left the superintendent at his post and bade him exact the amount of [10] tribute which they themselves had assessed. Thus he did not think it right either to degrade the official whom he had appointed or to impose a heavier tribute upon them than they themselves had fixed, but at the same time he himself received a far larger amount of money.

Pythocles, the Athenian, recommended to the Athenians that the state should [15] take the lead from the mines at Laurium out of private hands at the market price of two *drachmae* and that they should then themselves fix the price at six *drachmae* and so sell it.

Chabrias, when crews had been enrolled for a hundred and twenty ships and Taus only needed sixty, ordered the crews of the sixty ships which remained behind [20] to supply those who sailed with two months' provisions, or else to sail themselves. They, wishing to attend to their own affairs, complied with his demand.

Antimenēs ordered the satraps to keep the storehouses along the royal roads [25] filled according to the custom of the country; but whenever an army or any other body of men unaccompanied by the king passed along, he used to send one of his own men and sell the contents of the storehouses.

[1353<sup>b</sup>1] Cleomenes, when the first day of the month was approaching and he had to give his soldiers their rations, purposely put back into harbour, and as the new month advanced he put out again and distributed the rations; he then left an [5] interval until the first day of the next month. The soldiers, therefore, because they had recently received their rations, kept quiet; and Cleomenes by passing over a month each year . . .<sup>14</sup>

Stabelbius, the Mysian, when he owed his soldiers pay, called the officers together<sup>15</sup> and told them that he had no need of private soldiers but only of officers, [10] and that, when he did need soldiers, he would give each officer a sum of money and send him out to collect mercenaries, and that he would rather give the officers the pay which ought to go to the soldiers. He therefore ordered them each to send away their own levies out of the country. The officers, thinking that it would be an [15] opportunity to make money, dismissed the soldiers in accordance with his commands. But after a short interval he collected the officers together and told them that just as a flute player was no use without a chorus, so too officers were useless without private soldiers; he therefore ordered them to leave the country.

[20] Dionysius, when he was making a round of the temples, whenever he saw a gold or silver table displayed, ordered that a libation should be poured out 'to good luck' and that the table should be carried off; and whenever he saw amongst the statues one which held out a wine cup, he would say, 'I accept your pledge', and order the statue to be carried away. And he used to strip the gold from the statues, [25] saying that he would give them others lighter and more fragrant; he then clad them with white garments and crowns of white poplar.

1 · A good wife should be the mistress of her home, having under her care all that is within it, according to the rules we have laid down. She should allow none to enter without her husband's knowledge, dreading above all things the gossip of gadding women, which tends to poison the soul. She alone should have knowledge of what happens within, whilst if any harm is wrought by those from without, her husband will bear the blame. She must exercise control of the money spent on such festivities as her husband has approved, keeping well within the limit set by law upon expenditure, dress, and ornament; and remembering that beauty depends not on costliness of raiment, nor does abundance of gold so conduce to the excellence of a woman as self-control in all that she does, and her inclination towards an honourable and well-ordered life. For such adornment as this both elevates the mind and is a far surer warrant for the payment, to the woman herself in her old age and to her children after her, of the due meed of praise.

This, then, is the province over which a woman should be minded to bear an orderly rule; for it seems not fitting that a man should know all that passes within the house. But in all other matters, let it be her aim to obey her husband; giving no heed to public affairs, nor desiring any part in arranging the marriages of her children. Rather, when the time shall come to give or receive in marriage sons or daughters, let her even then hearken to her husband in all respects, and agreeing with him obey his behest; considering that it is less unseemly for him to deal with a matter within the house than it is for her to pry into those outside its walls. It is fitting that a woman of well-ordered life should consider that her husband's uses are as laws appointed for her own life by divine will, along with the marriage state and the fortune she shares. If she endures them with patience and gentleness, she will rule her home with ease; otherwise, not so easily. Hence not only when her husband is in prosperity and good report does it beseem her to be in agreement with him, and to render him the service he wills, but also in times of adversity. If, through sickness or fault of judgement, his good fortune fails, then must she show her quality, encouraging him ever with words of cheer and yielding him obedience in all fitting ways; only let her do nothing base or unworthy of herself, or remember any wrong her husband may have done her through distress of mind. Let her refrain from all complaint, nor charge him with the wrong, but rather attribute everything of this kind to

sickness or ignorance or accidental errors. For the more sedulous her service herein, the fuller will be his gratitude when he is restored, and freed from his sickness; and if she has failed to obey him when he commanded aught that is amiss, the deeper will be his recognition when health returns. Hence, whilst careful to avoid obedience in such circumstances, in other respects she will serve him more assiduously than if she had been a bondwoman bought and taken home. For he has indeed bought her with a great price—with partnership in his life and in the procreation of children; than which things nought could be greater or more sacred. And besides all this, the wife who had only lived in company with a fortunate husband would not have had the like opportunity to show her true quality. For though there is no small merit in a right and noble use of prosperity, still the right endurance of adversity justly receives an honour greater by far. For only a great soul can live in the midst of trouble and wrong without itself committing any base act. And so, while praying that her husband may be spared adversity, if trouble should come it beseems the wife to consider that here a good woman wins her highest praise. Let her bethink herself how Alcestis would never have attained such renown nor Penelope have deserved all the high praises bestowed on her had not their husbands known adversity; whereas the troubles of Admetus and Ulysses have obtained for their wives a reputation that shall never die. For because in time of distress they proved themselves faithful and dutiful to their husbands, the gods have bestowed on them the honour they deserved. To find partners in prosperity is easy enough; but only the best women are ready to share in adversity. For all these reasons it is fitting that a woman should pay her husband an honour greater by far, nor feel shame on his account even when, as Orpheus says, Holy health of soul, and wealth, the child of a brave spirit, companion him no more.

2 · Such then is the pattern of the rules and ways of living which a good wife will observe. And the rules which a good husband will follow in treatment of his wife will be similar; seeing that she has entered his home as the partner of his life and his children; and that the offspring she leaves behind her will bear the names of their parents, her name as well as his. And what could be more sacred than this, or more desired by a man of sound mind, than to beget by a noble and honoured wife children who, as shepherds of their old age, shall be the most loyal and discreet guardians of their father and mother, and the preservers of the whole house? Rightly reared by father and mother, children will grow up

virtuous, as those who have treated them piously and righteously deserve that they should; but without such education they will be flawed. For unless parents have given their children an example of how to live, the children in their turn will be able to offer a fair and specious excuse. Such parents will risk being rejected by their offspring for their evil lives, and thus bringing destruction upon their own heads.

Hence his wife's training should be the object of a man's unstinting care; that so far as is possible their children may spring from the noblest of stock. For the tiller of the soil spares no pains to sow his seed in the most fertile and best cultivated land, looking thus to obtain the fairest fruits; and to save it from devastation he is ready, if such be his lot, to fall in conflict with his foes, a death which men crown with the highest of praise. Seeing, then, that such care is lavished on the body's food, surely every care should be taken on behalf of our own children's mother and nurse, in whom is implanted the seed from which there springs a living soul. For it is only by this means that each mortal, successively produced, participates in immortality; and that petitions and prayers continue to be offered to ancestral gods. So that he who thinks lightly of this would seem also to be slighting the gods. Thus it is on behalf of the gods, in whose presence he offered sacrifice, that he led his wife home, promising to honour her far above all others except his parents.

Now a virtuous wife is best honoured when she sees that her husband is faithful to her, and has no preference for another woman, but before all others loves and trusts her and holds her as his own. And so much the more will the woman seek to be what he accounts her, if she perceives that her husband's affection for her is faithful and righteous, and she too will be faithful and righteous towards him. Hence a man of sound mind ought not to forget what honours are proper to his parents or what fittingly belong to his wife and children; so that rendering to each and all their own, he may obey the law of men and of gods. For the deprivation we feel most of all is that of the special honour which is our due; nor will abundant gifts of what belongs to others be welcome to him who is dispossessed of his own. Now to a wife nothing is of more value, nothing more rightfully her own, than honoured and faithful partnership with her husband. Hence it befits not a man of sound mind to bestow his person promiscuously, or have random intercourse with women; for otherwise the base-born will share in the rights of his lawful children, and his wife will be robbed of her honour due, and shame be attached to his sons.

3 · To all these matters, therefore, a man should give heed. And it is fitting that he should approach his wife in an honourable way, full of self-restraint and awe; and in his conversation with her, should use only the words of a right-minded man, suggesting only such acts as are themselves lawful and honourable; treating her with much self-restraint and trust, and passing over any trivial or unintentional errors she has committed. And if through ignorance she has done wrong, he should advise her of it without threatening, in a courteous and modest manner. Indifference and harsh reproof he must alike avoid. Between a courtesan and her lover, such tempers are allowed their course; between a free woman and her lawful spouse there should be a reverent and modest mingling of love and fear. For of fear there are two kinds. The fear which virtuous and honourable sons feel towards their fathers, and loyal citizens towards rightminded rulers, has for its companions reverence and modesty; but the other kind, felt by slaves for masters and by subjects for despots who treat them with injustice and wrong, is associated with hostility and hatred.

Reflecting on all this, a husband should choose the better course and secure the agreement, loyalty, and devotion of his wife, so that whether he himself is present or not, there may be no difference in her attitude towards him, since she realizes that they are alike guardians of the common interests; and so when he is away she may feel that to her no man is kinder or more virtuous or more truly hers than her own husband. And she will make this manifest from the beginning by her unfailing regard for the common welfare, novice though she may be in such matters. And if the husband learns first to master himself, he will thereby become his wife's best guide in all the affairs of life, and will teach her to follow his example. For Homer pays no honour either to affection or to fear where modesty is absent. Everywhere he bids affection be coupled with self-control and shame; whilst the fear he commends is such as Helen owns when she thus addresses Priam: "Beloved sire of my lord, it is fitting that I fear thee and dread thee and revere";<sup>17</sup> meaning that her love for him is mingled with fear and modest shame. And again, Ulysses speaks to Nausicaa in this manner: "Thou, lady, dost fill me with wonder and with fear."<sup>18</sup> For Homer believes that this is the feeling of a husband and wife for one another, and that if they so feel, it will be well with them both. For no one ever loves or admires or fears in this shamefaced way one of baser character; but such are the feelings towards one another of nobler souls and those by nature good; or of the inferior toward those

they know to be their betters. Feeling thus toward Penelope, Ulysses remained faithful to her in his wanderings; whereas Agamemnon did wrong to his wife for the sake of Chryseis, declaring in open assembly that a base captive woman, and of alien race besides, was in no way inferior to Clytemnestra in womanly excellence. This was ill spoken of the mother of his children; nor was his connexion with the other a righteous one. How could it be, when he had but recently compelled her to be his concubine, and before he had any experience of her behaviour to him? Ulysses on the other hand, when the daughter of Atlas besought him to share her bed and board, and promised him immortality, could not bring himself even for the sake of immortality to betray the kindness and love and loyalty of his wife, deeming immortality purchased by unrighteousness to be the worst of all punishments. For it was only to save his comrades that he yielded his person to Circe; and in answer to her he even declared that in his eyes nothing could be more lovely than his native isle, rugged though it were; and prayed that he might die, if only he might look upon his mortal wife and son. So firmly did he keep troth with his wife; and received in return from her the like loyalty.

4 · Once again, in the words addressed by Ulysses to Nausicaa the poet makes clear the great honour in which he holds the virtuous companionship of man and wife in marriage. There he prays the gods to grant her a husband and a home; and between herself and her husband, precious unity of mind; provided that such unity be for righteous ends. For, says he, there is no greater blessing on earth than when husband and wife rule their home in harmony of mind and will. Moreover it is evident from this that the unity which the poet commends is no mutual subservience in each other's vices, but one that is rightfully allied with wisdom and understanding; for this is the meaning of the words "rule the house in harmony of mind." And he goes on to say that wherever such a love is found, it is a cause of sore distress to those who hate them and of delight to those that love them; while the truth of his words is most of all acknowledged by the happy pair. For when wife and husband are agreed about the best things in life, of necessity the friends of each will also be mutually agreed; and the strength which the pair gain will make them formidable to their enemies and helpful to their own. But when discord reigns between them, their friends too will disagree, while the pair themselves will realize most fully their weakness.

In all these precepts it is clear that the poet is teaching husband and



wife to dissuade one another from whatever is evil and dishonourable, while unselfishly furthering to the best of their power one another's honourable and righteous aims. In the first place they will strive to perform all duty towards their parents, the husband towards those of his wife no less than towards his own, and she in her turn towards his. Their next duties are towards their children, their friends, their estate, and their entire household which they will treat as a common possession; each vying with the other in the effort to contribute most to the common welfare, and to excel in virtue and righteousness; laying aside arrogance, and ruling with justice in a kindly and unassuming spirit. And so at length, when they reach old age, and are freed from the duty of providing for others and from preoccupation with the pleasures and desires of youth, they will be able to give answer also to their children, if question arises which of them has contributed more good things to the common household store; and will be well assured that whatsoever of evil has befallen them is due to fortune, and whatsoever of good, to their own virtue. One who comes victorious through such question wins from heaven, as Pindar says, his chiefest reward; for "hope, and a soul filled with fair thoughts are supreme in the manifold mind of mortals"; and next, from his children the good fortune of being sustained by them in his old age. And therefore it behoves us to preserve throughout our lives a righteous attitude towards all gods and mortal men, to each individually, and to all in common; and not least towards our own wives and children and parents.

**\*\*TEXT:** B. A. van Groningen and A. Wartelle, Budé, Paris, 1968

<sup>1</sup>*Works and Days*, 405.

<sup>2</sup>*Works and Days*, 699.

<sup>3</sup>van Groningen and Wartelle mark a lacuna here.

<sup>4</sup>Excised by van Groningen and Wartelle.

<sup>5</sup>van Groningen and Wartelle mark a lacuna.

<sup>6</sup>van Groningen and Wartelle mark a lacuna.

<sup>7</sup>Omitting ἄλλων.

<sup>8</sup>Reading πρότερον ἀπέδωκε καὶ ὁ νῦν ἀνήνεγκαν.

<sup>9</sup>I.e. the six days ‘omitted’ from the year, one in each of the six 29-day months.

<sup>10</sup>The text is corrupt here.

<sup>11</sup>van Groningen and Wartelle mark a lacuna.

<sup>12</sup>The text is corrupt here.

<sup>13</sup>Reading τῆς γῆς.

<sup>14</sup>The text is corrupt.

<sup>15</sup>Reading ὁ Μυσός, ὀφείλων στρατιώταις μισθόν, συγκαλέσας τοὺς ἡγέμονας.

<sup>16</sup>This book survives only in Latin translation; it is not included in Bekker’s edition, so that the customary Bekker-references are absent. The English translation is adapted from that of G. C. Armstrong.

<sup>17</sup>*Iliad* III 172.

<sup>18</sup>*Odyssey* VI 168.

# RHETORIC\*\*

*W. Rhys Roberts*

## BOOK I

[1354<sup>a</sup>1] 1 · Rhetoric is the counterpart of dialectic. Both alike are concerned with such things as come, more or less, within the general ken of all men and belong to no definite science. Accordingly all men make use, more or less, of both; for to a certain [5] extent all men attempt to discuss statements and to maintain them, to defend themselves and to attack others. Ordinary people do this either at random or through practice and from acquired habit. Both ways being possible, the subject can plainly be handled systematically, for it is possible to inquire the reason why some [10] speakers succeed through practice and others spontaneously; and everyone will at once agree that such an inquiry is the function of an art.

Now, the framers of the current treatises on rhetoric have constructed but a small portion of that art. The modes of persuasion are the only true constituents of the art: everything else is merely accessory. These writers, however, say nothing [15] about enthymemes, which are the substance of rhetorical persuasion, but deal mainly with non-essentials. The arousing of prejudice, pity, anger, and similar emotions has nothing to do with the essential facts, but is merely a personal appeal to the man who is judging the case. Consequently if the rules for trials which are [20] now laid down in some states—especially in well-governed states—were applied everywhere, such people would have nothing to say. All men, no doubt, *think* that the laws should prescribe such rules, but some, as in the court of Areopagus, give practical effect to their thoughts and forbid talk about non-essentials. This is sound law and custom. It is not right to pervert the judge by moving him to anger or envy [25] or pity—one might as well warp a carpenter's rule before using it. Again, a litigant has clearly nothing to do but to show that the alleged fact is so or is not so, that it

has or has not happened. As to whether a thing is important or unimportant, just or unjust, the judge must surely refuse to take his instructions from the litigants: he [30] must decide for himself all such points as the law-giver has not already defined for him.

Now, it is of great moment that well-drawn laws should themselves define all the points they possibly can and leave as few as may be to the decision of the judges; and this for several reasons. First, to find one man, or a few men, who are sensible [1354<sup>b</sup>1] persons and capable of legislating and administering justice is easier than to find a large number. Next, laws are made after long consideration, whereas decisions in the courts are given at short notice, which makes it hard for those who try the case to satisfy the claims of justice and expediency. The weightiest reason of all is that [5] the decision of the lawgiver is not particular but prospective and general, whereas members of the assembly and the jury find it *their* duty to decide on definite cases brought before them. They will often have allowed themselves to be so much influenced by feelings of friendship or hatred or self-interest that they lose any clear [10] vision of the truth and have their judgement obscured by considerations of personal pleasure or pain. In general, then, the judge should, we say, be allowed to decide as few things as possible. But questions as to whether something has happened or has not happened, will be or will not be, is or is not, must of necessity be left to the judge, [15] since the lawgiver cannot foresee them. If this is so, it is evident that anyone who lays down rules about other matters, such as what must be the contents of the 'introduction' or the 'narration' or any of the other divisions of a speech, is theorizing about non-essentials as if they belonged to the art. The only question with which these writers here deal is how to put the judge into a given frame of [20] mind. About the orator's proper modes of persuasion they have nothing to tell us; nothing, that is, about how to gain skill in enthymemes.

Hence it comes that, although the same systematic principles apply to political as to forensic oratory, and although the former is a nobler business, and fitter for a citizen, than that which concerns the relations of private individuals, these authors [25] say nothing about political oratory, but try, one and all, to write treatises on the way to plead in court. The reason for this is that in political oratory there is less inducement to talk about non-essentials. [Political oratory is less given to unscrupulous practices than forensic, but treats of wider issues.]<sup>1</sup> In a political debate the man who is forming a judgement is making a decision about his own vital interests. [30] There is no need, therefore, to prove

anything except that the facts are what the supporter of a measure maintains they are. In forensic oratory this is not enough; to conciliate the listener is what pays here. It is other people's affairs that are to be decided, so that the judges, intent on their own satisfaction and listening with partiality, surrender themselves to the disputants instead of judging between them. [1355<sup>a</sup>1] Hence in many places, as we have said already, irrelevant speaking is forbidden in the law-courts: in the public assembly those who have to form a judgement are themselves well able to guard against that.

It is clear, then, that the technical study of rhetoric is concerned with the modes of persuasion. Now persuasion is a sort of demonstration (since we are most [5] fully persuaded when we consider a thing to have been demonstrated); the orator's demonstration is an enthymeme, [and this is, in general, the most effective of the modes of persuasion];<sup>1</sup> the enthymeme is a sort of deduction (the consideration of deductions of all kinds, without distinction, is the business of dialectic, either of dialectic as a whole or of one of its branches): clearly, then, he who is best able to see [10] how and from what elements a deduction is produced will also be best skilled in the enthymeme, when he has further learnt what its subject-matter is and in what respects it differs from the deductions of logic. For the true and the approximately [15] true are apprehended by the same faculty; it may also be noted that men have a sufficient natural instinct for what is true, and usually do arrive at the truth. Hence the man who makes a good guess at truth is likely to make a good guess at what is reputable.

It has now been shown that the ordinary writers on rhetoric treat of [20] non-essentials; it has also been shown why they have inclined more towards the forensic branch of oratory.

Rhetoric is useful because things that are true and things that are just have a natural tendency to prevail over their opposites, so that if the decisions of judges are not what they ought to be, the defeat must be due to the speakers themselves, and they must be blamed accordingly. Moreover, before some audiences not even the [25] possession of the exactest knowledge will make it easy for what we say to produce conviction. For argument based on knowledge implies instruction, and there are people whom one cannot instruct. Here, then, we must use, as our modes of persuasion and argument, notions possessed by everybody, as we observed in the *Topics*<sup>2</sup> when dealing with the way to handle a popular audience. Further, we must [30] be able to employ persuasion, just as deduction can be employed, on opposite sides of a question, not in

order that we may in practice employ it in both ways (for we must not make people believe what is wrong), but in order that we may see clearly what the facts are, and that, if another man argues unfairly, we on our part may be able to confute him. No other of the arts draws opposite conclusions: dialectic and [35] rhetoric alone do this. Both these arts draw opposite conclusions impartially. Nevertheless, the underlying facts do not lend themselves equally well to the contrary views. No; things that are true and things that are better are, by their nature, practically always easier to prove and more persuasive. Again, it is absurd to [1355<sup>b</sup>1] hold that a man ought to be ashamed of being unable to defend himself with his limbs, but not of being unable to defend himself with rational speech, when the use of rational speech is more distinctive of a human being than the use of his limbs. And if it is objected that one who uses such power of speech unjustly might do great harm, *that* is a charge which may be made in common against all good things except [5] excellence, and above all against the things that are most useful, as strength, health, wealth, generalship. A man can confer the greatest of benefits by a right use of these, and inflict the greatest of injuries by using them wrongly.

It is clear, then, that rhetoric is not bound up with a single definite class of subjects, but is like dialectic; it is clear, also, that it is useful. It is clear, further, that [10] its function is not simply to succeed in persuading, but rather to discover the persuasive facts in each case. In this it resembles all other arts. For example, it is not the function of medicine simply to make a man quite healthy, but to put him as far as may be on the road to health; it is possible to give excellent treatment even to [15] those who can never enjoy sound health. Furthermore, it is plain that it is the function of one and the same art to discern the real and the apparent means of persuasion, just as it is the function of dialectic to discern the real and the apparent deduction. What makes a man a sophist is not his abilities but his choices. In rhetoric, however, the term 'rhetorician' may describe either the speaker's knowledge of the art, or his choices. In dialectic a man is a sophist because he makes a [20] certain kind of choice, a dialectician in respect not of his choices but of his abilities.

Let us now try to give some account of the systematic principles of rhetoric itself—of the right method and means of succeeding in the object we set before us. We must make as it were a fresh start, and before going further define what [25] rhetoric is.

2 · Rhetoric may be defined as the faculty of observing in any given case the available means of persuasion. This is not a function of any other art. Every other art can instruct or persuade about its own particular subject-matter; for instance, medicine about what is healthy and unhealthy, geometry about the properties of [30] magnitudes, arithmetic about numbers, and the same is true of the other arts and sciences. But rhetoric we look upon as the power of observing the means of persuasion on almost any subject presented to us; and that is why we say that, in its technical character, it is not concerned with any special or definite class of subjects. [35]

Of the modes of persuasion some are technical, others non-technical. By the latter I mean such things as are not supplied by the speaker but are there at the outset—witnesses, evidence given under torture, written contracts, and so on. By the former I mean such as we can ourselves construct by means of the principles of rhetoric. The one kind has merely to be used, the other has to be invented. [1356<sup>a</sup>1]

Of the modes of persuasion furnished by the spoken word there are three kinds. The first kind depends on the personal character of the speaker; the second on putting the audience into a certain frame of mind; the third on the proof, or apparent proof, provided by the words of the speech itself. Persuasion is achieved by the speaker's personal character when the speech is so spoken as to make us think [5] him credible. We believe good men more fully and more readily than others: this is true generally whatever the question is, and absolutely true where exact certainty is impossible and opinions are divided. This kind of persuasion, like the others, should be achieved by what the speaker says, not by what people think of his character [10] before he begins to speak. It is not true, as some writers assume in their treatises on rhetoric, that the personal goodness revealed by the speaker contributes nothing to his power of persuasion; on the contrary, his character may almost be called the most effective means of persuasion he possesses. Secondly, persuasion may come through the hearers, when the speech stirs their emotions. Our judgements when we are pleased and friendly are not the same as when we are pained and hostile. It is [15] towards producing these effects, as we maintain, that present-day writers on rhetoric direct the whole of their efforts. This subject will be treated in detail when we come to speak of the emotions. Thirdly, persuasion is effected through the speech itself when we have proved a truth or an apparent truth by means of the [20] persuasive arguments suitable to the case in question.

There are, then, these three means of effecting persuasion. The man who is to be in command of them must, it is clear, be able to reason logically, to understand human characters and excellences, and to understand the emotions—that is, to know what they are, their nature, their causes and the way in which they are [25] excited. It thus appears that rhetoric is an offshoot of dialectic and also of ethical studies. Ethical studies may fairly be called political; and for this reason rhetoric masquerades as political science, and the professors of it as political experts—sometimes from want of education, sometimes from ostentation, sometimes owing [30] to other human failings. As a matter of fact, it is a branch of dialectic and similar to it, as we said at the outset. Neither rhetoric nor dialectic is the scientific study of anyone separate subject: both are faculties for providing arguments. This is [35] perhaps a sufficient account of their scope and of how they are related to each other.

[[With regard to the persuasion achieved by proof or apparent proof: just as in [1356<sup>b</sup>1] dialectic there is induction on the one hand and deduction or apparent deduction on the other, so it is in rhetoric. The example is an induction, the enthymeme is a deduction, and the apparent enthymeme is an apparent deduction; for I call a [5] rhetorical deduction an enthymeme, and a rhetorical induction an example.]]<sup>3</sup> Everyone who effects persuasion through proof does in fact use either enthymemes or examples: there is no other way. And since everyone who proves anything at all is bound to use either deductions or inductions (and this is clear to us from the [10] *Analytics*), it must follow that each of the latter is the same as one of the former. The difference between example and enthymeme is made plain by the passages in the *Topics*<sup>4</sup> where induction and deduction have already been discussed. When we base the proof of a proposition on a number of similar cases, this is induction in [15] dialectic, example in rhetoric; when it is shown that, certain propositions being true, a further and quite distinct proposition must also be true in consequence, whether universally or for the most part this is called deduction in dialectic, enthymeme in rhetoric. It is plain also that each of these types of oratory has its advantages. For [20] what has been said in the *Methodics* applies equally well here; in some oratorical styles examples prevail, in others enthymemes; and in like manner, some orators are better at the former and some at the latter. Speeches that rely on examples are as persuasive as the other kind, but those which rely on enthymemes excite the louder [25] applause. The reason for this, and their proper uses, we will discuss later. Our next step is to define the



processes themselves more clearly.

What is persuasive is persuasive to someone; and something is persuasive either because it is directly self-evident or because it appears to be proved from other statements that are so. But none of the arts theorizes about individual cases. [30] Medicine, for instance, does not theorize about what will help to cure Socrates or Callias, but only about what will help to cure any or all of a given class of patients: this alone is subject to technique—individual cases are so infinitely various that no knowledge of them is possible. In the same way the theory of rhetoric is concerned not with what seems reputable to a given individual like Socrates or Hippias, but with what seems so to men of a given type; and this is true of dialectic also. Dialectic does not construct its deductions out of any haphazard materials, such as the fancies of crazy people, but out of materials that call for discussion; and rhetoric draws [1357<sup>a</sup>1] upon the regular subjects of debate. The duty of rhetoric is to deal with such matters as we deliberate upon without arts or systems to guide us, in the hearing of persons who cannot take in at a glance a complicated argument, or follow a long chain of reasoning. The subjects of our deliberation are such as seem to present us with alternative possibilities: about things that could not have been, and cannot now [5] or in the future be, other than they are, nobody who takes them to be of this nature wastes his time in deliberation.

It is possible to form deductions and draw conclusions from the results of previous deductions; or, on the other hand, from premisses which have not been thus proved, and at the same time are not reputable and so call for proof. Reasonings of [10] the former kind will necessarily be hard to follow owing to their length, for we assume an audience of untrained thinkers; those of the latter kind will fail to be persuasive, because they are based on premisses that are not generally admitted or reputable.

The enthymeme and the example must, then, deal with what is for the most part capable of being otherwise, the example being an induction, and the [15] enthymeme a deduction. The enthymeme must consist of few propositions, fewer often than those which make up a primary deduction. For if any of these propositions is a familiar fact, there is no need even to mention it; the hearer adds it himself. Thus, to show that Dorieus has been victor in a contest for which the prize is a crown, it is enough to say 'For he has been victor in the Olympic games', without [20] adding 'And in the Olympic games the prize is a crown', a fact which everybody knows.

There are few facts of the necessary type that can form the basis of rhetorical deductions. Most of the things about which we make decisions, and into which we inquire, present us with alternative possibilities. For it is about our actions that we [25] deliberate and inquire, and all our actions have a contingent character; hardly any of them are determined by necessity. Again, conclusions that state what holds for the most part and is possible must be drawn from premisses that do the same, just as necessary conclusions must be drawn from necessary premisses; this too is clear to us from the *Analytics*.<sup>5</sup> It is evident, therefore, that the propositions forming the [30] basis of enthymemes, though some of them may be necessary, will in the main hold for the most part. Now the materials of enthymemes are probabilities and signs, so that each of the former must be the same as one of these. A probability is a thing [35] that happens for the most part—not, however, as some definitions would suggest, anything whatever that so happens, but only if it belongs to the class of what can turn out otherwise, and bears the same relation to that in respect of which it is probable as the universal bears to the particular. Of signs, one kind bears the same [1357<sup>b</sup>1] relation as the particular bears to the universal, the other the same as the universal bears to the particular. A necessary sign is an evidence, a non-necessary sign has no [5] specific name. By necessary signs I mean those on which deductions may be based; and this shows us why this kind of sign is called an evidence: when people think that what they have said cannot be refuted, they then think that they are bringing forward an evidence, meaning that the matter has now been demonstrated and [10] completed; for the word *πέρας* has the same meaning as the word *τέκμαρ* in the ancient tongue.<sup>6</sup> Now the one kind of sign (that which bears to the proposition it supports the relation of particular to universal) may be illustrated thus. Suppose it were said, ‘The fact that Socrates was wise and just is a sign that the wise are just’. Here we certainly have a sign; but even though the proposition is true, the argument is refutable, since it does not form a deduction. Suppose, on the other [15] hand, it were said, ‘The fact that he has a fever is a sign that he is ill’, or, ‘The fact that she is giving milk is a sign that she has lately borne a child’. Here we have the necessary kind of sign, the only kind that constitutes an evidence, since it is the only kind that, if true, is irrefutable. The other kind of sign, that which bears the relation of universal to particular, might be illustrated by saying, ‘The fact that he breathes [20] fast is a sign that he has a fever’. This argument also is refutable, even if true, since a man may breathe hard without having a fever.

It has, then, been stated above what is the nature of a probability, of a sign, [25] and of an evidence, and what are the differences between them. In the *Analytics*<sup>7</sup> a more explicit description has been given of these points; it is there shown why some of these reasonings can be put into deductions and some cannot.

The example has already been described as one kind of induction; and the special nature of the subject-matter that distinguishes it from the other kinds has also been stated above. Its relation is not that of part to whole, nor whole to part, nor whole to whole, but of part to part, or like to like. When two statements are of the [30] same order, but one is more familiar than the other, the former is an example. The argument may, for instance, be that Dionysius, in asking as he does for a bodyguard, is scheming to make himself a despot. For in the past Peisistratus kept asking for a bodyguard in order to carry out such a scheme, and did make himself a despot as soon as he got it; and so did Theagenes at Megara; and in the same way all other instances known to the speaker are made into examples, in order to show what [35] is not yet known, that Dionysius has the same purpose in making the same request: all these being instances of the one general principle, that a man who asks for a [1358<sup>a1</sup>] bodyguard is scheming to make himself a despot. We have now described the sources of those means of persuasion which are popularly supposed to be demonstrative.

There is an important distinction between two sorts of enthymemes that has been wholly overlooked by almost everybody—one that also subsists between the [5] deductions treated of in dialectic. One sort of enthymeme really belongs to rhetoric; but the other sort really belongs to other arts and faculties, whether to those we already exercise or to those we have not yet acquired. Hence they are not noticed by the audience . . . and, touching on them more than is appropriate, they get away from them.<sup>8</sup> This statement will be clearer if expressed more fully. I mean that the [10] proper subjects of dialectical and rhetorical deductions are the things with which we say the commonplaces are concerned, that is to say those that apply equally to questions of right conduct, natural science, politics, and many other things that have nothing to do with one another. Take, for instance, the commonplace concerned with ‘the more or less’. On this it is equally easy to base a deduction or [15] enthymeme about any of what nevertheless are essentially disconnected subjects—right conduct, natural science, or anything else whatever. But there are also those special commonplaces which are based on such propositions as apply only to particular groups or classes of things. Thus there are

propositions about natural science on which it is impossible to base any enthymeme or deduction about ethics, and other propositions about ethics on which nothing can be based about natural [20] science. The same principle applies throughout. The general commonplaces have no special subject-matter, and therefore will not increase our understanding of any particular class of things. On the other hand, the better the selection one makes of propositions suitable for special commonplaces the nearer one comes, unconsciously, to setting up a science that is distinct from dialectic and rhetoric. One may succeed in stating the required principles, but one's science will be no longer [25] dialectic or rhetoric, but the science to which the principles thus discovered belong. Most enthymemes are in fact based upon these particular or special kinds; comparatively few on the common kind. As in the *Topics*, therefore, so in this work, we must distinguish, in dealing with the enthymemes, the kinds and the common-places [30] on which they are to be founded. By kinds I mean the propositions peculiar to each several class of things, by commonplaces those common to all classes alike. We may begin with the kinds. But, first of all, let us classify rhetoric into its varieties. Having distinguished these we may deal with them one by one, and try to discover the elements of which each is composed, and the propositions each must employ. [35]

3 · Rhetoric falls into three divisions, determined by the three classes of listeners to speeches. For of the three elements in speech-making—speaker, subject, and person addressed—it is the last one, the hearer, that determines the speech's [1358b1] end and object. The hearer must be either a judge, with a decision to make about things past or future, or an observer. A member of the assembly decides about future events, a juryman about past events [while those who merely decide on the [5] orator's skill are observers].<sup>9</sup> From this it follows that there are three divisions of oratory—deliberative, forensic, and epideictic.

Deliberative speaking urges us either to do or not to do something: one of these two courses is always taken by private counsellors, as well as by men who address public assemblies. Forensic speaking either attacks or defends somebody: one or [10] other of these two things must always be done by the parties in a case. Epideictic oratory either praises or censures somebody. These three kinds of rhetoric refer to three different kinds of time. The deliberative orator is concerned with the future: it [15] is about things to be done hereafter that he advises, for or against. The

party in a case at law is concerned with the past; one man accuses the other, and the other defends himself, with reference to things already done. The epideictic orator is, properly speaking, concerned with the present, since all men praise or blame in view of the state of things existing at the time, though they often find it useful also to [20] recall the past and to make guesses at the future.

Rhetoric has three distinct ends in view, one for each of its three kinds. The deliberative orator aims at establishing the expediency or the harmfulness of a proposed course of action; if he urges its acceptance, he does so on the ground that it will do good; if he urges its rejection, he does so on the ground that it will do harm; [25] and all other points, such as whether the proposal is just or unjust, honourable or dishonourable, he brings in as subsidiary and relative to this main consideration. Parties in a law-case aim at establishing the justice or injustice of some action, and they too bring in all other points as subsidiary and relative to this one. Those who praise or attack a man aim at proving him worthy of honour or the reverse, and they too treat all other considerations with reference to this one.

That the three kinds of rhetoric do aim respectively at the three ends we have [30] mentioned is shown by the fact that speakers will sometimes not try to establish anything else. Thus, the litigant will sometimes not deny that a thing has happened or that he has done harm. But that he is guilty of injustice he will never admit; otherwise there would be no need of a trial. So too, deliberative orators often make [35] any concession short of admitting that they are recommending their hearers to take an inexpedient course or not to take an expedient one. The question whether it is not *unjust* for a city to enslave its innocent neighbours often does not trouble them at all. In like manner those who praise or censure a man do not consider whether his [1359<sup>a</sup>1] acts have been expedient or not, but often make it a ground of actual praise that he has neglected his own interest to do what was honourable. Thus they praise Achilles because he championed his fallen friend Patroclus, though he knew that this meant [5] death, and that otherwise he need not die: yet while to die thus was the nobler thing for him to do, the expedient thing was to live on.

It is evident from what has been said that it is these three subjects, more than any others, about which the orator must be able to have propositions at his command. Now the propositions of rhetoric are evidences, probabilities, and signs. Every kind of deduction is composed of propositions, and the enthymeme is a [10] deduction composed of the

aforesaid propositions.

Since only possible actions, and not impossible ones, can ever have been done in the past or the present, and since things which have not occurred, or will not occur, also cannot have been done or be going to be done, it is necessary for the [15] deliberative, the forensic, and the epideictic speaker alike to be able to have at their command propositions about the possible and the impossible, and about whether a thing has or has not occurred, will or will not occur. Further, all men, in giving praise or blame, in urging us to accept or reject proposals for action, in accusing or defending, attempt not only to prove the points mentioned but also to show that the [20] good or the harm, the honour or disgrace, the justice or injustice, is great or small, either absolutely or relatively; and therefore it is plain that we must also have at our command propositions about greatness or smallness and the greater or the lesser—propositions both universal and particular. Thus, we must be able to say which is the greater or lesser good, the greater or lesser act of justice or injustice; [25] and so on.

Such, then, are the subjects regarding which we are inevitably bound to master the propositions relevant to them. We must now discuss each particular class of these subjects in turn, namely those dealt with in deliberative, in epideictic, and lastly in legal, oratory.

4 · First, then, we must ascertain what are the kinds of things, good or bad, [30] about which the deliberative orator offers counsel. For he does not deal with all things, but only with such as may or may not take place. Concerning things which exist or will exist inevitably, or which cannot possibly exist or take place, no counsel can be given. Nor, again, can counsel be given about the whole class of things which may or may not take place; for this class includes some good things that occur naturally, and some that occur by accident; and about these it is useless to offer [35] counsel. Clearly counsel can only be given on matters about which people can deliberate; matters, namely, that ultimately depend on ourselves, and which we have it in our power to set going. For we turn a thing over in our mind until we have [1359<sup>b</sup>1] reached the point of seeing whether we can do it or not.

Now to enumerate and classify accurately the usual subjects of public business, and further to frame, as far as possible, true definitions of them, is a task which we must not attempt on the present occasion. For it does not belong to the art [5] of rhetoric, but to a more instructive art and a

more real branch of knowledge; and as it is, rhetoric has been given a far wider subject-matter than strictly belongs to it. The truth is, as indeed we have said already, that rhetoric is a combination of the sciences of logic and of ethics; and it is partly like dialectic, partly like sophistical [10] reasoning. But the more we try to make either dialectic or rhetoric not, what they really are, practical faculties, but sciences, the more we shall inadvertently be destroying their true nature; for we shall be re-fashioning them and shall be passing into the region of sciences dealing with definite subjects rather than simply with [15] speeches. Even here, however, we will mention those points which it is of practical importance to distinguish, their fuller treatment falling to political science.

The main matters on which all men deliberate and on which deliberative speakers make speeches are five in number: ways and means, war and peace, [20] national defence, imports and exports, and legislation.

As to Ways and Means, then, the intending speaker will need to know the number and extent of the country's sources of revenue, so that, if any is being [25] overlooked, it may be added, and, if any is defective, it may be increased. Further, he should know all the expenditure of the country, in order that, if any part of it is superfluous, it may be abolished, or, if any is too large, it may be reduced. For men become richer not only by increasing their existing wealth but also by reducing their expenditure. A comprehensive view of these questions cannot be gained solely from [30] experience in home affairs; in order to advise on such matters a man must study the methods worked out in other lands.

As to Peace and War, he must know the extent of the military strength of his [35] country, both actual and potential, and also the nature of that actual and potential strength; and further, what wars his country has waged, and how it has waged them. He must know these facts not only about his own country, but also about neighbouring countries; and also about countries with which war is likely, in order that peace may be maintained with those stronger than his own, and that his own [1360<sup>a</sup>1] may have power to make war or not against those that are weaker. He should know, too, whether the military power of another country is like or unlike that of his own; for this is a matter that may affect their relative strength. With that end in view he must, besides, have studied the wars of other countries as well as those of his own, [5] and the way they ended; similar causes are likely to have similar results.

With regard to National Defence he ought to know all about the methods of defence in actual use, and also the strength and character of

the defensive force and the positions of the forts—this last means that he must be well acquainted with the [10] lie of the country—in order that a garrison may be increased if it is too small or removed if it is not wanted, and that the strategic points may be guarded with special care.

With regard to the Food Supply he must know what will meet the needs of his country; what kinds of food are produced at home and what imported; and what articles must be exported or imported. This last he must know in order that [15] agreements and commercial treaties may be made with the countries concerned. There are, indeed, two sorts of state to which he must see that his countrymen give no cause for offence, states stronger than his own, and states with which it is advantageous to trade.

But while he must, for security's sake, be able to take all this into account, he must before all things understand the subject of legislation; for it is on a country's [20] laws that its whole welfare depends. He must, therefore, know how many different forms of constitution there are; under what conditions each of these will prosper and by what circumstances, both proper and opposite, each of them tends to be destroyed. When I speak of destruction through proper circumstances I refer to the fact that all constitutions, except the best one of all, are destroyed both by not being [25] pushed far enough and by being pushed too far. Thus, democracy loses its vigour, and finally passes into oligarchy, not only when it is not pushed far enough, but also when it is pushed a great deal too far; just as the aquiline and the snub nose not only turn into normal noses by not being aquiline or snub enough, but also by being too violently aquiline or snub arrive at a condition in which they no longer look like [30] noses at all.

It is useful, in framing laws, not only to study the past history of one's own country, in order to understand which constitution is desirable for it now, but also to have a knowledge of the constitutions of other nations, and so to learn for what kinds of nation the various kinds of constitution are suited. From this we can see that books of travel are useful aids to legislation, since from these we may learn the laws and customs of different races. The deliberative speaker will also find the [35] researches of historians useful. But all this is the business of political science and not of rhetoric.

These, then, are the most important kinds of information which the deliberative speaker must possess. Let us now go back and state the premisses from which he [1360<sup>b</sup>1] will have to argue in favour of adopting or rejecting measures regarding these and other matters.



5 · It may be said that every individual man and all men in common aim at a certain end which determines what they choose and what they avoid. This end, to [5] sum it up briefly, is happiness and its constituents. Let us, then, by way of illustration only, ascertain what is in general the nature of happiness, and what are the elements of its constituent parts. For all advice to do things or not to do them is concerned with happiness and with the things that make for or against it; whatever [10] creates or increases happiness or some part of happiness, we ought to do; whatever destroys or hampers happiness, or gives rise to its opposite, we ought not to do.

We may define happiness as prosperity combined with excellence; or as independence of life; or as the secure enjoyment of the maximum of pleasure; or as a [15] good condition of property and body, together with the power of guarding one's property and body and making use of them. That happiness is one or more of these things, pretty well everybody agrees.

From this definition of happiness it follows that its constituent parts are: good birth, plenty of friends, good friends, wealth, good children, plenty of children, a happy old age, also such bodily excellences as health, beauty, strength, [20] large stature, athletic powers, together with fame, honour, good luck, and excellence. A man cannot fail to be completely independent if he possesses these internal and these external goods; for besides these there are no others to have. [25] (Goods of the soul and of the body are internal. Good birth, friends, money, and honour are external.) Further, we think that he should possess resources and luck, in order to make his life really secure. Let us now, then, try to ascertain what each of [30] these things is.

Now good birth in a race or a state means that its members are indigenous or ancient; that its earliest leaders were distinguished men, and that from them have sprung many who were distinguished for qualities that we admire.

The good birth of an individual may come either from the male or the female side; it requires legitimacy on both sides, and implies that, as in the case of the state, [35] the founders of the line have been notable for excellence or wealth or something else which is highly prized, and that many distinguished persons belong to the family, men and women, young and old.

Possession of good children and of many children is clear enough. Applied to a [1361<sup>a</sup>1] community, they mean that its young men are

numerous and of good quality: good in regard to bodily excellences, such as stature, beauty, strength, athletic powers; and also in regard to the excellences of the soul, which in a young man are temperance and courage. Applied to an individual, they mean that his own children [5] are numerous and have the good qualities we have described. Both male and female are here included; the excellences of the latter are, in body, beauty and stature; in soul, self-command and an industry that is not sordid. Communities as well as [10] individuals should lack none of these perfections, in their women as well as in their men. Where, as among the Lacedaemonians, the state of women is bad, almost half of them are not happy.

The constituents of wealth are: plenty of coined money and territory; the ownership of numerous, large, and beautiful estates; also the ownership of [15] numerous and beautiful implements, live stock, and slaves. All these kinds of property are our own, are secure, gentlemanly, and useful. The useful kinds are those that are productive, the gentlemanly kinds are those that provide enjoyment. By 'productive' I mean those from which we get our income; by 'enjoyable', those from which we get nothing worth mentioning except the use of them. The criterion [20] of security is the ownership of property in such places and under such conditions that the use of it is in our power; and it is our own if it is in our own power to dispose of it or not. By 'disposing of it' I mean giving it away or selling it. Wealth as a whole consists in using things rather than in owning them; it is really the activity—that is, [25] the use—of property that constitutes wealth.

Fame means being respected by everybody, or having some quality that is desired by all men, or by most, or by the good, or by the wise.

Honour is the token of a man's being famous for doing good. It is chiefly and most properly paid to those who have already done good; but also to the man who [30] can do good in future. Doing good refers either to the preservation of life and the means of life, or to wealth, or to some other of the good things which it is hard to get either always or at that particular place or time—for many gain honour for things which seem small, but the place and the occasion account for it. The constituents of [35] honour are: sacrifices; commemoration, in verse or prose; privileges; grants of land; front seats at civic celebrations; state burial; statues; public maintenance; among foreigners, obeisances and giving place; and such presents as are among various bodies of men regarded as marks of honour. For a present is not only the bestowal of a piece of property, but also a token of honour; which explains why honour-loving as [1361<sup>b1</sup>]

well as money-loving persons desire it. The present brings to both what they want; it is a piece of property, which is what the lovers of money desire; and it brings honour, which is what the lovers of honour desire.

The excellence of the body is health; that is, a condition which allows us, while keeping free from disease, to have the use of our bodies; for many people are healthy [5] in the way we are told Herodicus was; and these no one can congratulate on their health, for they have to abstain from everything or nearly everything that men do. Beauty varies with the time of life. In a young man beauty is the possession of a body fit to endure the exertion of running and of contests of strength; which means [10] that he is pleasant to look at; and therefore all-round athletes are the most beautiful, being naturally adapted both for contests of strength and for speed also. For a man in his prime, beauty is fitness for the exertion of warfare, together with a pleasant but at the same time formidable appearance. For an old man, it is to be strong enough for such exertion as is necessary, and to be free from pain through escaping the ravages of old age. Strength is the power of moving something else at will; to do [15] this, you must either pull, push, lift, pin, or grip it; thus you must be strong in all of those ways or at least in some. Excellence in size is to surpass ordinary people in height, thickness, and breadth by just as much as will not make one's movements slower in consequence. Athletic excellence of the body consists in size and strength; [20] for the swift man is strong—he who can fling forward his legs in a certain way, and move them fast and far, is good at running; he who can grip and hold down is good at wrestling; he who can drive an adversary from his ground with the right blow is a [25] good boxer; he who can do both the last is a good pancratiast, while he who can do all is an all-round athlete.

Happiness in old age is the coming of old age slowly and painlessly; for a man has not this happiness if he grows old either quickly, or tardily but painfully. It arises both from the excellences of the body and from good luck. If a man is not free from disease, or if he is not strong, he will not be free from suffering or pain; nor can [30] he continue to live a long life unless he has good luck. There is, indeed, a capacity for long life that is quite independent of health or strength; for many people live long who lack the excellences of the body; but for our present purpose there is no use in going into the details of this.

The possession of many friends and the possession of good friends need no [35] explanation; for we define a friend as one who will always try, for your sake, to do what he takes to be good for you. The man towards whom many feel thus has many friends; if these are worthy men,

he has good friends.

Good luck is the acquisition or possession of all or most, or the most important, of those good things which are due to luck. Some of the things that are due to luck [1362<sup>a</sup>1] may also be due to artificial contrivance; but many are independent of art, as for example those which are due to nature—though, to be sure, things due to luck may actually be contrary to nature. Thus health may be due to artificial contrivance, but beauty and stature are due to nature. All such good things as excite envy are, as a [5] class, the outcome of good luck. Luck is also the cause of good things that happen contrary to reasonable expectation: as when, for instance, all your brothers are ugly, but you are handsome yourself; or when you find a treasure that everybody else has overlooked; or when a missile hits the next man and misses you; or when you are the only man not to go to a place you have gone to regularly, while the others go there [10] for the first time and are killed. All such things are reckoned pieces of good luck.

As to excellence, it is most closely connected with the subject of eulogy, and therefore we will wait to define it until we come to discuss that subject.

6 · It is now plain what our aims, future or actual, should be in urging, and [15] what in deprecating, a proposal; the latter being the opposite of the former. Now the deliberative orator's aim is utility: deliberation seeks to determine not ends but the means to ends, i.e. what it is most useful to do. Further, utility is a good thing. We [20] ought therefore to assure ourselves of the main facts about goodness and utility in general.

We may define a good thing as that which ought to be chosen for its own sake; or as that for the sake of which we choose something else; or as that which is sought after by all things, or by all things that have sensation or reason, or which will be sought after by any things that acquire reason; or as that which must be prescribed [25] for a given individual by reason generally, or is prescribed for him by his individual reason, this being his individual good; or as that whose presence brings anything into a satisfactory and self-sufficing condition; or as self-sufficiency; or as what produces, maintains, or entails characteristics of this kind, while preventing and destroying their opposites (one thing may entail another in either of two ways—[30] simultaneously, or subsequently. Thus learning entails knowledge subsequently, health

entails life simultaneously. Things are productive of other things in three senses: first as being healthy produces health; secondly, as food produces health; and thirdly, as exercise does—i.e. it does so usually. All this being settled, [35] we now see that both the acquisition of good things and the removal of bad things must be good; the latter entails freedom from the evil things simultaneously, while the former entails possession of the good things subsequently); or the acquisition of a greater in place of a lesser good, or of a lesser in place of a greater evil; for in [1362<sup>b</sup>1] proportion as the greater exceeds the lesser there is acquisition of good or removal of evil.<sup>10</sup> The excellences, too, must be something good; for it is by possessing these that we are in a good condition, and they tend to produce good works and good actions. [5] They must be severally named and described elsewhere. Pleasure, again, must be a good thing, since it is the nature of all animals to aim at it. Consequently both pleasant and beautiful things must be good things, since the former are productive of pleasure, while of the beautiful things some are pleasant and some desirable in and for themselves.

[10] The following is a more detailed list of things that must be good. Happiness, as being desirable in itself and sufficient by itself, and as being that for whose sake we choose all other things. Also justice, courage, temperance, magnanimity, magnificence, and all such qualities, as being excellences of the soul. Further, health, [15] beauty, and the like, as being bodily excellences and productive of many other good things: for instance, health is productive both of pleasure and of life, and therefore is thought the greatest of goods, since these two things which it causes, pleasure and life, are two of the things most highly prized by ordinary people. Wealth, again; for it is the excellence of possession, and also productive of many other good things. [20] Friends and friendship; for a friend is desirable in himself and also productive of many other good things. So, too, honour and reputation, as being pleasant, and productive of many other good things, and for the most part accompanied by the presence of the good things that cause them to be bestowed. The faculty of speech and action; since all such qualities are productive of what is good. Further—good parts, strong memory, receptiveness, quickness of intuition, and the like, for all such [25] faculties are productive of what is good. Similarly, all the sciences and arts. And life; since, even if no other good were the result of life, it is desirable in itself. And justice, as the cause of good to the community.

The above are pretty well all the things admittedly good. In dealing with things whose goodness is disputed, we may argue in the following

ways:—That is good of [30] which the contrary is bad. That is good the contrary of which is to the advantage of our enemies; for example, if it is to the particular advantage of our enemies that we should be cowards, clearly courage is of particular value to our countrymen. And generally, the contrary of that which our enemies desire, or of that at which they rejoice, is evidently valuable. Hence the passage beginning: [35]

Surely would Priam exult.<sup>11</sup>

This principle holds good for the most part, not always, since it may well be that our interest is sometimes the same as that of our enemies. Hence it is said that evils draw men together; that is, when the same thing is hurtful to them both. [1363<sup>a</sup>1]

Further: that which is not in excess is good, and that which is greater than it should be is bad. That also is good on which much labour or money has been spent; the mere fact of this makes it seem good, and such a good is assumed to be an end—an end reached through a long chain of means; and any end is a good. Hence the lines beginning:

And for Priam a boast,<sup>12</sup> [5]

and

Oh, it were shame to have tarried so long<sup>13</sup>

and there is also the proverb about breaking the pitcher at the door.

That which most people seek after, and which is obviously an object of contention, is also a good; for, as has been shown, that is good which is sought after by everybody, and ‘most people’ seems pretty well to amount to ‘everybody’. That which is praised is good, since no one praises what is not good. So, again, that which [10] is praised by our enemies; for it is as though everyone were thereby agreeing. And that which is praised by those who have suffered—they would agree because it is evidently good. Similarly, those must be worthless whom their friends censure and their enemies do not. (For this reason the Corinthians conceived themselves to be [15] insulted by Simonides when he wrote:

Against the Corinthians hath Ilium no complaint.)

Again, that is good which has been distinguished by the favour of a discerning or virtuous man or woman, as Odysseus was distinguished by Athena, Helen by Theseus, Paris by the goddesses, and Achilles by Homer. And, generally speaking, all things are good which men choose to

do; this will include the things already [20] mentioned, and also whatever may be bad for their enemies or good for their friends, and at the same time practicable. Things are practicable in two senses: it is possible to do them, it is easy to do them. Things are done easily when they are done either without pain or quickly: the difficulty of an act lies either in its painfulness or [25] in the long time it takes. Again, a thing is good if it is as men wish; and they wish to have either no evil at all or at least a balance of good over evil. This last will happen where the penalty is either imperceptible or slight. Good, too, are things that are a man's very own, possessed by no one else, exceptional; for this increases the credit of having them. So are things which befit the possessors, such as whatever is [30] appropriate to their birth or capacity. And whatever they feel they ought to have but lack—such things may indeed be trifling, but none the less men deliberately make them the goal of their action. And things easily effected; for these are practicable (in the sense of being easy); such things are those in which everyone, or most people, or one's equals, or one's inferiors have succeeded. Good also are the things by which we shall gratify our friends or annoy our enemies; and the things [35] chosen by those whom we admire; and the things for which we are fitted by nature or experience, since we think we shall succeed more easily in these; and those in which no worthless man can succeed, for such things bring greater praise; and those which we do in fact desire, for what we desire is taken to be not only pleasant but [1363<sup>b</sup>1] also better. Further, a man of a given disposition makes chiefly for the corresponding things: lovers of victory make for victory, lovers of honour for honour, money-loving men for money, and so with the rest. These, then, are the sources from which we must derive our means of persuasion about good and utility.

[5] 7 · Since, however, it often happens that people agree that two things are both useful but do not agree about which is the more so, the next step will be to treat of relative goodness and relative utility.

A thing which surpasses another may be regarded as being that other thing plus something more, and that other thing which is surpassed as being what is contained in the first thing. Now things are greater or more always in comparison [10] with something smaller or less, while they are great and small, much and little, in comparison with normal magnitude. The great is that which surpasses the normal, the small is that which is surpassed by the normal; and so with many and few.

Now we call 'good' what is desirable for its own sake and not for the sake of something else; that at which all things aim; what they would choose if they could [15] acquire understanding and practical wisdom; and that which tends to produce or preserve such goods, or is always accompanied by them; [Moreover, that for the sake of which things are done is the end (an end being that for the sake of which all else is done)]<sup>14</sup> and for each individual that thing is a good which fulfils these conditions in regard to himself. It follows, then, that a greater number of goods is a greater good than one or than a smaller number, if that one or that smaller number [20] is included in the count; for then the larger number surpasses the smaller, and the smaller quantity is surpassed as being contained in the larger.

Again, if the largest member of one class surpasses the largest member of another, then the one class surpasses the other; and if one class surpasses another, then the largest member of the one surpasses the largest member of the other. Thus, if the tallest man is taller than the tallest woman, then men in general are taller than [25] women. Conversely, if men in general are taller than women, then the tallest man is taller than the tallest woman. For the superiority of class over class is proportionate to the superiority possessed by their largest specimens. Again, where one good is always accompanied by another, but does not always accompany it, it is greater than the other, for the use of the second thing is implied in the use of the first. A [30] thing may be accompanied by another either simultaneously, or subsequently, or potentially. Life accompanies health simultaneously (but not health life), knowledge accompanies the act of learning subsequently, cheating accompanies sacrilege potentially, since a man who has committed sacrilege is always capable of cheating. Again, when two things each surpass a third, that which does so by the greater amount is the greater of the two; for it must surpass the less great as well. A thing productive of a greater good is itself a greater good than that other. For that is what [35] being productive of something greater is. Likewise, that which is produced by a greater good is itself a greater good; thus, if what is wholesome is more desirable and a greater good than what gives pleasure, health too must be a greater good than pleasure. Again, a thing which is desirable in itself is a greater good than a thing [1364<sup>a</sup>1] which is not desirable in itself, as for example bodily strength than what is wholesome, since the latter is not pursued for its own sake, whereas the former is; and this was our definition of the good. Again, if one of two things is an end, and the other is not, the former is the greater good, as



being chosen for its own sake and not for the sake of something else; as, for example, exercise is a greater good than physical well-being. And of two things that which stands less in need of other things [5] is the greater good, since it is more self-sufficing. (That which stands less in need of others is that which needs either *fewer* or *easier* things.) And when one thing does not exist or cannot come into existence without a second, while the second can exist without the first, the second is the better. For that which does not need something else is more self-sufficing than that which does, and presents itself as a greater good for that reason. Again, that which is an origin of other things is a greater good than that which is not, and that which is a cause is a greater good than that which is not; [10] the reason being the same in each case, namely that without a cause and an origin nothing can exist or come into existence. Again, where there are two origins, what arises from the greater is greater; and where there are two causes, what arises from the greater cause is greater. And conversely, that origin or cause is itself the greater [15] which has the greater consequences. Now it is plain, from all that has been said, that one thing may be shown to be greater than another from two opposite points of view: it may appear the greater because it is an origin and the other thing is not, and also because it is not an origin and the other thing is—on the ground that the end is greater and is not an origin. So Leodamas, when accusing Callistratus, said that the man who prompted the deed was more guilty than the doer, since it would not have [20] been done if he had not planned it. On the other hand, when accusing Chabrias he said that the doer was worse than the prompter, since there would have been no deed without some one to do it; men, said he, plot a thing only in order to carry it out.

Further, what is rare is a greater good than what is plentiful. Thus gold is a [25] better thing than iron, though less useful: it is harder to get, and therefore more worth getting. In another way, the plentiful is a better thing than the rare, because we can make more use of it. For what is often useful surpasses what is seldom useful, whence the saying

The best of things is water.<sup>15</sup>

More generally: the hard thing is better than the easy, because it is rarer; and in [30] another way the easy thing is better than the hard, for it is as we wish it to be. That is the greater good whose contrary is greater, and whose loss is greater. Excellence is greater than non-excellence, badness than non-badness; for excellence, goodness and badness are ends, which the mere absence of them cannot be. Further, if the functions of things

are nobler or baser, the things themselves are greater; and if the badnesses and excellences are greater, their functions also are greater; for the [35] nature of results corresponds with that of their causes and origins and the nature of causes and origins corresponds with that of their results. Moreover, those things are greater goods, superiority in which is more desirable or more honourable. [[Thus, keenness of sight is more desirable than keenness of smell, sight generally being more desirable than smell generally; and similarly, unusually great love of friends [1364<sup>b</sup>1] being more honourable than unusually great love of money, love of friends is more honourable than love of money.]]<sup>16</sup> Conversely, if one of two things is better or nobler than the other, an unusual degree of that thing is better or nobler than an unusual degree of the other. Again, one thing is more honourable or better than [5] another if it is more honourable or better to desire it; for greater desires have greater objects; and for the same reason, if one thing is more honourable or better than another, it is more honourable and better to desire it. Again, if one science is more honourable and valuable than another, its objects are also more honourable and valuable; as is the science, so is the reality that is its object, each science being [10] authoritative in its own sphere. So, also, the more valuable and honourable the object of a science, the more valuable and honourable the science itself is in consequence. Again, that which would be judged, or which has been judged, a greater good, by all or most people of understanding, or by the majority of men, or by the ablest, must be so; either without qualification, or in so far as they use their understanding to form their judgement. This is indeed a general principle, applicable to all other judgements also; not only the goodness of things, but their [15] essence, magnitude, and general nature are in fact just what knowledge and understanding will declare them to be. Here the principle is applied to judgements of goodness, since one definition of good was what beings that acquire understanding will choose in any given case; from which it clearly follows that that thing is *better* which understanding declares to be so. That, again, is a better thing which [20] attaches to better men, either absolutely, or in virtue of their being better; as courage is better than strength. And that is a greater good which would be chosen by a better man, either absolutely, or in virtue of his being better: for instance, to suffer wrong rather than to do wrong, for that would be the choice of the juster man. Again, the pleasanter of two things is the better, since all things pursue pleasure, and things desire pleasurable sensation for its own sake; and these are two of the characteristics by which the good and the end have been defined. One

pleasure is [25] greater than another if it is more unmixed with pain, or more lasting. Again, the nobler thing is better than the less noble, since the noble is either what is pleasant or what is desirable in itself. And those things also are greater goods which men desire more earnestly to bring about for themselves or for their friends, whereas those things which they least desire to bring about are greater evils. And those things [30] which are more lasting are better than those which are more fleeting, and the more secure than the less; the enjoyment of the lasting has the advantage of being longer, and that of the secure has the advantage of suiting our wishes, being there for us whenever we like. Further, in the case of co-ordinates and inflexions of the same stem, what is true of one is true of all. Thus if 'bravely' is more noble and desirable [35] than 'temperately', then bravery is more desirable than temperance and being brave than being temperate. That, again, which is chosen by all is a greater good than that which is not, and that chosen by the majority than that chosen by the minority. For that which all desire is good, as we have said; and so, the more a thing is desired, the [1365<sup>a</sup>1] better it is. Further, that is the better thing which is considered so by competitors or enemies, or, again, by judges or those whom they judge. In the first two cases the decision is virtually that of everyone, in the last two that of authorities and experts. And sometimes what all share is the better thing, since it is a dishonour not to share [5] in it; at other times, what none or few share is better, since it is rarer. The more praiseworthy things are, the nobler and therefore the better they are. So with the things that earn greater honours than others—honour is, as it were, a measure of value; and the things whose absence involves greater penalties; and the things that are greater than others admitted or believed to be great. Moreover, things look greater merely by being divided into their parts, since they then seem to surpass a [10] greater number of things than before. Hence Homer says that Meleager was roused to battle by the thought of

All horrors that light on a folk whose city is ta'en of their foes,  
When they slaughter the men, when the town is wasted with ravening  
flame,  
When strangers are haling young children to thraldom.'<sup>17</sup>[15]

The same effect is produced by piling up facts in a climax after the manner of Epicharmus. The reason is partly the same as in the case of division (for combination too makes the impression of great superiority), and partly that the original thing appears to be the cause and origin of great results. And since a thing is greater when it is harder or rarer than other things, its superiority may be due to seasons, ages, places, times, or

one's natural powers. When a man accomplishes [20] something beyond his natural power, or beyond his years, or beyond the measure of people like him, or in a special way, or at a special place or time, his deed will have a high degree of nobleness, goodness, and justice, or of their opposites. Hence the [25] epigram on the victor at the Olympic games:

In time past, bearing a yoke on my shoulders, of wood unshaven,  
I carried my loads of fish from Argos to Tegea town.

So Iphicrates used to extol himself by describing the low estate from which he had risen. Again, what is natural is better than what is acquired, since it is harder to come by. Hence the words of Homer:

[30] I have learnt from none but myself.<sup>18</sup>

And the greatest of a great thing is particularly good; as when Pericles in his funeral oration said that the country's loss of its young men in battle was as if the spring were taken out of the year. So with those things which are of service when the need is greater; for example, in old age and times of sickness. And of two things that which leads more directly to the end in view is the better. So too is that which is good [35] for an individual than that which is good generally. Again, what *can* be got is better than what cannot, for it is good in a given case and the other thing is not. And what is an end of life is better than what is not, since ends are better than things close to [1365<sup>b</sup>1] the end. What aims at reality is better than what aims at appearance. We may define what aims at appearance as what a man will not choose if nobody is to know of his having it. This would seem to show that to receive benefits is more desirable than to confer them, since a man will choose the former even if nobody is to know of it, but it does not seem that he will choose the latter if nobody knows of it. What a [5] man wants to *be* is better than what a man wants to *seem*, for in aiming at that he is aiming more at reality. Hence men say that justice is of small value, since it is more desirable to seem just than to be just, whereas with health it is not so. That is better than other things which is useful for a number of purposes; for example, that which promotes life, good life, pleasure, and noble conduct. For this reason wealth and [10] health are thought to be of the highest value, as possessing all these advantages. Again, that is better than other things which is accompanied both with less pain and with actual pleasure; for here there is more than one advantage; and so here we have the good of feeling pleasure and also the good of not feeling pain. And of two good things that is the better whose addition to a third thing makes a better

whole. Again, those things which we are seen to possess are better than those which we are not [15] seen to possess, since the former have the air of reality. Hence being rich may be regarded as a greater good than seeming to be. That which is dearly prized is better than what is not—the sort of thing that some people have only one of, though others have more like it. Accordingly, blinding a one-eyed man inflicts worse injury than half-blinding a man with two eyes; for the one-eyed man has been robbed of what he dearly prized.

The grounds on which we must base our persuasions, when we are speaking for [20] or against a proposal, have now been set forth more or less completely.

8 · The most important and effective qualification for success in persuading audiences and speaking well on public affairs is to understand all the forms of government and to discriminate their respective customs, institutions, and interests. For all men are persuaded by considerations of their interest, and their interest lies [25] in the maintenance of the established order. Further, it rests with the supreme authority to give authoritative decisions, and this varies with each form of government; there are as many different supreme authorities as there are different forms of government. The forms of government are four—democracy, oligarchy, aristocracy, monarchy. The supreme right to judge and decide always rests, [30] therefore, with either a part or the whole of one or other of these governing powers.

A democracy is a form of government under which the citizens distribute the offices of state among themselves by lot, whereas under oligarchy there is a property qualification, under aristocracy one of education. By education I mean that education which is laid down by the law; for it is those who have been loyal to the [35] national institutions that hold office under an aristocracy. These are bound to be looked upon as the best men, and it is from this fact that this form of government has derived its name.<sup>19</sup> Monarchy, as the word implies, is the constitution in which one man has authority over all. There are two forms of monarchy: kingship, which is [1366a1] limited by prescribed conditions, and tyranny, which is not limited by anything.

We must also notice the ends which the various forms of government pursue, since people choose such actions as will lead to the realization of their ends. The end of democracy is freedom; of oligarchy, wealth; of aristocracy, the maintenance of [5] education and national institutions; of

tyranny, the protection of the tyrant. It is clear, then, that we must distinguish those particular customs, institutions, and interests which tend to realize the end of each constitution, since men choose their means with reference to their ends. But rhetorical persuasion is effected not only by demonstrative but by ethical argument; it helps a speaker to convince us, if we [10] believe that he has certain qualities himself, namely, goodness, or goodwill towards us, or both together. Similarly, we should know the character of each form of government, for the special character of each is bound to provide us with our most effective means of persuasion in dealing with it. We shall learn the qualities of governments in the same way as we learn the qualities of individuals, since they are revealed in their acts of choice; and these are determined by the end that inspires [15] them.

We have now considered the objects, present or future, at which we are to aim when urging any proposal, and the grounds on which we are to base our persuasions in favour of its utility, and the means and methods by which we shall gain a good [20] knowledge of the characters and institutions peculiar to the various forms of government—only, however, to the extent demanded by the present occasion; a detailed account of the subject has been given in the *Politics*.

9 · We have now to consider excellence and vice, the noble and the base, since these are the objects of praise and blame. In doing so, we shall at the same [25] time be finding out how to make our hearers take the required view of our own characters—our second method of persuasion. The ways in which to make them trust the goodness of other people are also the ways in which to make them trust our own. Praise, again, may be serious or frivolous; nor is it always of a human or divine [30] being but often of inanimate things, or of the humblest of the lower animals. Here too we must know on what grounds to argue, and must, therefore, now discuss the subject, though by way of illustration only.

The noble is that which is both desirable for its own sake and also worthy of praise; or that which is both good and also pleasant because good. If this is the [35] noble, it follows that excellence must be noble, since it is both a good thing and also praiseworthy. Excellence is, according to the usual view, a faculty of providing and preserving good things; or a faculty of conferring many great benefits, and benefits [1366<sup>b1</sup>] of all kinds on all occasions. The parts of excellence are justice, courage, temperance, magnificence, magnanimity, liberality, gentleness,

prudence, wisdom. If excellence is a faculty of beneficence, the highest kinds of it must be those which [5] are most useful to others, and for this reason men honour most the just and the courageous, since courage is useful to others in war, justice both in war and in peace. Next comes liberality; liberal people let their money go instead of fighting for it, whereas other people care more for money than for anything else. Justice is the excellence through which everybody enjoys his own possessions in accordance [10] with the law; its opposite is injustice, through which men enjoy the possessions of others in defiance of the law. Courage is the excellence that disposes men to do noble deeds in situations of danger, in accordance with the law and in obedience to its commands; cowardice is the opposite. Temperance is the excellence that disposes [15] us to obey the law where physical pleasures are concerned; intemperance is the opposite. Liberality disposes us to spend money for others' good; illiberality is the opposite. Magnanimity is the excellence that disposes us to do good to others on a large scale; [its opposite is meanness of spirit].<sup>20</sup> Magnificence is the excellence productive of greatness in matters involving the spending of money. The opposites [20] of these two are smallness of spirit and meanness respectively. Prudence is that excellence of the understanding which enables men to come to wise decisions about the relation to happiness of the goods and evils that have been previously mentioned.

The above is a sufficient account, for our present purpose, of excellence and vice in general, and of their various parts. As to further aspects of the subject, it is [25] not difficult to discern the facts; it is evident that things productive of excellence are noble, as tending towards excellence; and also the effects of excellence, that is, the signs of its presence and the acts to which it leads. And since the signs of excellence and such acts as it is the mark of a good man to do or have done to him, are noble, it follows that all deeds or signs of courage, and everything done courageously, must [30] be noble things; and so with what is just and actions done justly. (Not, however, things done to us; for in this alone of the excellences, justly does not always imply nobly—when a man is punished, it is more shameful that this should be justly than [35] unjustly done to him.) The same is true of the other excellences. Again, those actions are noble for which the reward is simply honour, or honour more than money. So are those in which a man aims at something desirable for someone else's sake; actions good absolutely, such as those a man does for his country without thinking of himself; actions good in their own nature; actions that are not good simply for the individual, since

individual interests are selfish. Noble also are those [1367<sup>a</sup>1] actions whose advantage may be enjoyed after death, as opposed to those whose advantage is enjoyed during one's lifetime; for the latter are more likely to be for one's own sake only. Also, all actions done for the sake of others, since these less than other actions are done for one's own sake; and all successes which benefit others and not oneself; and services done to one's benefactors, for this is just; and [5] good deeds generally, since they are not directed to one's own profit. And the opposites of those things of which men feel ashamed, for men are ashamed of saying, doing, or intending to do shameful things. So when Alcaeus said

Something I fain would say to thee,  
Only shame restraineth me, [10]

Sappho wrote

If for things good and noble thou wert yearning,  
If to speak baseness were thy tongue not burning,  
No load of shame would on thine eyelids weigh;  
What thou with honour wishest thou wouldst say.

Those things, also, are noble for which men strive anxiously, without feeling fear; [15] for they feel thus about the good things which lead to fame. Again, one excellence or action is nobler than another if it is that of a naturally finer being: thus a man's will be nobler than a woman's. And those qualities are noble which give more pleasure to other people than to their possessors; hence the nobleness of justice and just actions. It is noble to avenge oneself on one's enemies and not to come to terms with them; [20] for requital is just, and the just is noble; and not to surrender is a sign of courage. Victory, too, and honour belong to the class of noble things, since they are desirable although they yield no fruits, and they prove our superiority in good qualities. Things that deserve to be remembered are noble, and the more they deserve this, the nobler they are. So are the things that continue even after death; [those which are [25] always attended by honour]<sup>21</sup> those which are exceptional; and those which are possessed by one person alone—these last are more readily remembered than others. So again are possessions that bring no profit, since they are more fitting than others for a gentleman. So are the distinctive qualities of a particular people, and the symbols of what it specially admires, like long hair in Sparta, where this is a [30] mark of a free man, as it is not easy to perform any menial task when one's hair is long. Again, it is noble not to practise any sordid craft, since it is the



mark of a free man not to live at another's beck and call. We are also to assume, when we wish either to praise a man or blame him, that qualities closely allied to those which he actually has are identical with them; for instance, that the cautious man is [35] cold-blooded and treacherous, and that the stupid man is an honest fellow or the thick-skinned man a good-tempered one. We can always idealize any given man by drawing on the virtues akin to his actual qualities; thus we may say that the [1367<sup>b</sup>1] passionate and excitable man is frank; or that the arrogant man is superb or impressive. Those who run to extremes will be said to possess the corresponding good qualities; rashness will be called courage, and extravagance generosity. That will be what most people think; and at the same time this method enables an advocate to draw a misleading inference from the motive, arguing that if a man runs [5] into danger needlessly, much more will he do so in a noble cause; and if a man is open-handed to anyone and everyone, he will be so to his friends also, since it is the extreme form of goodness to be good to everybody.

We must also take into account the nature of our particular audience when making a speech of praise; for, as Socrates used to say, it is not difficult to praise the Athenians to an Athenian audience.<sup>22</sup> If the audience esteems a given quality, we must say that our hero has that quality, no matter whether we are addressing [10] Scythians or Spartans or philosophers. Everything, in fact, that is esteemed we are to represent as noble. After all, people regard the two things as much the same.

All actions are noble that are appropriate to the man who does them: if, for instance, they are worthy of his ancestors or of his own past career. For it makes for happiness, and is a noble thing, that he should add to the honour he already has. [15] Even inappropriate actions are noble if they are better and nobler than the appropriate ones would be; for instance, if one who was just an average person when all went well becomes a hero in adversity, or if he becomes better and easier to get on with the higher he rises. Compare the saying of Iphicrates, 'Think what I was and what I am'; and the epigram on the victor at the Olympic games,

In time past, bearing a yoke on my shoulders, of wood unshaven;  
and the encomium of Simonides,

[20] A woman whose father, whose husband, whose brethren were princes all.

Since we praise a man for what he has actually done, and fine actions are distinguished from others by being chosen, we must try to prove that his acts are [25] based on choice. This is all the easier if we can make out

that he has often acted so before, and therefore we must assert coincidences and accidents to have been chosen. Produce a number of good actions, all of the same kind, and people will think that they are signs of excellence and choice.

<sup>23</sup> [[Praise is the expression in words of the eminence of a man's good qualities, and therefore we must display his actions as the product of such qualities; [Encomium refers to what he has actually done]<sup>24</sup> the mention of accessories, such as good birth and education, merely helps to make our story credible—good fathers are likely to have good sons, and good training is likely to produce good character. [30] [Hence it is only when a man has already done something that we bestow *encomiums* upon him.]]<sup>25</sup> Yet the actual deeds are evidence of the doer's character: even if a man has not actually done a given good thing, we shall bestow *praise* on him, if we are sure that he is the sort of man who *would* do it. [To call any one blest is the same thing as to call him happy; but these are not the same thing as to bestow praise and encomium upon him; the two latter are a part of calling happy, just as [35] goodness is a part of happiness.]]<sup>26</sup>

To praise a man is in one respect akin to urging a course of action. The suggestions which would be made in the latter case become encomiums when [1368<sup>a</sup>1] differently expressed. Since we know what action or character is required, then, in order to express these facts as suggestions for action, we have to change and reverse our form of words. Thus the statement 'A man should be proud not of what he owes to fortune but of what he owes to himself, if put like this, amounts to a suggestion; [5] to make it into praise we must put it thus, 'Since he is proud not of what he owes to fortune but of what he owes to himself. Consequently, whenever you want to praise anyone, think what you would urge people to do; and when you want to urge the doing of anything, think what you would praise a man for having done. Since suggestion may or may not forbid an action, the praise into which we convert it must have one or other of two opposite forms of expression accordingly.<sup>27</sup>]] [10]

There are, also, many useful ways of heightening the effect of praise. We must, for instance, point out that a man is the only one, or the first, or almost the only one who has done something, or that he has done it better than anyone else; all these distinctions are honourable. And we must, further, make much of the particular season and occasion of an action; and these must be used when the action was inappropriate. If a man has often achieved the same success, we must mention this; that is a strong point; he himself, and not luck, will then be given the credit. So,

too, [15] if it is on his account that observances have been devised and instituted to encourage or honour such achievements as his own [[and if the first encomium was made for him, as in the case of Hippolochus]],<sup>28</sup> as Harmodius and Aristogeiton had their statues put up in the market-place. And we may censure bad men for the opposite reason.

Again, if you cannot find enough to say of a man himself, you may pit him against others, which is what Isocrates used to do owing to his familiarity with [20] forensic pleading. The comparison should be with famous men; that will strengthen your case; it is a noble thing to surpass men who are themselves great. It is only natural that methods of heightening the effect should be attached particularly to speeches of praise; they aim at proving superiority over others, and any such superiority is a form of nobleness. Hence if you cannot compare your hero with [25] famous men, you should at least compare him with other people generally, since any superiority is held to reveal excellence. And, in general, of the lines of argument which are common to all speeches, this heightening of effect is most suitable for declamations, where we take the actions as admitted facts, and our business is simply to invest these with dignity and nobility. Examples are most suitable to [30] deliberative speeches; for we judge of future events by divination from past events. Enthymemes are most suitable to forensic speeches; it is the past which, because of its obscurity, most admits of explanation and demonstration.

The above are the general lines on which all, or nearly all, speeches of praise or [35] blame are constructed. We have seen the sort of thing we must bear in mind in making such speeches, and the materials out of which encomiums and censures are made. Knowing the above facts, we know their contraries; and it is out of these that speeches of censure are made.

[1368<sup>b</sup>1] **10** · We have next to treat of Accusation and Defence, and to enumerate and describe the ingredients of the deductions used therein. There are three things we must ascertain—first, the nature and number of the incentives to wrong-doing; [5] second, the state of mind of wrongdoers; third, the kind of persons who are wronged, and their condition. We will deal with these questions in order. But before that let us define the act of wrong-doing.

We may describe wrong-doing as injury voluntarily inflicted contrary to law. Law is either special or general. By special law I mean that written law which regulates the life of a particular community; by general law,

all those unwritten principles which are supposed to be acknowledged everywhere. We do things [10] voluntarily when we do them with knowledge and without constraint. (Not all voluntary acts are chosen but all chosen acts are done with knowledge—no one is ignorant of what he chooses.) The causes of our choosing harmful and wicked acts contrary to law are vice and incontinence. For the wrongs a man does to others will [15] correspond to the bad quality or qualities that he himself possesses. Thus it is the mean man who will wrong others about money, the intemperate in matters of physical pleasure, the effeminate in matters of comfort, and the coward where danger is concerned [his terror makes him abandon those who are involved in the [20] same danger].<sup>29</sup> The ambitious man does wrong for the sake of honour, the quick-tempered from anger, the lover of victory for the sake of victory, the embittered man for the sake of revenge, the stupid man because he has misguided notions of right and wrong, the shameless man because he does not mind what people think of him; and so with the rest—any wrong that anyone does to others corresponds to his particular faults of character.

However, this subject has already been cleared up in part in our discussion of [25] the excellences and will be further explained later when we treat of the emotions. We have now to consider the motives and states of mind of wrong-doers, and to whom they do wrong.

Let us first decide what sort of things people are trying to get or avoid when they set about doing wrong to others. For it is plain that the prosecutor must [30] consider, out of all the aims that can ever induce us to do wrong to our neighbours, how many, and which, affect his adversary; while the defendant must consider how many, and which, do *not* affect him. Now every action of every person either is or is not due to that person himself. Of those not due to himself some are due to chance, the others to necessity; of these latter, again, some are due to compulsion, the others [35] to nature. Consequently all actions that are not due to a man himself are due either to chance or to nature or to compulsion. All actions that *are* due to a man himself and caused by himself are due either to habit or to desire; and of the latter, some are [1369a1] due to rational desire, the others to irrational. Rational desire is wishing, and wishing is a desire for good—nobody wishes for anything unless he thinks it good. Irrational desire is twofold, viz. anger and appetite.

Thus every action must be due to one or other of seven causes: chance, nature, [5] compulsion, habit, reasoning, anger, or appetite. It is superfluous further to distinguish actions according to the doers' ages, states, or the like; it is of course true that, for instance, young men do

have hot tempers and strong appetites; still, it is not through youth that they act accordingly, but through anger or appetite. Nor, again, [10] is action due to wealth or poverty; it is of course true that poor men, being short of money, do have an appetite for it, and that rich men, being able to command needless pleasures, do have an appetite for such pleasures: but here, again, their actions will be *due* not to wealth or poverty but to appetite. Similarly, with just men, [15] and unjust men, and all others who are said to act in accordance with their states, their actions will really be due to one of the causes mentioned—either reasoning or emotion: due, indeed, sometimes to good dispositions and good emotions, and sometimes to bad; but that good qualities should be followed by good emotions, and bad by bad, is merely an accessory fact—it is no doubt true that the temperate man, [20] for instance, because he is temperate, is always and at once attended by healthy opinions and appetites in regard to pleasant things, and the intemperate man by unhealthy ones. So we must ignore such distinctions. Still we must consider what kinds of actions and of people usually go together; for while there are no definite [25] kinds of action associated with the fact that a man is fair or dark, tall or short, it does make a difference if he is young or old, just or unjust. And, generally speaking, all those accessory qualities that cause distinctions of human character are important: e.g. the sense of wealth or poverty, of being lucky or unlucky. This will [30] be dealt with later—let us now deal first with the rest of the subject before us.

The things that happen by chance are all those whose cause cannot be determined, that have no purpose, and that happen neither always nor for the most part nor in any fixed way. The definition of chance shows just what they are. Those things happen by nature which have a fixed and internal cause; they take place [1369<sup>b</sup>1] uniformly, either always or for the most part. There is no need to discuss in exact detail the things that happen contrary to nature, nor to ask whether they happen in some sense naturally or from some other cause; it would seem that chance is indeed [5] the cause of such events. Those things happen through compulsion which take place contrary to the desire or reason of the agents themselves. Acts are done from habit which men do because they have often done them before. Actions are due to reasoning when, in view of any of the goods already mentioned, they appear useful either as ends or as contributing to an end, and are performed for that reason—for [10] intemperate men too perform a certain number of useful actions, but because they are pleasant and not because they are useful. To passion and anger are due all acts of revenge. Revenge and punishment are different

things. Punishment is inflicted for the sake of the person punished; revenge for that of the punisher, to satisfy his [15] feelings. (What anger is will be made clear when we come to discuss the emotions.) Appetite is the cause of all actions that appear pleasant. Things familiar and things habitual belong to the class of pleasant things; for there are many actions not naturally pleasant which men perform with pleasure, once they have become used to them. To sum up then, all actions due to ourselves either are or seem to be either [20] good or pleasant. Moreover, as all actions due to ourselves are done voluntarily and actions not due to ourselves are done involuntarily, it follows that all voluntary actions must either be or seem to be either good or pleasant; for I reckon among [25] goods escape from evils or apparent evils and the exchange of a greater evil for a less (since these things are in a sense desirable), and likewise I count among pleasures escape from painful or apparently painful things and the exchange of a greater pain for a less. We must ascertain, then, the number and nature of the things that are [30] useful and pleasant. The useful has been previously examined in connexion with deliberative oratory; let us now proceed to examine the pleasant. Our various definitions must be regarded as adequate, even if they are not exact, provided they are clear.

11 · We may lay it down that pleasure is a movement, a movement by which the soul as a whole is consciously brought into its normal state of being; and that [1370<sup>a</sup>1] pain is the opposite. If this is what pleasure is, it is clear that the pleasant is what tends to produce this condition, while that which tends to destroy it, or to cause the soul to be brought into the opposite state, is painful. It must therefore be pleasant for the most part to move towards a natural state of being, particularly when a [5] natural process has achieved the complete recovery of that natural state. Habits also are pleasant; for as soon as a thing has become habitual, it is virtually natural; habit is a thing not unlike nature; what happens often is akin to what happens always, natural events happening always, habitual events often. Again, that is pleasant which is not forced on us; for force is unnatural, and that is why what is [10] compulsory is painful, and it has been rightly said

All that is done on compulsion is bitterness unto the soul.<sup>30</sup>

So all acts of concentration, strong effort, and strain are necessarily painful; they all involve compulsion and force, unless we are accustomed to them, in which case it is custom that makes them pleasant. The

opposites to these are pleasant; and hence ease, freedom from toil, relaxation, amusement, rest, and sleep belong to the class of [15] pleasant things; for these are all free from any element of compulsion. Everything, too, is pleasant for which we have the appetite within us, since appetite is desire for pleasure. [[Of the appetites some are irrational, some associated with reason. By irrational I mean those which do not arise from any opinion held by the mind. Of [20] this kind are those known as natural; for instance, those originating in the body, such as the appetite for nourishment, [namely hunger and thirst]<sup>31</sup> and a separate kind of appetite answering to each kind of nourishment; and those connected with taste and sex and sensations of touch in general; and those of smell, hearing, and vision. Rational appetites are those which we are induced to have; there are many [25] things we desire to see or get because we have been told of them and induced to believe them good.]]<sup>32</sup> Further, pleasure is the consciousness through the senses of a certain kind of emotion; but imagination is a feeble sort of sensation, and there will always be in the mind of a man who remembers or expects something the imagination of what he remembers or expects. If this is so, it is clear that memory [30] and expectation also, being accompanied by sensation, may be accompanied by pleasure. It follows that anything pleasant is either present and perceived, past and remembered, or future and expected, since we perceive present things, remember past ones, and expect future ones. Now the things that are pleasant to remember are [1370<sup>b</sup>1] not only those that, when actually present, *were* pleasant, but also some things that were not, provided that their results have subsequently proved noble and good. Hence the words

Sweet 'tis when rescued to remember pain,<sup>33</sup>

and

Even his griefs are a joy long after to one that remembers [5]

All that he wrought and endured.<sup>34</sup>

The reason for this is that it is pleasant even to be merely free from evil. The things it is pleasant to expect are those that when present are felt to afford us either great delight or great but not painful benefit. And in general, all the things that delight us when they are present also do so, for the most part, when we merely remember or [10] expect them. Hence even being angry is pleasant—Homer said of wrath that

Sweeter it is by far than the honeycomb dripping with  
sweetness—<sup>35</sup>

for no one grows angry with a person on whom there is no prospect of taking vengeance, and we feel comparatively little anger, or none at all, with those who are much our superiors in power. Some pleasant feeling is associated with most of our [15] appetites; we are enjoying either the memory of a past pleasure or the expectation of a future one, just as persons down with fever, during their attacks of thirst, enjoy remembering the drinks they have had and looking forward to having more. So also a lover enjoys talking or writing about his loved one, or doing any little thing [20] connected with him; all these things recall him to memory and make him as it were present to the eye of imagination. Indeed, it is always the first sign of love, that besides enjoying some one's presence, we remember him when he is gone; and we love when we actually feel pain because he is there no longer. Similarly there is an [25] element of pleasure even in mourning and lamentation. There is grief, indeed, at his loss, but pleasure in remembering him and as it were seeing him before us in his deeds and in his life. We can well believe the poet when he says

He spake, and in each man's heart he awakened the love of lament.<sup>36</sup>

[30] Revenge, too, is pleasant; it is pleasant to get anything that it is painful to fail to get, and angry people suffer extreme pain when they fail to get their revenge; but they enjoy the prospect of getting it. Victory also is pleasant, and not merely to the competitive but to everyone; the winner sees himself in the light of a champion, and everybody has a more or less keen appetite for being that. The pleasantness of [1371<sup>a</sup>1] victory implies of course that combative sports and intellectual contests are pleasant (since in these it often happens that someone wins) and also games like knucklebones, ball, dice, and draughts. And similarly with the serious sports; some [5] of these become pleasant when one is accustomed to them; while others are pleasant from the first, like hunting with hounds, or indeed any kind of hunting. For where there is competition, there is victory. That is why forensic pleading and debating contests are pleasant to those who are accustomed to them and have the capacity for them. Honour and good repute are among the most pleasant things of all; they make a man see himself in the character of a fine fellow, especially when he is credited [10] with it by people whom he thinks tell the truth. His neighbours are better judges than people at a distance; his associates and fellow-countrymen better than strangers; his contemporaries better than posterity; sensible persons better than foolish ones; a large number of people better than a small number: those of the



former class, in each case, are the more likely to be truthful. Honour and credit [15] bestowed by those whom you think much inferior to yourself—e.g. children or animals—you do not value: not for its own sake, anyhow: if you do value it, it is for some other reason. Friends belong to the class of pleasant things; it is pleasant to love—if you love wine, you certainly find it delightful; and it is pleasant to be loved, [20] for this too makes a man see himself as the possessor of goodness, a thing that every being that has a feeling for it desires to possess: to be loved means to be valued for one's own personal qualities. To be admired is also pleasant, for the same reason as to be honoured is. Flattery and flatterers are pleasant: the flatterer is a man who, you believe, admires and likes you. To do the same thing often is pleasant, since, as we saw, anything familiar is pleasant. And to change is also pleasant: change means [25] an approach to nature, whereas invariable repetition of anything causes the excessive prolongation of a settled condition: therefore, says the poet,

Change is in all things sweet.<sup>37</sup>

That is why what comes to us only at long intervals is pleasant, whether it be a person or a thing; for it is a change from what we had before, and, besides, what [30] comes only at long intervals has the value of rarity. Learning things and wondering at things are also pleasant for the most part; wondering implies the desire of learning, so that the object of wonder is an object of desire; while in learning one is brought into one's natural condition. [[Conferring and receiving benefits belong to the class of pleasant things; to receive a benefit is to get what one desires; to confer a [1371<sup>b</sup>1] benefit implies both possession and superiority, both of which are things we try to attain. It is because beneficent acts are pleasant that people find it pleasant to put their neighbours straight again and to supply what they lack.]]<sup>38</sup> Again, since learning and wondering are pleasant, it follows that such things as acts of imitation [5] must be pleasant—for instance, painting, sculpture, poetry—and every product of skilful imitation; this latter, even if the object imitated is not itself pleasant; for it is not the object itself which here gives delight; the spectator draws inferences ("That is a so-and-so") and thus learns something fresh. Dramatic turns of fortune and [10] hairbreadth escapes from perils are pleasant, because we feel all such things are wonderful.

And since what is natural is pleasant, and things akin to each other seem natural to each other, therefore all kindred and similar things are for the most part pleasant to each other; for instance, one man, horse, or young person is pleasant to another man, horse, or young person. Hence

the proverbs ‘mate delights mate’, ‘like [15] to like’, ‘beast knows beast’, ‘jackdaw to jackdaw’, and the rest of them. But since everything like and akin to oneself is pleasant, and since every man is himself more like and akin to himself than anyone else is, it follows that all of us must be more or [20] less fond of ourselves. For all this resemblance and kinship is present particularly in the relation of an individual to himself. And because we are all fond of ourselves, it follows that what is our own is pleasant to all of us, as for instance our own deeds and words. That is why we are for the most part fond of our flatterers, our lovers, and honour; also of our children, for our children are our own work. It is also pleasant to complete what is defective, for the whole thing thereupon becomes our [25] own work. [[And since power over others is very pleasant, it is pleasant to be thought wise, for practical wisdom secures us power over others. (Scientific wisdom is the knowledge of many wonderful things.)]]<sup>39</sup> Again, since for the most part men are ambitious, it must be pleasant to disparage our neighbours as well as to have power over them.<sup>40</sup> It is pleasant for a man to spend his time over what he feels he can do [30] best; just as the poet says,

To that he bends himself,  
To that each day allots most time, wherein  
He is indeed the best part of himself.<sup>41</sup>

Similarly, since amusement and every kind of relaxation too belong to the class of pleasant things, it follows that ludicrous things are pleasant, whether men, words, or [1372<sup>a</sup>1] deeds. We have discussed the ludicrous separately in the treatise on the *Art of Poetry*.

So much for the subject of pleasant things: by considering their opposites we can easily see what things are unpleasant.

**12** · The above are the motives that make men do wrong to others; we are [5] next to consider the states of mind in which they do it, and the persons to whom they do it.

They must themselves suppose that the thing can be done, and done by them; and that they can do it without being found out, or that if they are found out they can escape being punished, or that if they are punished the disadvantage will be less than the gain for themselves or those they care for. The general subject of apparent [10] possibility and impossibility will be handled later on, since it is relevant to all kinds of speaking. But it may here be said that people think that they can

themselves most easily do wrong to others without being punished for it if they possess eloquence, or practical ability, or much legal experience, or a large body of friends, or a great deal of money. Their confidence is greatest if they personally possess the advantages [15] mentioned; but even without them they are satisfied if they have friends or supporters or partners who do possess them: they can thus both commit their crimes and escape being found out and punished for committing them. They are also safe, they think, if they are on good terms with their victims or with the judges who try them. Their victims will in that case not be on their guard against being wronged, [20] and will make some arrangement with them instead of prosecuting; while their judges will favour them because they like them, either letting them off altogether or imposing light sentences. They are not likely to be found out if their appearance contradicts the charges that might be brought against them (for instance, a weakling is unlikely to be charged with violent assault, or a poor and ugly man with adultery), or if they act publicly and in the open (for nobody could at all suppose [25] that possible, and therefore no precautions are taken). The same is true of crimes so great and terrible that no man living could be suspected of them: here too no precautions are taken. For all men guard against ordinary offences, just as they guard against ordinary diseases; but no one takes precautions against an offence that nobody has ever yet committed. You feel safe, too, if you have either no enemies or a great many; if you have none, you expect not to be watched and [30] therefore not to be detected; if you have a great many, you will be watched, and therefore people will think you can never risk an attempt on them, and you can defend your innocence by pointing out that you could never have taken such a risk. You may also trust to hide your crime by the way you do it or the place you do it in, or by some convenient means of disposal.

You may feel that even if you are found out you can stave off a trial, or have it postponed, or corrupt your judges: or that even if you are sentenced you can avoid paying damages, or can at least postpone doing so for a long time: or that you are so [35] badly off that you will have nothing to lose. You may feel that the gain to be got by wrong-doing is great or certain or immediate, and that the penalty is small or uncertain or distant. [[It may be that the advantage to be gained is greater than any [1372<sup>b</sup>1] possible retribution: as in the case of despotic power, as is thought.]]<sup>42</sup> You may consider your crimes as bringing you solid profit, while their punishment is nothing more than being called bad names. Conversely, your crimes may bring you some credit (thus you may,

incidentally, be avenging your father or mother, like Zeno), [5] whereas the punishment may amount to a fine, or banishment, or something of that sort. People may be led on to wrong others by either of these motives or feelings; but no man by both—they will affect people of quite opposite characters. You may be encouraged by having often escaped detection or punishment already; or by having often tried and failed; for in crime, as in war, there are men who will always refuse [10] to give up the struggle. You may get your pleasure on the spot and the pain later, or the gain on the spot and the loss later. That is what appeals to incontinent persons—and incontinence may be shown with regard to all the objects of desire. Conversely—what appeals to self-controlled and sensible people—the pain and loss may be immediate, while the pleasure and profit come later and last longer. You [15] may feel able to make it appear that your crime was due to chance, or to necessity, or to natural causes, or to habit: in fact, to put it generally, as if you had made a mistake rather than actually done wrong. You may be able to trust other people to judge you equitably. You may be stimulated by being in want: which may mean that you want necessities, as poor people do, or that you want luxuries, as rich [20] people do. You may be encouraged by having a particularly good reputation, because that will save you from being suspected; or by having a particularly bad one, because nothing you are likely to do will make you more suspected.

The above, then, are the various states of mind in which a man sets about doing wrong to others. The kind of people to whom he does wrong, and the ways in which he does it, must be considered next. The people to whom he does it are those who have what he wants himself, whether this means necessities or luxuries and [25] materials for enjoyment. His victims may be far off or near at hand. If they are near, he gets his profit quickly; if they are far off, vengeance is slow, as those think who plunder the Carthaginians. They may be those who are trustful instead of being cautious and watchful, since all such people are easy to elude. Or those who are too easy-going to have enough energy to prosecute an offender. Or sensitive [30] people, who are not apt to show fight over questions of money. Or those who have been wronged already by many people, and yet have not prosecuted; such men must surely be the proverbial ‘Mysian prey’. Or those who have either never or often been wronged before; in neither case will they take precautions; if they have never been wronged they think they never will, and if they have often been wronged they feel that surely it cannot happen again. Or those whose character has been attacked in [35] the past, or is exposed to attack in the future: they will

be too much frightened of the judges to choose to prosecute, nor can they win their case if they do: this is true of those who are hated or unpopular. Another likely class of victim is those who their [1373<sup>a</sup>1] injurer can pretend have, themselves or through their ancestors or friends, treated badly, or intended to treat badly, the man himself, or his ancestors, or those he cares for; as the proverb says, 'wickedness needs but a pretext'. A man may wrong his enemies, because that is pleasant: he may equally wrong his friends, because that is [5] easy. Then there are those who have no friends, and those who lack eloquence and practical capacity; these will either not attempt to prosecute, or they will come to terms, or failing that they will lose their case. There are those whom it does not pay to waste time in waiting for trial or damages, such as foreigners and small farmers; they will settle for a trifle, and always be ready to leave off. Also those who have [10] themselves wronged others, either often, or in the same way as they are now being wronged themselves—for it is felt that next to no wrong is done to people when it is the same wrong as they have often themselves done to others: if, for instance, you assault a man who has been accustomed to behave with violence to others. So too with those who have done wrong to others, or have meant to, or mean to, or are [15] likely to do so; there is something fine and pleasant in wronging such persons, it seems as though almost no wrong were done. Also those by doing wrong to whom we shall be gratifying our friends, or those we admire or love, or our masters, or in general the people by reference to whom we mould our lives. Also those whom we may wrong and yet be sure of equitable treatment. Also those against whom we have had any grievance, or any previous differences with them, as Callippus had [20] when he behaved as he did to Dion: here too it seems as if almost no wrong were being done. Also those who are on the point of being wronged by others if we fail to wrong them ourselves, since here we feel we have no time left for thinking the matter over. So Aenesidemus is said to have sent the 'cottabus' prize to Gelon, who had just reduced a town to slavery, because Gelon had got there first and forestalled his own attempt. Also those by wronging whom we shall be able to do many [25] righteous acts; for we feel that we can then easily cure the harm done. Thus Jason the Thessalian said that it is a duty to do some unjust acts in order to be able to do many just ones.

Among the kinds of wrong done to others are those that are done universally, or at least commonly: one expects to be forgiven for doing these. Also those that can easily be kept dark, as where things that can rapidly be consumed like eatables are [30] concerned, or things that can

easily be changed in shape, colour, or combination, or things that can easily be stowed away almost anywhere—portable objects that you can stow away in small corners, or things so like others of which you have plenty already that nobody can tell the difference. There are also wrongs of a kind that shame prevents the victim speaking about, such as outrages done to the women in [35] his household or to himself or to his sons. Also those for which you would be thought very litigious to prosecute anyone—trifling wrongs, or wrongs for which people are usually excused.

The above is a fairly complete account of the circumstances under which men do wrong to others, of the sort of wrongs they do, of the sort of persons to whom they do them, and of their reasons for doing them.

**13** · It will now be well to make a complete classification of just and unjust [1373<sup>b</sup>1] actions. We may begin by observing that they have been defined relatively to two kinds of law, and also relatively to two classes of persons. By the two kinds of law I mean particular law and universal law. Particular law is that which each community lays down and applies to its own members: this is partly written and [5] partly unwritten. Universal law is the law of nature. For there really is, as everyone to some extent divines, a natural justice and injustice that is common to all, even to those who have no association or covenant with each other. It is this that Sophocles' Antigone clearly means when she says that the burial of Polyneices was a just act in [10] spite of the prohibition: she means that it was just by nature.

Not of to-day or yesterday it is,  
But lives eternal: none can date its birth.<sup>43</sup>

And so Empedocles, when he bids us kill no living creature, says that doing this is not just for some people while unjust for others, [15]

Nay, but, an all-embracing law, through the realms of the sky  
Unbroken it stretcheth, and over the earth's immensity.<sup>44</sup>

And Alcidas says the same in his Messeniatic Oration.

The actions that we ought to do or not to do have also been divided into two classes as affecting either the whole community or some one of its members. From [20] this point of view we can perform just or unjust acts in either of two ways—towards one definite person, or towards the community. The man who is guilty of adultery or assault is doing wrong to some definite person; the man who avoids service in the army is doing

wrong to the community.

Thus the whole class of unjust actions may be divided into two classes, those [25] affecting the community, and those affecting one or more other persons. We will next, before going further, say what being wronged is. Since it has already been settled that doing a wrong must be voluntary, being wronged must consist in having an injury done to you by someone who does it voluntarily. In order to be wronged, a man must suffer actual harm and suffer it involuntarily. The various possible forms [30] of harm are clearly explained by our previous separate discussion of goods and evils. We have also seen that a voluntary action is one where the doer knows what he is doing. We now see that every accusation must be of an action affecting either the community or some individual. The doer of the action must either know and act voluntarily or not know and act involuntarily. In the former case, he must be acting [35] either from choice or from passion. (Anger will be discussed when we speak of the passions; the motives for crime and the state of mind of the criminal have already been discussed.) Now it often happens that a man will admit an act, but will not [1374<sup>a</sup>1] admit the prosecutor's label for the act nor the facts which that label implies. He will admit that he took a thing but not that he stole it; that he struck someone first, but not that he committed outrage; that he had intercourse with a woman, but not that he committed adultery; that he is guilty of theft, but not that he is guilty of [5] sacrilege, the object stolen not being consecrated; that he has encroached, but not that he has encroached on State lands; that he has been in communication with the enemy, but not that he has been guilty of treason. Here therefore we must be able to distinguish what is theft, outrage, or adultery, from what is not, if we are to be able to make the justice of our case clear, no matter whether our aim is to establish a man's guilt or to establish his innocence. Wherever such charges are brought [10] against a man, the question is whether he is or is not a wrong-doer and wicked. It is choice that constitutes wickedness and wrong-doing, and such names as outrage or theft imply choice as well as the mere action. A blow does not always amount to outrage, but only if it is struck with some such purpose as to insult the man struck or [15] gratify the striker himself. Nor does taking a thing without the owner's knowledge always amount to theft, but only if it is taken with the intention of keeping it and injuring the owner. And as with these charges, so with all the others.

We saw that there are two kinds of right and wrong conduct towards others, one provided for by written ordinances, the other by unwritten.

We have now [20] discussed the kind about which the laws have something to say. The other kind has itself two varieties. First, there is the conduct that springs from exceptional goodness or badness, and is visited accordingly with censure and loss of honour, or with praise and increase of honour and decorations: for instance, gratitude to, or [25] requital of, our benefactors, readiness to help our friends, and the like. The second kind makes up for the defects of a community's written code of law. For equity is regarded as just; it is, in fact, the sort of justice which goes beyond the written law. Its existence partly is and partly is not intended by legislators; not intended, where [30] they have noticed no defect in the law; intended, where they find themselves unable to define things exactly, and are obliged to legislate universally where matters hold only for the most part; or where it is not easy to be complete owing to the endless possible cases presented, such as the kinds and sizes of weapons that may be used to inflict wounds—a lifetime would be too short to make out a complete list of these. If, then, a precise statement is impossible and yet legislation is necessary, the law [35] must be expressed in wide terms; and so, if a man has no more than a finger-ring on his hand when he lifts it to strike or actually strikes another man, he is guilty of a [1374<sup>b</sup>1] criminal act according to the written words of the law; but he is innocent really, and it is equity that declares him to be so. From this definition of equity it is plain what sort of actions, and what sort of persons, are equitable or the reverse. Equity must be [5] applied to forgivable actions; and it must make us distinguish between wrongdoings on the one hand, and mistakes, or misfortunes, on the other. (A misfortune is an act, not due to wickedness, that has unexpected results; a mistake is an act, also not due to turpitude, that has results that might have been expected; a wrongdoing has results that might have been expected, but *is* due to turpitude.) Equity bids us be merciful to the weakness of human nature; to think less about the laws than about [10] the man who framed them, and less about what he said than about what he meant; not to consider the actions of the accused so much as his choice, nor this or that detail so much as the whole story; to ask not what a man is now but what he has [15] always or for the most part been. It bids us remember benefits rather than injuries, and benefits received rather than benefits conferred; to be patient when we are wronged; to settle a dispute by negotiation and not by force; to prefer arbitration to [20] litigation—for an arbitrator goes by the equity of a case, a judge by the law, and arbitration was invented with the express purpose of securing full power for equity.



The above may be taken as a sufficient account of the nature of equity.

14 · The worse of two acts of wrong done to others is that which is prompted by the worse disposition. Hence the most trifling acts may be the worst ones; as [25] when Callistratus charged Melanopus with having cheated the temple-builders of three consecrated half-obols. The converse is true of just acts. This is because the greater is here potentially contained in the less: there is no crime that a man who has stolen three consecrated half-obols would shrink from committing. Sometimes, however, the worse act is reckoned not in this way but by the greater harm that it [30] does. Or it may be because no punishment for it is severe enough to be adequate; or the harm done may be incurable—a difficult and even hopeless crime to defend;<sup>45</sup> or the sufferer may not be able to get his injurer legally punished, a fact that makes the harm incurable, since legal punishment and chastisement are the proper cure. Or again, the man who has suffered wrong may have inflicted some fearful punishment on himself; then the doer of the wrong ought in justice to receive a still more fearful [35] punishment. Thus Sophocles, when pleading for retribution to Euctemon, who had cut his own throat because of the outrage done to him, said he would not fix a [1375<sup>a</sup>1] penalty less than the victim had fixed for himself. Again, a man's crime is worse if he has been the first man, or the only man, or almost the only man, to commit it; or if it is by no means the first time he has made the same mistake; or if his crime has led to the thinking-out and invention of measures to prevent and punish similar crimes—thus in Argos a penalty is inflicted on a man on whose account a law is [5] passed, and also on those on whose account the prison was built; or if a crime is specially brutal, or specially deliberate; or if the report of it arouses more terror than pity. There are also such rhetorically effective ways of putting it as the following: that the accused has disregarded and broken not one but many solemn obligations like oaths, promises, pledges, or rights of intermarriage between [10] states—here the crime is worse because it consists of many crimes; and that the crime was committed in the very place where criminals are punished, as for example perjurers do—it is argued that a man who will commit a crime in a law-court would commit it anywhere. Further, the worse deed is that which involves the doer in special shame; that whereby a man wrongs his benefactors—for he does more than [15] one wrong, by not merely doing them harm but failing to do them good; that which breaks the unwritten laws of justice—the better

sort of man will be just without being forced to be so, and the written laws depend on force while the unwritten ones do not. It may however be argued otherwise, that the crime is worse which breaks the written laws; for the man who commits crimes for which terrible penalties are [20] provided will not hesitate over crimes for which no penalty is provided at all.—So much, then, for the comparative badness of wrongdoing.

15 · There are also the so-called ‘non-technical’ means of persuasion; and we must now take a cursory view of these, since they are specially characteristic of forensic oratory. They are five in number: laws, witnesses, contracts, tortures, oaths.

[25] First, then, let us take laws and see how they are to be used in persuasion and dissuasion, in accusation and defence. If the written law tells against our case, clearly we must appeal to the universal law and to equity as being more just. We must argue that the juror’s oath ‘I will give my verdict according to my honest [30] opinion’ means that one will not simply follow the letter of the written law. We must urge that the principles of equity are permanent and changeless, and that the universal law does not change either, for it is the law of nature, whereas written laws often do change. This is the bearing of the lines in Sophocles’ *Antigone*, where Antigone pleads that in burying her brother she had broken Creon’s law, but not the unwritten law:

[1375<sup>b</sup>1] Not of today or yesterday they are;

Not I would fear the wrath of any man . . .<sup>46</sup>

We shall argue that justice indeed is true and profitable, but that sham justice is not, and that consequently the written law is not, because it does not fulfil the [5] function of law. Or that justice is like silver, and must be assayed by the judges, if the genuine is to be distinguished from the counterfeit. Or that the better man will follow and abide by the unwritten law in preference to the written. Or perhaps that the law in question contradicts some other highly-esteemed law, or even contradicts [10] itself. Thus it may be that one law will enact that all contracts must be held binding, while another forbids us ever to make illegal contracts. Or if a law is ambiguous, we shall turn it about and consider which construction best fits the interests of justice or utility, and then follow that way of looking at it. Or if, though the law still exists, [15] the situation to meet which it was passed exists no longer, we must do our best to prove this and to combat the law thereby. If however the written law supports our case, we must urge that the oath ‘to give my verdict

according to my honest opinion' is not meant to make the judges give a verdict that is contrary to the law, but to save them from the guilt of perjury if they misunderstand what the law really means. Or that no one chooses what is absolutely good, but everyone what is good for himself. Or that not to use the laws is as bad as to have no laws at all. Or that, as in the other [20] arts, it does not pay to try to be cleverer than the doctor: for less harm comes from the doctor's mistakes than from the growing habit of disobeying authority. Or that trying to be cleverer than the laws is just what is forbidden by those codes of law that are accounted best.—So far as the laws are concerned, the above discussion is [25] probably sufficient.

As to witnesses, they are of two kinds, the ancient and the recent; and these latter, again, either do or do not share in the risks of the trial. By ancient witnesses I mean the poets and all other notable persons whose judgements are known to all. Thus the Athenians appealed to Homer as a witness about Salamis; and the men of [30] Tenedos not long ago appealed to Periander of Corinth in their dispute with the people of Sigeum; and Cleophon supported his accusation of Critias by quoting the elegiac verse of Solon, maintaining that discipline had long been slack in the family of Critias, or Solon would never have written,

Pray thee, bid the red-haired Critias do what his father commands him.<sup>47</sup>

These witnesses are concerned with past events. As to future events we shall [1376\*1] also appeal to soothsayers: thus Themistocles quoted the oracle about 'the wooden wall' as a reason for engaging the enemy's fleet. Further, proverbs are, as has been said, one form of evidence. Thus if you are urging somebody not to make a friend of an old man, you will appeal to the proverb, [5]

Never show an old man kindness.

Or if you are urging that he who has made away with fathers should also make away with their sons, quote,

Fool, who slayeth the father and leaveth his sons to avenge him.

Recent witnesses are well-known people who have expressed their opinions about some disputed matter: such opinions will be useful support for subsequent disputants on the same points: thus Eubulus used in the law-courts against Chares [10] the reply Plato had made to

Archibius, 'It has become the regular custom in this country to admit that one is a scoundrel'. There are also those witnesses who share the risk of punishment if their evidence is pronounced false. These are valid witnesses to the fact that an action was or was not done, that something is or is not the case; they are not valid witnesses to the quality of an action, to its being just or [15] unjust, useful or harmful. On such questions of *quality* the opinion of detached persons does count. Most trustworthy of all are the ancient witnesses, since they cannot be corrupted.

In dealing with the evidence of witnesses, the following are useful arguments. If you have no witnesses on your side, you will argue that the judges must decide from what is probable; that this is meant by 'giving a verdict in accordance with one's honest opinion'; that probabilities cannot be bribed to mislead the court; and [20] that probabilities are never convicted of perjury. If you *have* witnesses, and the other man has not, you will argue that probabilities cannot be put on their trial, and that we could do without the evidence of witnesses altogether if we need do no more than balance the pleas advanced on either side.

The evidence of witnesses may refer either to ourselves or to our opponent; and [25] either to questions of fact or to questions of personal character: so, clearly, we need never be at a loss for useful evidence. For if we have no evidence of fact supporting our own case or telling against that of our opponent, at least we can always find evidence to prove our own worth or our opponent's worthlessness. Other arguments [30] about a witness—that he is a friend or an enemy or neutral, or has a good, bad, or indifferent reputation, and any other such distinctions—we must construct from the same commonplaces as we use for enthymemes.

Concerning contracts argument can be so far employed as to increase or [1376<sup>b1</sup>] diminish their importance and their credibility; we shall try to increase both if they tell in our favour, and to diminish both if they tell in favour of our opponent. Now for confirming or upsetting the credibility of contracts the procedure is just the same as for dealing with witnesses, for the credit to be attached to contracts depends [5] upon the character of those who have signed them or have the custody of them. The contract being once admitted genuine, we must insist on its importance, if it supports our case. We may argue that a contract is a law, though of a special and limited kind; and that, while contracts do not of course make the law binding, the [10] law does make any lawful contract binding, and that the law itself as a whole is a sort of contract, so that anyone who disregards or repudiates any contract is repudiating the law itself.

Further, most business relations—those, namely, that are voluntary—are regulated by contracts, and if these lose their binding force, human intercourse ceases to exist. We need not go very deep to discover the other [15] appropriate arguments of this kind. If, however, the contract tells against us and for our opponents, in the first place those arguments are suitable which we can use to fight a law that tells against us. We do not regard ourselves as bound to observe a bad law which it was a mistake ever to pass: and it is ridiculous to suppose that we are bound to observe a bad and mistaken contract. Again, we may argue that the [20] duty of the judge as umpire is to decide what is just, and therefore he must ask where justice lies, and not what this or that document means. And that it is impossible to pervert justice by fraud or by force, since it is founded on nature, but a party to a contract may be the victim of either fraud or force. Moreover, we must [25] see if the contract contravenes either universal law or any written law of our own or another country; and also if it contradicts any other previous or subsequent contract; arguing that the subsequent is the binding contract, or else that the previous one was right and the subsequent one fraudulent—whichever way suits us. Further, we must consider the question of utility, noting whether the contract is [30] against the interest of the judges or not; and so on—these arguments are as obvious as the others.

Examination by torture is one form of evidence, to which great weight is often attached because it is in a sense compulsory. Here again it is not hard to point out the available grounds for magnifying its value, if it happens to tell in our favour, and arguing that it is the only form of evidence that is truthful; or, on the other hand, for [1377<sup>a</sup>1] refuting it if it tells against us and for our opponent, when we may say what is true of torture of every kind alike, that people under its compulsion lie just as often, sometimes persistently refusing to tell the truth, sometimes recklessly making a [5] false charge in order to be let off sooner. We ought to be able to quote cases, familiar to the judges, in which this sort of thing has actually happened.

In regard to oaths, a fourfold division can be made. A man may either both offer and accept an oath, or neither, or one without the other—that is, he may offer an oath but not accept one, or accept an oath but not offer one. There is also the [10] situation that arises when an oath has already been sworn either by himself or by his opponent.

If you refuse to offer an oath, you may argue that men do not hesitate to perjure themselves; and that if your opponent does swear, you lose your money, whereas, if he does not, you think the judges will decide

against him; and that the risk of an unfavourable verdict is preferable, since you trust the judges and do not trust him. [15]

If you refuse to accept an oath, you may argue that an oath is always paid for; that you would of course have taken it if you had been a rascal, since if you *are* a rascal you had better make something by it, and you would in that case have to swear in order to succeed. Thus your refusal, you argue, must be due to excellence, not to fear of perjury: and you may aptly quote the saying of Xenophanes, that it is no fair challenge when an impious man challenges a pious man—it is as if a strong [20] man were to challenge a weakling to strike, or be struck by, him.

If you agree to accept an oath, you may argue that you trust yourself but not your opponent; and that (to invert the remark of Xenophanes) the fair thing is for the impious man to offer the oath and for the pious man to accept it; and that it would be monstrous if you yourself were unwilling to accept an oath in a case where [25] you demand that the judges should do so before giving their verdict. If you wish to offer an oath, you may argue that piety disposes you to commit the issue to the gods; and that your opponent ought not to want other judges than himself, since you leave the decision with him; and that it is outrageous for your opponents to refuse to swear about this question, when they insist that others should do so.

Now that we see how we are to argue in each case separately, we see also how we are to argue when they occur in pairs, namely, when you are willing to accept the [30] oath but not to offer it; to offer it but not to accept it; both to accept and to offer it; or to do neither. These are of course combinations of the cases already mentioned, [1377<sup>b</sup>1] and so your arguments also must be combinations of the arguments already mentioned.

If you have already sworn an oath that contradicts your present one, you must argue that it is not perjury, since perjury is a crime, and a crime must be a voluntary action, whereas actions due to the force or fraud of others are involuntary. You [5] must further reason from this that perjury depends on the intention and not on the spoken words. But if it is your opponent who has already sworn an oath that contradicts his present one, you must say that if he does not abide by his oaths he is the enemy of society, and that this is the reason why men take an oath before administering the laws. ‘Do my opponents insist that you, the judges, must abide by [10] the oath you have sworn, and yet will not abide by their own oaths?’ And there are other arguments which may be used to magnify the importance of the oath.



## BOOK II

[15]1 · We have now considered the materials to be used in supporting or opposing a measure, in pronouncing eulogies or censures, and for prosecution and defence. We have considered the opinions and propositions useful for persuasive arguments in these areas; for it is about these and on the basis of them that [20] enthymemes are constructed, separately for each type of speech.

But since rhetoric exists to affect the giving of decisions—the hearers decide between one political speaker and another, and a legal verdict *is* a decision—the orator must not only try to make the argument of his speech demonstrative and worthy of belief; he must also make his own character look right and put his hearers, [25] who are to decide, into the right frame of mind. Particularly in deliberative oratory, but also in lawsuits, it adds much to an orator's influence that his own character should look right and that he should be thought to entertain the right feelings towards his hearers; and also that his hearers themselves should be in just the right frame of mind. [[That the orator's own character should look right is particularly [30] important in deliberative speaking: that the audience should be in the right frame of mind, in lawsuits.]]<sup>1</sup> When people are feeling friendly and placable, they think one sort of thing; when they are feeling angry or hostile, they think either something [1378<sup>a</sup>1] totally different or the same thing with a different intensity: when they feel friendly to the man who comes before them for judgement, they regard him as having done little wrong, if any; when they feel hostile, they take the opposite view. Again, if they are eager for, and have good hopes of, a thing that will be pleasant if it [5] happens, they think that it certainly will happen and be good for them; whereas if they are indifferent or annoyed, they do not think so.

There are three things which inspire confidence in the orator's own character—the three, namely, that induce us to believe a thing apart from any proof of it: good sense, excellence, and goodwill. False statements and bad advice are due to one [10] or more of the following three causes. Men either form a false opinion through want of good sense; or they form a true opinion, but because of their moral badness do not say what they really think; or finally, they are both sensible and upright, but not well disposed to their hearers, and may fail in consequence to



recommend what they know to be the best course. These are the only possible cases. It follows that anyone [15] who is thought to have all these good qualities will inspire trust in his audience. The way to make ourselves thought to be sensible and good must be gathered from the analysis of goodness already given: the way to establish your own goodness is the same as the way to establish that of others. Goodwill and friendliness of disposition must form part of our discussion of the emotions. [20]

The emotions are all those feelings that so change men as to affect their judgements, and that are also attended by pain or pleasure. Such are anger, pity, fear and the like, with their opposites. We must arrange what we have to say about each of them under three heads. Take, for instance, the emotion of anger: here we must discover what the state of mind of angry people is, who the people are with [25] whom they usually get angry, and on what grounds they get angry with them. It is not enough to know one or even two of these points; unless we know all three, we shall be unable to arouse anger in anyone. The same is true of the other emotions. So just as earlier in this work we drew up a list of propositions, let us now proceed in the same way to analyse the subject before us. [30]

2 · Anger may be defined as a desire accompanied by pain, for a conspicuous revenge for a conspicuous slight at the hands of men who have no call to slight oneself or one's friends. If this is a proper definition of anger, it must always be felt towards some particular individual, e.g. Cleon, and not man in general. It must be felt because the other has done or intended to do something to him or one of his [1378<sup>b</sup>1] friends. It must always be attended by a certain pleasure—that which arises from the expectation of revenge. For it is pleasant to think that you will attain what you aim at, and nobody aims at what he thinks he cannot attain. Hence it has been well [5] said about wrath,

Sweeter it is by far than the honeycomb dripping with sweetness,  
And spreads through the hearts of men.<sup>2</sup>

It is also attended by a certain pleasure because the thoughts dwell upon the act of vengeance, and the images then called up cause pleasure, like the images called up in dreams.

Now slighting is the actively entertained opinion of something as obviously of [10] no importance. We think bad things, as well as good ones, have serious importance; and we think the same of anything that

tends to produce such things, while those which have little or no such tendency we consider unimportant. There are three kinds of slighting-contempt, spite, and insolence. Contempt is one kind of slighting: you feel contempt for what you consider unimportant, and it is just such [15] things that you slight. Spite is another kind; it is a thwarting another man's wishes, not to get something yourself but to prevent his getting it. The slight arises just from the fact that you do not aim at something for yourself: clearly you do not think that he can do you harm, for then you would be afraid of him instead of slighting him, [20] nor yet that he can do you any good worth mentioning, for then you would be anxious to make friends with him. Insolence is also a form of slighting, since it consists in doing and saying things that cause shame to the victim, not in order that [25] anything may happen to yourself, or because anything has happened to yourself, but simply for the pleasure involved. (Retaliation is not insolence, but vengeance.) The cause of the pleasure thus enjoyed by the insolent man is that he thinks himself greatly superior to others when ill-treating them. That is why youths and rich men are insolent; they think themselves superior when they show insolence. One sort of [30] insolence is to rob people of the honour due to them; you certainly slight them thus; for it is the unimportant, for good or evil, that has no honour paid to it. So Achilles says in anger:

He hath taken my prize for himself and hath done me dishonour,

and

Like an alien honoured by none,<sup>3</sup>

meaning that this is why he is angry. A man expects to be specially respected by his [1379a1] inferiors in birth, in capacity, in goodness, and generally in anything in which he is much their superior: as where money is concerned a wealthy man looks for respect from a poor man; where speaking is concerned, the man with a turn for oratory looks for respect from one who cannot speak; the ruler demands the respect of the ruled, and the man who thinks he ought to be a ruler demands the respect of the man whom he thinks he ought to be ruling. Hence it has been said

Great is the wrath of kings, whose father is Zeus almighty,

[5] and

Yea, but his rancour abideth long afterward also,<sup>4</sup>

their great resentment being due to their great superiority. Then again a man looks for respect from those who he thinks owe him good treatment, and these are the people whom he has treated or is treating well, or means or has meant to treat well, either himself, or through his friends, or through others at his request.

It will be plain by now, from what has been said, in what frame of mind, with [10] what persons, and on what grounds people grow angry. The frame of mind is that in which any pain is being felt. In that condition, a man is always aiming at something. Whether, then, another man opposes him either directly in any way, as by preventing him from drinking when he is thirsty, or indirectly; whether someone works against him, or fails to work with him, or otherwise vexes him while he is in [15] this mood, he is equally angry in all these cases. [Hence people who are afflicted by sickness or poverty or love or thirst or any other unsatisfied desires are prone to anger and easily roused: especially against those who slight their present distress.]<sup>5</sup> Thus a sick man is angered by disregard of his illness, a poor man by disregard of his [20] poverty, a man waging war by disregard of the war he is waging, a lover by disregard of his love, and so in other cases too. Each man is predisposed, by the emotion now controlling him, to his own particular anger. Further, we are angered if we happen to be expecting a contrary result; for a quite unexpected evil is specially painful, just as the quite unexpected fulfilment of our wishes is specially pleasant. Hence it is plain what seasons, times, conditions, and periods of life tend to [25] stir men easily to anger, and where and when this will happen; and it is plain that the more we are under these conditions the more easily we are stirred.

These, then, are the frames of mind in which men are easily stirred to anger. The persons with whom we get angry are those who laugh, mock, or jeer at us, for such conduct is insolent. Also those who inflict injuries upon us that are marks of [30] insolence. These injuries must be such as are neither retaliatory nor profitable to the doers; for then they will be felt to be due to insolence. Also those who speak ill of us, and show contempt for us, in connexion with the things we ourselves most care about: thus those who are eager to win fame as philosophers get angry with those who show contempt for their philosophy; those who pride themselves upon their appearance get angry with those who show contempt for their appearance; and so on [35] in other cases. We feel particularly angry on this account if we suspect that we are in fact, or that people think we are, lacking completely or to any effective extent in the qualities in question. For when we are convinced that we excel in the

qualities for [1379<sup>b</sup>1] which we are jeered at, we can ignore the jeering. Again, we are angrier with our friends than with other people, since we feel that our friends ought to treat us well and not badly. We are angry with those who have usually treated us with honour or regard, if a change comes and they behave to us otherwise; for we think that they [5] feel contempt for us, or they would still be behaving as they did before. And with those who do not return our kindnesses or fail to return them adequately, and with those who oppose us though they are our inferiors; for all such persons seem to feel contempt for us—those who oppose us seem to think us inferior to themselves, and those who do not return our kindnesses seem to think that those kindnesses were conferred by inferiors. And we feel particularly angry with men of no account at all, [10] if they slight us. For we have supposed that anger caused by the slight is felt towards people who are not justified in slighting us, and our inferiors are not thus justified. Again, we feel angry with friends if they do not speak well of us or treat us well; and still more, if they do the contrary; or if they do not perceive our needs, which is why Plexippus is angry with Meleager in Antiphon's play; for this want of perception [15] shows that they are slighting us—we do not fail to perceive the needs of those for whom we care. Again, we are angry with those who rejoice at our misfortunes or simply keep cheerful in the midst of our misfortunes, since this shows that they either hate us or are slighting us. Also with those who are indifferent to the pain they give us: this is why we get angry with bringers of bad news. And with those who [20] listen to stories about us or keep on looking at our weaknesses; this seems like either slighting us or hating us; for those who love us share in all our distresses and it must distress anyone to keep on looking at his own weaknesses. Further, with those who slight us before five classes of people: namely, our rivals, those whom we admire, [25] those whom we wish to admire us, those for whom we feel reverence, those who feel reverence for us: if anyone slights us before such persons, we feel particularly angry. Again, we feel angry with those who slight us in connexion with what we are as honourable men bound to champion—our parents, children, wives, or subjects. [30] And with those who do not return a favour, since such a slight is unjustifiable. Also with those who reply with humorous levity when we are speaking seriously, for such behaviour indicates contempt. And with those who treat us less well than they treat everybody else; it is another mark of contempt that they should think we do not deserve what everyone else deserves. Forgetfulness, too, causes anger, as when our [35] own names are forgotten, trifling as this

may be; since forgetfulness is felt to be another sign that we are being slighted; it is due to negligence, and to neglect us is to slight us.

[1380<sup>a</sup>1] The persons with whom we feel anger, the frame of mind in which we feel it, and the reasons why we feel it, have now all been set forth. Clearly the orator will have to speak so as to bring his hearers into a frame of mind that will dispose them to anger, and to represent his adversaries as open to such charges and possessed of such qualities as do make people angry.

[5] **3** · Since growing calm is the opposite of growing angry, and calmness the opposite of anger, we must ascertain in what frames of mind men are calm, towards whom they feel calm, and by what means they are made so. Growing calm may be defined as a settling down or quieting of anger. Now we get angry with those who slight us; and since slighting is a voluntary act, it is plain that we feel calm towards [10] those who do nothing of the kind, or who do or seem to do it involuntarily. Also towards those who intended to do the opposite of what they did do. Also towards those who treat themselves as they have treated us: since no one can be supposed to slight himself. Also towards those who admit their fault and are sorry; since we [15] accept their grief at what they have done as satisfaction, and cease to be angry. The punishment of servants shows this: those who contradict us and deny their offence we punish all the more, but we cease to be incensed against those who agree that they deserve their punishment. The reason is that it is shameless to deny what is [20] obvious, and those who are shameless towards us slight us and show contempt for us: anyhow, we do not feel shame before those of whom we are thoroughly contemptuous. Also we feel calm towards those who humble themselves before us and do not gainsay us; we feel that they thus admit themselves our inferiors, and inferiors feel fear, and nobody can slight anyone so long as he feels afraid of him. That our anger ceases towards those who humble themselves before us is shown [25] even by dogs, who do not bite people when they sit down. We also feel calm towards those who are serious when we are serious, because then we feel that we are treated seriously and not contemptuously. Also towards those who have done us more kindnesses than we have done them. Also towards those who pray to us and beg for mercy, since they humble themselves by doing so. Also towards those who do not [30] insult or mock at or slight any one at all, or not any worthy person or anyone like ourselves. [[In general, the things that make us calm may be

inferred by seeing what the opposites are of those that make us angry.]]<sup>6</sup> We are not angry with people we fear or respect; for while we are in these states we are not angry—you cannot be afraid of a person and also at the same time angry with him. Again, we feel no anger, or comparatively little, with those who have done what they did through anger; we do not feel that they have done it from a wish to slight us, for no one [35] slights people when angry with them, since slighting is painless, and anger is painful. Nor do we grow angry with those who reverence us. [1380<sup>b</sup>1]

As to the frame of mind that makes people calm, it is plainly the opposite to that which makes them angry, as when they are amusing themselves or laughing or feasting; when they are feeling prosperous or successful or satisfied; when, in fine, they are enjoying freedom from pain, or inoffensive pleasure, or justifiable hope. [5] Also when time has passed and their anger is no longer fresh, for time puts an end to anger. And vengeance previously taken on one person puts an end to even greater anger felt against another person. [[Hence Philocrates, being asked by someone, at a time when the public was angry with him, ‘Why don’t you defend yourself?’ did right to reply, ‘The time is not yet’. ‘Why, when is the time?’ ‘When I see someone [10] else calumniated’.]]<sup>7</sup> For men become calm when they have spent their anger on somebody else. This happened in the case of Ergophilus: though the people were more irritated against him than against Callisthenes, they acquitted him because they had condemned Callisthenes to death the day before. Again, men become calm if they have convicted the offender; or if he has already suffered worse things than they in their anger would have themselves inflicted upon him; for they feel as if they [15] were already avenged. Or if they feel that they themselves are in the wrong and are suffering justly, since men no longer think then that they are suffering without justification; and anger, as we have seen, means this. Hence we ought always to inflict a preliminary punishment in words: if that is done, even slaves are less aggrieved by the actual punishment. We also feel calm if we think that the offender [20] will not see that he is punished on our account and because of the way he has treated us. This is plain from the definition. Hence the poet has well written:

Say that it was Odysseus, sacker of cities,<sup>8</sup>

implying that Odysseus would not have been avenged unless the Cyclops perceived both by whom and for what he had been blinded. Consequently we do not get angry with anyone who cannot be aware of our anger, and

we cease to be angry with [25] people once they are dead, for we feel that the worst has been done to them, and that they will neither feel pain nor anything else that we in our anger aim at making them feel. And therefore the poet has well made Apollo say, in order to put a stop to the anger of Achilles against the dead Hector,

For behold in his fury he doeth despite to the senseless clay.<sup>9</sup>

It is now plain that when you wish to calm others you must draw upon these [30] commonplaces; you must put your hearers into the corresponding frame of mind, and represent those with whom they are angry as formidable, or as worthy of reverence, or as benefactors, or as involuntary agents, or as much distressed at what they have done.

4 · Let us now turn to friendship and enmity, and ask towards whom these [35] feelings are entertained, and why. We will begin by defining friendship and friendly feeling. We may describe friendly feeling towards anyone as wishing for him what you believe to be good things, not for your own sake but for his, and being inclined, [1381<sup>a</sup>1] so far as you can, to bring these things about. [[A friend is one who feels thus and excites these feelings in return.]]<sup>10</sup> Those who think they feel thus towards each other think themselves friends. This being assumed, it follows that your friend is the [5] sort of man who shares your pleasure in what is good and your pain in what is unpleasant, for your sake and for no other reason. This pleasure and pain of his will be the token of his good wishes for you, since we all feel glad at getting what we wish for, and pained at getting what we do not. Those, then, are friends to whom the same things are good and evil; [[and those who are, moreover, friendly or unfriendly [10] to the same people]]<sup>11</sup> for in that case they must have the same wishes, and thus by wishing for each other what they wish for themselves, they show themselves each other's friends. Again, we feel friendly to those who have treated us well, either ourselves or those we care for; or if they have done so on a large scale, or readily, or at some particular crisis; provided it was for our own sake. And also to those who we [15] think *wish* to treat us well. And also to our friends' friends, and to those who like, or are liked by, those whom we like ourselves. And also to those who are enemies to those whose enemies we are, and dislike, or are disliked by, those whom we dislike. For all such persons think the things good which we think good, so that they wish [20] what is good for us; and this, as we saw, is what friends must do. And also to those who are

willing to treat us well where money or our personal safety is concerned; and therefore we value those who are liberal and brave. And to just men—the just we consider to be those who do not live on others; which means those who work for their living, especially farmers and others who work with their own hands. We also [25] like temperate men, because they are not unjust to others; and, for the same reason, those who mind their own business. And also those whose friends we wish to be, if it is plain that they wish to be our friends: such are the good in respect of excellence, and those well thought of by everyone, by the best men, or by those whom we [30] admire or who admire us. And also those with whom it is pleasant to live and spend our days: such are the good-tempered, and those who are not too ready to show us our mistakes, and those who are not cantankerous or quarrelsome—such people are always wanting to fight us, and those who fight us we feel wish for the opposite of what we wish for ourselves—and those who have the tact to make and take a joke; for in both ways they have the same object in view as their neighbour, being able to [35] stand being made fun of as well as do it prettily themselves. And we also feel friendly towards those who praise such good qualities as we possess, and especially if they praise the good qualities that we are not too sure we *do* possess. And towards those who are cleanly in their person, their dress, and all their way of life. And [1381<sup>b1</sup>] towards those who do not reproach us with what we have done amiss to them or they have done to help us, for both actions show a tendency to criticize us. And towards those who do not nurse grudges or store up grievances, but are always ready to make [5] friends again; for we take it that they will behave to us just as we find them behaving to everyone else. And towards those who are not slanderers and who are aware of neither their neighbours' bad points nor our own, but of our good ones only, as a good man always will be. And towards those who do not try to thwart us when we are angry or in earnest, which would mean being ready to fight us. And towards [10] those who have some serious feeling towards us, such as admiration for us, or belief in our goodness, or pleasure in our company; especially if they feel like this about qualities in us for which we especially wish to be admired, esteemed, or liked. And towards those who are like ourselves in character and occupation, provided they do [15] not get in our way or gain their living from the same source as we do—for then it will be a case of 'potter against potter'. And those who desire the same things as we desire, if it is possible for us both to share them together; otherwise the same trouble arises here too. And towards those with whom we are on such terms that, while we



respect their opinions, we need not blush before them for doing what is conventionally [20] wrong; as well as towards those before whom we should be ashamed to do anything really wrong. Again, our rivals, and those whom we should like to envy us—though without ill-feeling—either we like these people or at least we wish them to like us. And we feel friendly towards those whom we help to secure good for themselves, provided we are not likely to suffer heavily by it ourselves. And those who feel as friendly to us when we are not with them as when we are—which is why [25] all men feel friendly towards those who are faithful to their dead friends. And, speaking generally, towards those who are really fond of their friends and do not desert them in trouble; of all good men, we feel most friendly to those who show their goodness as friends. Also towards those who are honest with us, including those who will tell us of their own weak points: it has just been said that with our [30] friends we are not ashamed of what is conventionally wrong, and if we do have this feeling, we do not love them; if therefore we do not have it, it looks as if we *did* love them. We also like those with whom we do not feel frightened or uncomfortable—nobody can like a man of whom he feels frightened. Friendship has various forms—comradeship, intimacy, kinship, and so on.

Things that cause friendship are: doing kindnesses; doing them unasked; and [35] not proclaiming the fact when they are done, which shows that they were done for our own sake and not for some other reason.

Enmity and hatred should clearly be studied by reference to their opposites. [1382<sup>a</sup>1] Enmity may be produced by anger or spite or calumny. Now whereas anger arises from offences against oneself, enmity may arise even without that; we may hate people merely because of what we take to be their character. Anger is always concerned with individuals—Callias or Socrates—whereas hatred is directed also [5] against classes: we all hate any thief and any informer. Moreover, anger can be cured by time; but hatred cannot. The one aims at giving pain to its object, the other at doing him harm; the angry man wants his victims to feel; the hater does not mind [10] whether they feel or not. All painful things are felt; but the greatest evils, injustice and folly, are the least felt, since their presence causes no pain. And anger is accompanied by pain, hatred is not; the angry man feels pain, but the hater does not. Much may happen to make the angry man pity those who offend him, but the hater under no circumstances wishes to pity a man whom he has once hated; for the [15] one would have the offenders suffer for what they have done; the other

would have them cease to exist.

It is plain from all this that we can prove people to be friends or enemies; if they are not, we can make them out to be so; if they claim to be so, we can refute their claim; and if they are disputing through anger or hatred, we can bring them to [20] whichever of these we prefer.

5 · Next, we show the things and persons of which, and the states of mind in which, we feel afraid. Fear may be defined as a pain or disturbance due to imagining some destructive or painful evil in the future. For there are some evils, e.g. wickedness or stupidity, the prospect of which does not frighten us: only such as amount to great pains or losses do. And even these only if they appear not remote [25] but so near as to be imminent: we do not fear things that are a very long way off; for instance, we all know we shall die, but we are not troubled thereby, because death is not close at hand. From this definition it will follow that fear is caused by whatever we feel has great power of destroying us, or of harming us in ways that tend to cause [30] us great pain. Hence the very indications of such things are terrible, making us feel that the terrible thing itself is close at hand; and this—the approach of what is terrible—is danger. Such indications are the enmity and anger of people who have power to do something to us; for it is plain that they have the will to do it, and so they are on the point of doing it. Also injustice in possession of power; for it is the unjust [1382<sup>b</sup>1] man's choice that makes him unjust. Also outraged excellence in possession of power; for it is plain that, when outraged, it always chooses to retaliate, and now it has the power to do so. Also fear felt by those who have the power to do something to us, since such persons are sure to be ready to do it. And since most men tend to be [5] bad—slaves to greed, and cowards in danger—it is, as a rule, a terrible thing to be at another man's mercy; and therefore, if we have done anything horrible, those in the secret terrify us with the thought that they may betray or desert us. And those who can do us wrong are terrible to us when we are liable to be wronged; for as a rule men do wrong to others whenever they have the power to do it. And those who [10] have been wronged, or believe themselves to be wronged, are terrible; for they are always looking out for their opportunity. Also those who have done people wrong, if they possess power, since they stand in fear of retaliation: we have already said that wickedness possessing power is terrible. Again, our rivals for a thing cause us fear when we cannot both have it at once; for we are always at war with such men. We [15]

also fear those who are to be feared by stronger people than ourselves: if they can hurt those stronger people, still more can they hurt us; and, for the same reason, we fear those whom those stronger people are actually afraid of. Also those who have destroyed people stronger than we are. Also those who are attacking people weaker than we are: either they are already formidable, or they will be so when they have thus grown stronger. Of those we have wronged, and of our enemies or rivals, it is [20] not the passionate and outspoken whom we have to fear, but the quiet, dissembling, unscrupulous; since we never know when they are upon us, we can never be sure they are at a safe distance. All terrible things are more terrible if they give us no chance of retrieving a blunder—either no chance at all, or only one that depends on our enemies and not ourselves. Those things are also worse which we cannot, or [25] cannot easily, help. Speaking generally, anything causes us to feel fear that when it happens to, or threatens, others causes us to feel pity.

The above are, roughly, the chief things that are terrible and are feared. Let us now describe the conditions under which we ourselves feel fear. If fear is associated with the expectation that something destructive will happen to us, plainly nobody [30] will be afraid who believes nothing can happen to him; we shall not fear things that we believe cannot happen to us, nor people who we believe cannot inflict them upon us; nor shall we be afraid at times when we think ourselves safe from them. It follows therefore that fear is felt by those who believe something to be likely to happen to them, at the hands of particular persons, in a particular form, and at a particular time. People do not believe this when they are, or think they are, in the [1383<sup>a</sup>1] midst of great prosperity, and are in consequence insolent, contemptuous, and reckless—the kind of character produced by wealth, physical strength, abundance of friends, power; nor yet when they feel they have experienced every kind of horror already and have grown callous about the future, like men who are being flogged to [5] death—if they are to feel the anguish of uncertainty, there must be some faint expectation of escape. This appears from the fact that fear sets us thinking what can be done, which of course nobody does when things are hopeless. Consequently, when it is advisable that the audience should be frightened, the orator must make them feel that they really are in danger of something, pointing out that it has happened to others who were stronger than they are, and is happening, or has happened, to [10] people like themselves, at the hands of unexpected people, in an unexpected form, and at an unexpected time.

Having now seen the nature of fear, and of the things that cause it,

and the various states of mind in which it is felt, we can also see what confidence is, about what things we feel it, and under what conditions. It is the opposite of fear, and what [15] causes it is the opposite of what causes fear; it is, therefore, the imaginative expectation of the nearness of what keeps us safe and the absence or remoteness of what is terrible: it may be due either to the near presence of what inspires confidence or to the absence of what causes alarm. We feel it if we can take [20] steps—many, or important, or both—to cure or prevent trouble; if we have neither wronged others nor been wronged by them; if we have either no rivals at all or no strong ones; if our rivals who are strong are our friends or have treated us well or been treated well by us; or if those whose interest is the same as ours are the more numerous party, or the stronger, or both.

[25] As for our own state of mind, we feel confidence if we believe we have often succeeded and never suffered reverses, or have often met danger and escaped it safely. For there are two reasons why human beings face danger calmly: they may have no experience of it, or they may have means to deal with it: thus when in [30] danger at sea people may feel confident about what will happen either because they have no experience of bad weather, or because their experience gives them the means of dealing with it. We also feel confident whenever there is nothing to terrify other people like ourselves, or people weaker than ourselves, or people than whom we believe ourselves to be stronger—and we believe this if we have conquered them, or conquered others who are as strong as they are, or stronger. Also if we believe ourselves superior to our rivals in the number and importance of the advantages that [1383<sup>b1</sup>] make men formidable—plenty of money, men, friends, land, military equipment (of all, or the most important, kinds). Also if we have wronged no one, or not many, or [5] not those of whom we are afraid. And when we are being wronged; [[and generally, if our relations with the gods are satisfactory, as will be shown especially by signs and oracles]]<sup>12</sup> for anger makes us confident and, anger is excited by our knowledge that we are not the wrongers but the wronged, and that the divine power is always supposed to be on the side of the wronged. Also when, at the outset of an enterprise, [10] we believe that we cannot fail, or that we shall succeed. So much for the causes of fear and confidence.

6 · Next we will explain the things that cause shame and shamelessness, and the persons before whom, and the states of mind

under which they are felt. [15] Shame may be defined as pain or disturbance in regard to bad things, whether present, past, or future, which seem likely to involve us in discredit; and shamelessness as contempt or indifference in regard to these same bad things. If this definition be granted, it follows that we feel shame at such bad things as we think are disgraceful to ourselves or to those we care for. These evils are, in the first place, [20] those due to badness. Such are throwing away one's shield or taking to flight; for these bad things are due to cowardice. Also, withholding a deposit; for that is due to injustice. Also, having carnal intercourse with forbidden persons, at wrong times, or in wrong places; for these things are due to licentiousness. Also, making profit in petty or disgraceful ways, or out of helpless persons, e.g. the poor, or the [25] dead—whence the proverb 'He would pick a corpse's pocket'; for all this is due to low greed and meanness. Also, in money matters, giving less help than you might, or none at all, or accepting help from those worse off than yourself; so also borrowing when it will seem like begging; begging when it will seem like asking the return of a [30] favour; asking such a return when it will seem like begging; praising a man in order that it may seem like begging; and going on begging in spite of failure: all such actions are tokens of meanness. [[Again, praising people to their face is a mark of flattery.]]<sup>13</sup> Also, praising extravagantly a man's good points and glozing over his weaknesses, and showing extravagant sympathy with his grief when you are in his presence, and all that sort of thing; all this shows the disposition of a flatterer. Also, refusing to endure hardships that are endured by people who are older, more [1384<sup>a</sup>1] delicately brought up, of higher rank, or generally less capable of endurance than ourselves; for all this shows effeminacy. Also, accepting benefits, especially accepting them often, from another man, and then abusing him for conferring them: all this shows a mean, ignoble disposition. Also, talking incessantly about [5] yourself, making loud professions, and appropriating the merits of others; for this is due to boastfulness. The same is true of the actions due to any of the other forms of badness of character, of the tokens of such badness, and the like: they are all disgraceful and shameless. Another sort of bad thing at which we feel shame is, lacking a share in the honourable things shared by everyone else, or by all or nearly [10] all who are like ourselves. By 'those like ourselves' I mean those of our own race or country or age or family, and generally those who are on our own level. Once we are on a level with others, it is a disgrace to be, say, less well educated than they are; and so with other advantages: all the more so, in each case, if it is

seen to be our own fault: wherever we are ourselves to blame for our present, past, or future [15] circumstances, it follows at once that this is to a greater extent due to our badness. We are moreover ashamed of having done to us, having had done, or being about to have done to us acts that involve us in dishonour and reproach, e.g. when we submit to outrage (we yield to lust both voluntarily and involuntarily, to force involuntarily), [20] for unresisting submission to them is due to unmanliness or cowardice.

These things, and others like them, are what cause the feeling of shame. Now since shame is the imagination of disgrace, in which we shrink from the disgrace itself and not from its consequences, and we only care what opinion is held of us [25] because of the people who form that opinion, it follows that the people before whom we feel shame are those whose opinion of us matters to us. Such persons are: those who admire us, those whom we admire, those by whom we wish to be admired, those with whom we are competing, and those whose opinion of us we respect. We admire those, and wish those to admire us, who possess any good thing that is highly [30] esteemed; or from whom we are very anxious to get something that they are able to give us—as a lover feels. We compete with our equals. We respect, as true, the views of sensible people, such as our elders and those who have been well educated. And we feel more shame about a thing if it is done openly, before all men's eyes. Hence [35] the proverb, 'shame dwells in the eyes'. For this reason we feel most shame before those who will always be with us and those who notice what we do, since in both cases eyes are upon us. We also feel it before those not open to the same imputation [1384<sup>b1</sup>] as ourselves; for it is plain that their opinions about it are the opposite of ours. [[Also before those who are hard on anyone whose conduct they think wrong.]]<sup>14</sup> For what a man does himself, he is said not to resent when his neighbours do it: so that of course he does resent their doing what he does not do himself. And before those who [5] are likely to tell everybody about you; not telling others is as good as not believing you wrong. People are likely to tell others about you if you have wronged them, since they are on the look out to harm you; or if they speak evil of everybody, for those who attack the innocent will be still more ready to attack the guilty. And [10] before those whose main occupation is with their neighbours' failings—people like satirists and writers of comedy; these are really a kind of evil-speakers and tell-tales. And before those who have never yet known us come to grief, since their attitude to us has amounted to admiration so far: that is why we feel ashamed to refuse

those a favour who ask one for the first time—we have not as yet lost credit with them. Such [15] are those who are just beginning to wish to be our friends; for they have seen our best side only (hence the appropriateness of Euripides' reply to the Syracusans); and such also are those among our old acquaintances who know nothing to our discredit. And we are ashamed not merely of the actual shameful conduct mentioned, but also of the signs of it: not merely, for example, of actual sexual [20] intercourse, but also of its signs; and not merely of disgraceful acts but also of disgraceful talk. Similarly we feel shame not merely in presence of the persons mentioned but also of those who will tell them what we have done, such as their servants or friends. And, generally, we feel no shame before those upon whose opinions we quite look down as untrustworthy (no one feels shame before small [25] children or animals); nor are we ashamed of the same things before intimates as before strangers, but before the former of what seem genuine faults, before the latter of what seem conventional ones.

The conditions under which we shall feel shame are these: first, having people related to us like those before whom we said we feel shame. These are, as was stated, [30] persons whom we admire, or who admire us, or by whom we wish to be admired, or from whom we desire some service that we shall not obtain if we forfeit their good opinion. These persons may be actually looking on (as Cydias represented them in his speech on land assignments in Samos, when he told the Athenians to imagine the Greeks to be standing all around them, actually seeing the way they voted and not [35] merely going to hear about it afterwards); or again they may be near at hand, or may be likely to find out about what we do. This is why in misfortune we do not wish [1385<sup>a</sup>1] to be seen by those who once wished themselves like us; for such a feeling implies admiration. And men feel shame when they have acts or exploits to their credit on which they are bringing dishonour, whether these are their own, or those of their ancestors, or those of other persons with whom they have some close connexion. Generally, we feel shame before those for whose own misconduct we should also feel [5] it—those already mentioned; those who take us as their models, e.g. those whose teachers or advisers we have been; or other people, it may be, like ourselves, whose rivals we are. For there are many things that shame before such people makes us do or leave undone. And we feel more shame when we are likely to be seen by, and go about under the eyes of, those who know of our disgrace. Hence, when Antiphon the [10] poet was to be flogged to death by order of Dionysius, and saw those who were to perish with him

covering their faces as they went through the gates, he said “Why do you cover your faces? Is it lest some of these spectators should see you tomorrow?”

So much for shame; to understand shamelessness, we need only consider the converse cases, and plainly we shall have all we need. [15]

7 · To take kindness next: the definition of it will show us towards whom it is felt, why, and in what frames of mind. Kindness—under the influence of which a man is said to be kind—may be defined as helpfulness towards some one in need, not in return for anything, nor for the advantage of the helper himself, but for that of the person helped. Kindness is great if shown to one who is in great need, or who [20] needs what is important and hard to get, or who needs it at an important and difficult crisis; or if the helper is the only, the first, or the chief person to give the help. Desires constitute such needs; and in particular desires, accompanied by pain, for what is not being attained. The appetites are desires of this kind: sexual desire, for instance. Also those which arise during bodily injuries and in dangers; for appetite is active both in danger and in pain. Hence those who stand by us in poverty [25] or in banishment, even if they do not help us much, are yet really kind to us, because our need is great and the occasion pressing; for instance, the man who gave the mat in the Lyceum. The helpfulness must therefore meet, preferably, just this kind of need; and failing just this kind, some other kind as great or greater. We now see to [30] whom, why, and under what conditions kindness is shown; and these facts must form the basis of our arguments. We must show that the persons helped are, or have been, in such pain and need as has been described, and that their helpers gave, or are giving, the kind of help described, in the kind of need described. We can also see how to eliminate the idea of kindness and make our opponents appear unkind: we may maintain that they are being or have been helpful simply to promote their own [1385<sup>b</sup>1] interest—this, as has been stated, is not kindness; or that their action was accidental, or was forced upon them; or that they were not doing a favour, but merely returning one, whether they know this or not—in either case the action is a mere return, and is therefore not a kindness even in the latter case. In considering this subject we must look at all the categories: an act may be an act of kindness [5] because it is a particular thing, it has a particular magnitude or quality, or is done at a particular time or place. As evidence of the want of kindness, we may point out that a smaller service had been



refused to the man in need; or that the same service, or an equal or greater one, has been given to his enemies; these facts show that the service in question was not done for the sake of the person helped. Or we may point out that the thing desired was worthless and that the helper knew it: no one will [10] admit that he is in need of what is worthless.

8 · So much for kindness and unkindness. Let us now consider pity, asking ourselves what things excite pity, and for what persons, and in what states of our mind pity is felt. Pity may be defined as a feeling of pain at an apparent evil, destructive or painful, which befalls one who does not deserve it, and which we might expect to befall ourselves or some friend of ours, and moreover to befall us [15] soon. For if we are to feel pity we must obviously be capable of supposing that some evil may happen to us or some friend of ours, and moreover some such evil as is stated in our definition or is more or less of that kind. It is therefore not felt by those [20] completely ruined, who suppose that no further evil can befall them, since the worst has befallen them already; nor by those who imagine themselves immensely fortunate—their feeling is rather insolence, for when they think they possess all the good things of life, it is clear that the impossibility of evil befalling them will be included, this being one of the good things in question. Those who think evil *may* [25] befall them are such as have already had it befall them and have safely escaped from it; elderly men, owing to their good sense and their experience; weak men, especially men inclined to cowardice; and also educated people, since these can take long views. Also those who have parents living, or children, or wives; for these are our own, and the evils mentioned above may easily befall them. And those who are [30] neither moved by any courageous emotion such as anger or confidence (these emotions take no account of the future), nor by a disposition to insolence (insolent men, too, take no account of the possibility that something evil will happen to them), nor yet by great fear (panic-stricken people do not feel pity, because they are taken up with what is happening to themselves); only those feel pity who are between these two extremes. In order to feel pity we must also believe in the [1386<sup>a</sup>1] goodness of at least some people; if you think nobody good, you will believe that everybody deserves evil fortune. And, generally, we feel pity whenever we are in the condition of remembering that similar misfortunes have happened to us or ours, or expecting them to happen in future.

So much for the mental conditions under which we feel pity. What we

pity is [5] stated clearly in the definition. All unpleasant and painful things excite pity, and all destructive things; and all such evils as are due to chance, if they are serious. The painful and destructive evils are: death in its various forms, bodily injuries and afflictions, old age, diseases, lack of food. The evils due to chance are: friendlessness, [10] scarcity of friends (it is a pitiful thing to be torn away from friends and companions), deformity, weakness, mutilation; evil coming from a source from which good ought to have come; and the frequent repetition of such misfortunes. Also the coming of good when the worst has happened: e.g. the arrival of the Great [15] King's gifts for Diopieithes after his death. Also that either no good should have befallen a man at all, or that he should not be able to enjoy it when it has.

The grounds, then, on which we feel pity are these or like these. The people we pity are: those whom we know, if only they are not very closely related to us—in that case we feel about them as if we were in danger ourselves. For this reason Amasis [20] did not weep, they say, at the sight of his son being led to death, but did weep when he saw his friend begging: the latter sight was pitiful, the former terrible, and the terrible is different from the pitiful; it tends to cast out pity, and often helps to produce the opposite of pity. For we no longer feel pity when the danger is near [25] ourselves. Also we pity those who are like us in age, character, disposition, social standing, or birth; for in all these cases it appears more likely that the same misfortune may befall us also. Here too we have to remember the general principle that what we fear for ourselves excites our pity when it happens to others. Further, since it is when the sufferings of others are close to us that they excite our pity (we cannot remember what disasters happened a hundred centuries ago, nor look forward to what will happen a hundred centuries hereafter, and therefore feel little [30] pity, if any, for such things): it follows that those who heighten the effect of their words with suitable gestures, tones, appearance, and dramatic action generally, are especially successful in exciting pity: they thus put the disasters before our eyes, and make them seem close to us, just coming or just past. Anything that has just [1386<sup>b1</sup>] happened, or is going to happen soon, is particularly piteous: so too therefore are the signs of suffering—the garments and the like of those who have already suffered; the words and the like of those actually suffering—of those, for instance, who are on the point of death. For all this, because it seems close, tends to produce pity. Most [5] piteous of all is it when, in such times of trial, the victims are persons of noble character, for their suffering is undeserved and it is set before our eyes.

9 · Most directly opposed to pity is the feeling called indignation. Pain at [10] unmerited good fortune is, in one sense, opposite to pain at unmerited bad fortune, and is due to the same character. Both feelings are associated with good character; it is our duty to feel sympathy and pity for unmerited distress, and to feel indignation at unmerited prosperity; for whatever is undeserved is unjust, and that [15] is why we ascribe indignation even to the gods. It might indeed be thought that envy is similarly opposed to pity, on the ground that envy is closely akin to indignation, or even the same thing. But it is not the same. It is true that it also is a disturbing pain excited by the prosperity of others. But it is excited not by the prosperity of the undeserving but by that of people who are like us or equal with us. The two feelings [20] have this in common, that they must be due not to some untoward thing being likely to befall ourselves, but only to what is happening to our neighbour. The feeling ceases to be envy in the one case and indignation in the other, and becomes fear, if the pain and disturbance are due to the prospect of something bad for ourselves as the result of the other man's good fortune. The feelings of pity and indignation will [25] obviously be attended by the converse feelings of satisfaction. If you are pained by the unmerited distress of others, you will be pleased, or at least not pained, by their merited distress. Thus no good man can be pained by the punishment of parricides or murderers. These are things we are bound to rejoice at, as we must at the [30] prosperity of the deserving; both these things are just, and both give pleasure to any honest man, since he cannot help expecting that what has happened to a man like him will happen to him too. All these feelings are associated with the same type of character. And their contraries are associated with the contrary type; the man who is delighted by others' misfortunes is identical with the man who envies others' [1387<sup>a</sup>1] prosperity. For anyone who is pained by the occurrence or existence of a given thing must be pleased by that thing's non-existence or destruction. We can now see that all these feelings tend to prevent pity (though they differ among themselves, for the reasons given), so that all are equally useful for neutralizing an appeal to pity. [5]

We will first consider indignation—reserving the other emotions for subsequent discussion—and ask with whom, on what grounds, and in what states of mind we may be indignant. These questions are really answered by what has been said already. Indignation is pain caused by the sight of undeserved good fortune. It is, [10] then, plain to begin with that there are some forms of good the sight of which cannot cause it. Thus a man may be just or brave, or acquire excellence: but we shall not

be indignant with him for that reason, any more than we shall pity him for the contrary reason. Indignation is roused by the sight of wealth, power, and the like—by all [15] those things, roughly speaking, which are deserved by good men and by those who possess the goods of nature—noble birth, beauty, and so on. Again, what is long established seems akin to what exists by nature; and therefore we feel more indignation at those possessing a given good if they have as a matter of fact only just got it and the prosperity it brings with it. The newly rich give more offence than [20] those whose wealth is of long standing and inherited. The same is true of those who have office or power, plenty of friends, a fine family, etc. We feel the same when these advantages of theirs secure them others. For here again, the newly rich give us more offence by obtaining office through their riches than do those whose wealth is [25] of long standing; and so in all other cases. The reason is that what the latter have is felt to be really their own, but what the others have is not: what appears to have been always what it is is regarded as real, and so the possessions of the newly rich do not seem to be really their own. Further, it is not any and every man that deserves any given kind of good; there is a certain correspondence and appropriateness in such things; thus it is appropriate for brave men, not for just men, to have fine [30] weapons, and for men of family, not for parvenus, to make distinguished marriages. Indignation may therefore properly be felt when anyone gets what is not appropriate for him, though he may be a good man enough. It may also be felt when anyone sets himself up against his superior, especially against his superior in some particular respect—whence the lines

Only from battle he shrank with Ajax, Telamon's son;

Zeus had been angered with him, had he fought with a mightier one;<sup>15</sup>

[1387<sup>b</sup>1] but also, even apart from that, when the inferior in any sense contends with his superior; a musician, for instance, with a just man, for justice is a finer thing than music.

Enough has been said to make clear the grounds on which, and the persons against whom, indignation is felt—they are those mentioned, and others like them. As for the people who feel it; we feel it if we do ourselves deserve the greatest [5] possible goods and moreover have them, for it is an injustice that those who are not our equals should have been held to deserve as much as we have. Or, secondly, we feel it if we are really good and honest people; our judgement is then sound, and we loathe any kind of injustice. Also if we are ambitious and eager to gain

particular [10] ends, especially if we are ambitious for what others are getting without deserving to get it. And, generally, if we think that we ourselves deserve a thing and that others do not, we are disposed to be indignant with those others so far as that thing is concerned. Hence servile, worthless, unambitious persons are not inclined to indignation, since there is nothing they can believe themselves to deserve.

From all this it is plain what sort of men those are at whose misfortunes, [15] distresses, or failures we ought to feel pleased, or at least not pained: by considering the facts described we see at once what their contraries are. If therefore our speech puts the judges in such a frame of mind as that indicated and shows that those who claim pity on certain definite grounds do not deserve to secure pity but do deserve not to secure it, it will be impossible for the judges to feel pity. [20]

10 · To take envy next: we can see on what grounds, against what persons, and in what states of mind we feel it. Envy is pain at the sight of such good fortune as consists of the good things already mentioned; we feel it towards our equals; not with the idea of getting something for ourselves, but because the other people have it. We shall feel it if we have, or think we have, equals; and by ‘equals’ I mean equals [25] in birth, relationship, age, disposition, distinction, or wealth. We feel envy also if we fall but a little short of having everything; which is why people in high place and prosperity feel it—they think everyone else is taking what belongs to themselves. Also if we are exceptionally distinguished for some particular thing, and especially [30] if that thing is wisdom or good fortune. Ambitious men are more envious than those who are not. So also those who profess wisdom; they are ambitious to be thought wise. Indeed, generally, those who aim at a reputation for anything are envious on this particular point. And small-minded men are envious, for everything seems great to them. The good things which excite envy have already been mentioned. The deeds or possessions which arouse the love of reputation and honour and the desire [1388<sup>a</sup>1] for fame, and the various gifts of fortune, are almost all subject to envy; and particularly if we desire the thing ourselves, or think we are entitled to it, or if possession of it puts us a little above others, or a little below them. It is clear also what kind of people we envy; that was included in what has been said already; we [5] envy those who are near us in time, place, age, or reputation. [[Hence the line:

Ay, kin can even be jealous of their kin.]]<sup>16</sup>

Also our fellow-competitors, who are indeed the people just mentioned—we do not compete with men who lived a hundred centuries ago, or those not yet born, or those [10] who dwell near the Pillars of Hercules, or those whom, in our opinion or that of others, we take to be far below us or far above us. So too we compete with those who follow the same ends

as ourselves: we compete with our rivals in sport or in love, and generally with those who are after the same things; and it is therefore these whom [15] we are bound to envy beyond all others. Hence the saying, Potter against potter. We also envy those whose possession of or success in a thing is a reproach to us: these are our neighbours and equals; for it is clear that it is our own fault we have missed the good thing in question; this annoys us, and excites envy in us. We also envy those who have what we ought to have, or have got what we did have once. Hence old men [20] envy younger men, and those who have spent much envy those who have spent little on the same thing. And men who have not got a thing, or not got it yet, envy those who have got it quickly. We can also see what things and what persons give pleasure to envious people, and in what states of mind they feel it: the states of mind in which [25] they feel pain are those under which they will feel pleasure in the contrary things. If therefore we ourselves with whom the decision rests are put into an envious state of mind, and those for whom our pity, or the award of something desirable, is claimed are such as have been described, it is obvious that they will win no pity from us.

11 · We will next consider emulation, showing in what follows its causes [30] and objects, and the state of mind in which it is felt. Emulation is pain caused by seeing the presence, in persons whose nature is like our own, of good things that are highly valued and are possible for ourselves to acquire; but it is felt not because others have these goods, but because we have not got them ourselves. It is therefore a good feeling felt by good persons, whereas envy is a bad feeling felt by bad [35] persons. Emulation makes us take steps to secure the good things in question, envy makes us take steps to stop our neighbour having them. Emulation must therefore [1388<sup>b</sup>1] tend to be felt by persons who believe themselves to deserve certain good things that they have not got. [[For no one aspires to things which appear impossible.]]<sup>17</sup> It is accordingly felt by the young and by persons of lofty disposition. Also by those who possess such good things as are deserved by men held in honour—these are wealth, [5] abundance of friends, public office, and the like; on the assumption that they ought to be good men, they are emulous to gain such goods as ought, in their belief, to belong to men whose state of mind is good. Also by those whom all others think deserving. We also feel it about anything for which our ancestors, relatives, personal friends, race, or country are specially honoured, looking upon that thing as really [10] our own, and therefore feeling that we deserve to have it. Further, since

all good things that are highly honoured are objects of emulation, excellence in its various forms must be such an object, and also all those good things that are useful and serviceable to others: for men honour those who are good, and also those who do them service. So with those good things our possession of which can give enjoyment to our neighbours—wealth and beauty rather than health. We can see, too, what [15] persons are the objects of the feeling. They are those who have these and similar things—those already mentioned, as courage, wisdom, public office. Holders of public office—generals, orators, and all who possess such powers—can do many people a good turn. Also those whom many people wish to be like; those who have [20] many acquaintances or friends; those whom many admire, or whom we ourselves admire; and those who have been praised and eulogized by poets or prose-writers. Persons of the contrary sort are objects of contempt: for the feeling and notion of contempt are opposite to those of emulation. Those who are such as to emulate or be [25] emulated by others are inevitably disposed to be contemptuous of all such persons as are subject to those bad things which are contrary to the good things that are the objects of emulation, despising them for just that reason. Hence we often despise the fortunate, when luck comes to them without their having those good things which are held in honour.

This completes our discussion of the means by which the several emotions may be produced or dissipated, and upon which depend the persuasive arguments [30] connected with the emotions.

12 · Let us now consider the various types of human character, in relation to the emotions, states of character, ages and fortunes. By emotions I mean anger, desire, and the like; these we have discussed already. By states of character I mean [35] excellences and vices; these also have been discussed already, as well as the various things that various types of men tend to choose and to do. By ages I mean youth, the prime of life, and old age. By fortune I mean birth, wealth, power, and their [1389<sup>a</sup>1] opposites—in fact, good fortune and ill fortune.

To begin with the youthful type of character. Young men have strong passions, and tend to gratify them indiscriminately. Of the bodily desires, it is the sexual by which they are most swayed and in which they show absence of [5] self-control. They are changeable and fickle in their desires, which are violent while they last, but quickly over: their impulses are keen but not deep-rooted, and are like sick people's attacks of hunger



and thirst. They are hot-tempered and quicktempered, and apt to give way to their anger; bad temper often gets the better of [10] them, for owing to their love of honour they cannot bear being slighted, and are indignant if they imagine themselves unfairly treated. While they love honour, they love victory still more; for youth is eager for superiority over others, and victory is one form of this. They love both more than they love money, which indeed they love very little, not having yet learnt what it means to be without it—this is the point of [15] Pittacus' remark about Amphiaraus. They look at the good side rather than the bad, not having yet witnessed many instances of wickedness. They trust others readily, because they have not yet often been cheated. They are sanguine; nature warms their blood as though with excess of wine; and besides that, they have as yet met [20] with few disappointments. Their lives are mainly spent not in memory but in expectation; for expectation refers to the future, memory to the past, and youth has a long future before it and a short past behind it: on the first day of one's life one has nothing at all to remember, and can only look forward. They are easily cheated, [25] owing to the sanguine disposition just mentioned. Their hot tempers and hopeful dispositions make them more courageous than older men are; the hot temper prevents fear, and the hopeful disposition creates confidence; we cannot feel fear so long as we are feeling angry, and any expectation of good makes us confident. They are shy, accepting the rules of society in which they have been trained, and not yet believing in any other standard of honour. They have exalted notions, because they [30] have not yet been humbled by life or learnt its necessary limitations; moreover, their hopeful disposition makes them think themselves equal to great things—and that means having exalted notions. They would always rather do noble deeds than useful ones: their lives are regulated more by their character than by reasoning; and [35] whereas reasoning leads us to choose what is useful, excellence leads us to choose what is noble. They are fonder of their friends and companions than older men are, because they like spending their days in the company of others, and have not yet [1389<sup>b</sup>1] come to value either their friends or anything else by their usefulness to themselves. All their mistakes are in the direction of doing things excessively and vehemently. They disobey Chilon's precept by overdoing everything; they love too much and [5] hate too much, and the same with everything else. They think they know everything, and are always quite sure about it; this, in fact, is why they overdo everything. If they do wrong to others, it is because they mean to insult them, not to do them actual harm. They are ready to pity others, because they think

everyone an honest man, or anyhow better than he is: they judge their neighbour by their own harmless [10] natures, and so cannot think he deserves to be treated in that way. They are fond of fun and therefore witty, wit being well-bred insolence.

13 · Such, then, is the character of the young. The character of elderly men—men who are past their prime—may be said to be formed for the most part of [15] elements that are the contrary of all these. They have lived many years; they have often been taken in, and often made mistakes; and life on the whole is a bad business. The result is that they are sure about nothing and under-do everything. They ‘think’, but they never ‘know’; and because of their hesitation they always add a ‘possibly’ or a ‘perhaps’, putting everything this way and nothing positively. They [20] are cynical; that is, they tend to put the worse construction on everything. Further, their experience makes them distrustful and therefore suspicious of evil. Consequently they neither love warmly nor hate bitterly, but following the hint of Bias they love as though they will some day hate and hate as though they will some day [25] love. They are small-minded, because they have been humbled by life: their desires are set upon nothing more exalted or unusual than what will help them to keep alive. They are not generous, because money is one of the things they must have, and at the same time their experience has taught them how hard it is to get and how easy to lose. They are cowardly, and are always anticipating danger; unlike that of the [30] young, who are warm-blooded, their temperament is chilly; old age has paved the way for cowardice; fear is, in fact, a form of chill. They love life; and all the more when their last day has come, because the object of all desire is something we have not got, and also because we desire most strongly that which we need most urgently. [35] They are too fond of themselves; this is one form that small-mindedness takes. Because of this, they guide their lives too much by considerations of what is useful [1390<sup>a</sup>1] and too little by what is noble—for the useful is what is good for oneself, and the noble what is good absolutely. They are not shy, but shameless rather; caring less for what is noble than for what is useful, they feel contempt for what people may think of them. They lack confidence in the future; partly through experience—for [5] most things go wrong, or anyhow turn out worse than one expects; and partly because of their cowardice. They live by memory rather than by hope; for what is left to them of life is but little as compared with the long past; and hope is of the future, memory of the past. This, again, is the cause of their loquacity; they are [10] continually

talking of the past, because they enjoy remembering it. Their fits of anger are sudden but feeble. Their sensual passions have either altogether gone or have lost their vigour: consequently they do not feel their passions much, and their actions are inspired less by what they do feel than by the love of gain. Hence men at this time of life are often supposed to have a self-controlled character; the fact is [15] that their passions have slackened, and they are slaves to the love of gain. They guide their lives by reasoning more than by character; reasoning being directed to utility and character to excellence. If they wrong others, they mean to injure them, not to insult them. Old men may feel pity, as well as young men, but not for the same reason. Young men feel it out of kindness; old men out of weakness, imagining [20] that anything that befalls anyone else might easily happen to them, which, as we saw, is a thought that excites pity. Hence they are querulous, and not disposed to jesting or laughter—the love of laughter being the very opposite of querulousness.

Such are the characters of young men and elderly men. People always think well of speeches adapted to, and reflecting, their own character: and we can now see [25] how to compose our speeches so as to adapt both them and ourselves to our audiences.

14 · As for men in their prime, clearly we shall find that they have a character between that of the young and that of the old, free from the extremes of [30] either. They have neither that excess of confidence which amounts to rashness, nor too much timidity, but the right amount of each. They neither trust everybody nor distrust everybody, but judge people correctly. Their lives will be guided not by the sole consideration either of what is noble or of what is useful, but by both; neither by [1390<sup>b</sup>1] parsimony nor by prodigality, but by what is fit and proper. So, too, in regard to anger and desire; they will be brave as well as temperate, and temperate as well as brave; these virtues are divided between the young and the old; the young are brave [5] but intemperate, the old temperate but cowardly. To put it generally, all the valuable qualities that youth and age divide between them are united in the prime of life, while all their excesses or defects are replaced by moderation and fitness. The body is in its prime from thirty to thirty-five; the mind about forty-nine. [10]

15 · So much for the types of character that distinguish youth, old age, and the prime of life. We will now turn to those gifts of fortune by

which human [15] character is affected. First let us consider good birth. Its effect on character is to make those who have it more ambitious; it is the way of all men who have something to start with to add to the pile, and good birth implies ancestral distinction. The well-born man will look down even on those who are as good as his own ancestors, [20] because any far-off distinction is greater than the same thing close to us, and better to boast about. Being well-born, which means coming of a fine stock, must be distinguished from nobility, which means being true to the family nature—a quality not usually found in the well-born, most of whom are poor creatures. In the generations of men as in the fruits of the earth, there is a varying yield; now and [25] then, where the stock is good, exceptional men are produced for a while, and then decadence sets in. A clever stock will degenerate towards the insane type of [30] character, like the descendants of Alcibiades or of the elder Dionysius; a steady stock towards the fatuous and torpid type, like the descendants of Cimon, Pericles, and Socrates.

16 · The type of character produced by wealth lies on the surface for all to see. Wealthy men are insolent and arrogant; their possession of wealth affects their [1391<sup>a</sup>1] understanding; they feel as if they had every good thing that exists; wealth becomes a sort of standard of value for everything else, and therefore they imagine there is nothing it cannot buy. They are luxurious and ostentatious; luxurious, because of the luxury in which they live and the prosperity which they display; ostentatious and [5] vulgar, because, like other people's, their minds are regularly occupied with the object of their love and admiration, and also because they think that other people's idea of happiness is the same as their own. It is indeed quite natural that they should be affected thus; for if you have money, there are always plenty of people who come begging from you. Hence the saying of Simonides about wise men and rich men, in [10] answer to Hiero's wife, who asked him whether it was better to grow rich or wise. 'Why, rich', he said; 'for I see the wise men spending their days at the rich men's doors'. Rich men also consider themselves worthy to hold public office; for they consider they already have the things that give a claim to office. In a word, the type of character produced by wealth is that of a prosperous fool. There is indeed one [15] difference between the type of the newly-enriched and those who have long been rich: the newly-enriched have all the bad qualities mentioned in an exaggerated and worse form—to be newly-enriched means, so to speak, no education in riches. The wrongs they do others are not meant to injure their victims,

but spring from insolence or self-indulgence, e.g. those that end in assault or in adultery.

[20] **17** · As to power, here too it may fairly be said that the type of character it produces is mostly obvious enough. Some elements in this type it shares with the wealthy type, others are better. Those in power are more ambitious and more manly in character than the wealthy, because they aspire to do the great deeds that their [25] power permits them to do. Responsibility makes them more serious: they have to keep paying attention to the duties their position involves. They are dignified rather than arrogant, for the respect in which they are held inspires them with dignity and therefore with moderation—dignity being a mild and becoming form of arrogance. If they wrong others, they wrong them not on a small but on a great scale.

[30] Good fortune in certain of its branches produces the types of character belonging to the conditions just described, since these conditions are in fact more or less the kinds of good fortune that are regarded as most important. It may be added that good fortune leads us to gain all we can in the way of family happiness and [1391<sup>b</sup>1] bodily advantages. It does indeed make men more supercilious and more reckless; but there is one excellent quality that goes with it—piety, and respect for the divine power, in which they believe because of events which are really the result of chance.

This account of the types of character that correspond to differences of age or fortune may end here; for to arrive at the opposite types to those described, namely, [5] those of the poor, the unfortunate, and the powerless, we have only to ask what the opposite qualities are.

**18** · [[The use of persuasive speech is to lead to decisions. (When we know a thing, and have decided about it, there is no further use in speaking about it.) This is so even if one is addressing a single person and urging him to do or not to do [10] something, as when we advise a man about his conduct or try to change his views: the single person is as much your judge as if he were one of many; we may say, without qualification, that anyone is your judge whom you have to persuade. Nor does it matter whether we are arguing against an actual opponent or against a mere proposition; in the latter case we still have to use speech and overthrow the opposing arguments, and we attack these as we should attack an actual opponent. Our [15] principle holds good of epideictic speeches

also; the audience for whom such a speech is put together is treated as the judge of it. Nevertheless, the only sort of person who can strictly be called a judge is the man who decides the issue in some matter of public controversy; for the issue concerns the facts under dispute or subject to deliberation.]]<sup>18</sup> In the section on political oratory an account has already [20] been given of the types of character that mark the different constitutions.

The manner and means of investing speeches with moral character may now be regarded as fully set forth.

Each of the main divisions of oratory has, we have seen, its own distinct goal. With regard to each division, we have noted the accepted views and propositions upon which we may base our arguments—for deliberative, for epideictic, and for [25] forensic speaking. We have further determined completely by what means speeches may be invested with the required character. We are now to proceed to discuss the arguments common to *all* oratory. All orators are bound to use the topic of the possible and impossible; and to try to show that a thing has happened, or will happen [30] in the future. Again, the topic of size is common to all oratory; all of us have to argue that things are bigger or smaller than they seem, whether we are making deliberative speeches, speeches of eulogy or attack, or prosecuting or defending in [1392<sup>a</sup>1] the law-courts. Having analysed these subjects, we will try to say what we can about the general principles of arguing by enthymeme and example, by the addition of which we may hope to complete the project with which we set out. Of the above-mentioned commonplaces, that concerned with amplification is—as has been [5] already said—most appropriate to epideictic speeches; that concerned with the past, to forensic speeches, where the required decision is always about the past; that concerned with possibility and the future, to deliberative speeches.

19 · Let us first speak of the possible and impossible. It would seem to be the case that if it is possible for one of a pair of contraries to be or happen, then it is possible for the other: e.g. if a man can be cured, he can also fall ill; for any two [10] contraries are equally possible, in so far as they are contraries. That if of two similar things one is possible, so is the other. That if the harder of two things is possible, so is the easier. That if a thing can come into existence in a good and beautiful form, then [15] it can come into existence generally; thus a house can exist more easily than a beautiful house. That if the beginning of a thing can occur, so can the

end; for nothing impossible occurs or begins to occur; thus the commensurability of the diagonal of a square with its side neither occurs nor can begin to occur. That if the [20] end is possible, so is the beginning; for all things that occur have a beginning. That if that which is posterior in essence or in order of generation can come into being, so can that which is prior: thus if a man can come into being, so can a boy, since the boy comes first in order of generation; and if a boy can, so can a man, for the man also is first. That those things are possible of which the love or desire is natural; for [25] no one, as a rule, loves or desires impossibilities. That things which are the object of any kind of science or art are possible and exist or come into existence. That anything is possible the first step in whose production depends on men or things which we can compel or persuade to produce it, by our greater strength, our control of them, or our friendship with them. That where the parts are possible, the whole is [30] possible; and where the whole is possible, the parts are usually possible. For if the slit in front, the toe-piece, and the upper leather can be made, then shoes can be made; and if shoes, then also the front slit and the toe-piece. That if a whole genus is [1392<sup>b1</sup>] a thing that can occur, so can the species; and if the species can occur, so can the genus: thus, if a sailing vessel can be made, so also can a trireme; and if a trireme, then a sailing vessel also. That if one of two things whose existence depends on each [5] other is possible, so is the other; for instance, if double, then half, and if half, then double. That if a thing can be produced without art or preparation, it can be produced still more certainly by the careful application of art to it. Hence Agathon has said:

To some things we by art must needs attain,  
Others by destiny or luck we gain.<sup>19</sup>

[10] That if anything is possible to inferior, weaker, and stupider people, it is more so for their opposites; thus Isocrates said that it would be a strange thing if he could not discover a thing that Euthynus had found out. As for impossibility, we can clearly get what we want by taking the contraries of the arguments stated above.

[15] Questions of past fact may be looked at in the following ways. First, that if the less likely of two things has occurred, the more likely must have occurred also. That if one thing that usually follows another has happened, then that other thing has happened; that, for instance, if a man has forgotten a thing, he has also once learnt it. That if a man had the power and the wish to do a thing, he has done it; for every [20] one does do whatever he wants to do whenever he can do it, there being

nothing to stop him. That, further, he has done the thing in question either if he intended it and nothing external prevented him; or if he had the power to do it and was angry at the time; or if he had the power to do it and his heart was set upon it—for people, as a rule do what they long to do, if they can; bad people through lack of self-control; good people, because their hearts are set upon good things. Again, that if a thing was going to happen, it has happened; if a man was going to do something, he has [25] done it, for it is likely that the intention was carried out. That if one thing has happened which naturally happens before another or with a view to it, the other has happened; for instance, if it has lightened, it has also thundered; and if an action has been attempted, it has been done. That if one thing has happened which naturally happens after another, or with a view to which that other happens, then that other (that which happens first, or happens with a view to this thing) has also happened; thus, if it has thundered it has also lightened, and if an action has been done it has [30] been attempted. Of all these sequences some are inevitable and some merely usual. The arguments for the *non*-occurrence of anything can obviously be found by considering the opposites of those that have been mentioned.

How questions of future fact should be argued is clear from the same [1393<sup>a</sup>1] considerations: that a thing will be done if there is both the power and the wish to do it; or if along with the power to do it there is a craving for the result, or anger, or calculation, prompting it. That the thing will be done, in these cases,<sup>20</sup> if the man is actually setting about it, or even if he means to do it later—for usually what we mean to do happens rather than what we do not mean to do. That a thing will [5] happen if another thing which naturally happens before it has already happened; thus, if it is clouding over, it is likely to rain. That if the means to an end have occurred, then the end is likely to occur; thus, if there is a foundation, there will be a house.

For arguments about the greatness and smallness of things, the greater and the lesser, and generally great things and small, what we have already said will show [10] the line to take. In discussing deliberative oratory we have spoken about the relative greatness of various goods, and about the greater and lesser in general. Since therefore in each type of oratory the object under discussion is some kind of good—whether it is utility, nobleness, or justice—it is clear that every orator must obtain the materials of amplification through these channels. To go further than [15] this, and try to establish abstract laws of greatness and superiority, is to argue without an object; in practical life, particular facts



count more than generalizations.

Enough has now been said about these questions of possibility and the reverse, of past or future fact, and of the relative greatness or smallness of things. [20]

**20** · The special forms of oratorical argument having now been discussed, we have next to treat of those which are common to all kinds of oratory. These are of two main kinds, example and enthymeme; for a maxim is part of an enthymeme. [25]

We will first treat of argument by example, for it has the nature of induction, which is the foundation of reasoning. This form of argument has two varieties; one consisting in the mention of actual past facts, the other in the invention of facts by the speaker. Of the latter, again, there are two varieties, the illustrative parallel and [30] the fable (e.g. the fables of Aesop, or those from Libya). As an instance of the mention of actual facts, take the following. The speaker may argue thus: 'We must prepare for war against the king of Persia and not let him subdue Egypt. For Darius of old did not cross the Aegean until he had seized Egypt; but once he had seized it, he did cross. And Xerxes, again, did not attack us until he had seized Egypt; but [1393<sup>b</sup>1] once he had seized it, he did cross. If therefore the present king seizes Egypt, he also will cross, and therefore we must not let him'.

The illustrative parallel is the sort of argument Socrates used: e.g. 'Public [5] officials ought not to be selected by lot. That is like using the lot to select athletes, instead of choosing those who are fit for the contest; or using the lot to select a steersman from among a ship's crew, as if we ought to take the man on whom the lot falls, and not the man who knows most about it'.

Instances of the fable are that of Stesichorus about Phalaris, and that of Aesop [10] in defence of the popular leader. When the people of Himera had made Phalaris military dictator, and were going to give him a bodyguard, Stesichorus wound up a long talk by telling them the fable of the horse who had a field all to himself. Presently there came a stag and began to spoil his pasturage. The horse, wishing to [15] revenge himself on the stag, asked a man if he could help him to do so. The man said, 'Yes, if you will let me bridle you and get on to your back with javelins in my hand'. The horse agreed, and the man mounted; but instead of getting his revenge on the stag, the horse found himself the slave of the man. 'You too', said [20] Stesichorus, 'take care lest, in your desire for revenge

on your enemies, you meet the same fate as the horse. By making Phalaris military dictator, you have already let yourselves be bridled. If you let him get on to your backs by giving him a bodyguard, from that moment you will be his slaves’.

Aesop, defending before the assembly at Samos a popular leader who was being tried for his life, told this story: A fox, in crossing a river, was swept into a hole [25] in the rocks; and, not being able to get out, suffered miseries for a long time through the swarms of fleas that fastened on her. A hedgehog, while roaming around, noticed the fox; and feeling sorry for her asked if he might remove the fleas. But the fox declined the offer; and when the hedgehog asked why, she replied, ‘These fleas [30] are by this time full of me and not sucking much blood; if you take them away, others will come with fresh appetites and drink up all the blood I have left’. ‘So, men of Samos’, said Aesop, ‘my client will do you no further harm; he is wealthy already. [1394<sup>a</sup>1] But if you put him to death, others will come along who are not rich, and their peculations will empty your treasury completely’.

Fables are suitable for addresses to popular assemblies; and they have one advantage—they are comparatively easy to invent, whereas it is hard to find parallels among actual past events. You will in fact frame them just as you frame [5] illustrative parallels: all you require is the power of thinking out your analogy, a power developed by intellectual training. But while it is easier to supply parallels by inventing fables, it is more valuable for the political speaker to supply them by quoting what has actually happened, since in most respects the future will be like what the past has been.

Where we are unable to argue by enthymeme, we must try to demonstrate our [10] point by this method of example, and to convince our hearers thereby. If we *can* argue by enthymeme, we should use our examples as subsequent supplementary evidence. They should not precede the enthymemes: that will give the argument an inductive air, which only rarely suits the conditions of speech-making. If they follow the enthymemes, they have the effect of witnesses giving evidence, and this always tells. For the same reason, if you put your examples first you must give a large [15] number of them; if you put them last, a single one is sufficient; even a single witness will serve if he is a good one. It has now been stated how many varieties of argument by example there are, and how and when they are to be employed.

21 · We now turn to the use of maxims, in order to see upon what subjects and occasions, and for what kind of speaker, they will appropriately form part of a [20] speech. This will appear most clearly when we have defined a maxim. It is a statement; not about a particular fact, such as the character of Iphicrates, but of a general kind; nor is it about any and every subject—e.g. ‘straight is the contrary of curved’ is not a maxim—but only about questions of practical conduct, courses of [25] conduct to be chosen or avoided. Now an enthymeme is a deduction dealing with such practical subjects. It is therefore roughly true that the premisses or conclusions of enthymemes, considered apart from the rest of the argument, are maxims: e.g.

Never should any man whose wits are sound  
Have his sons taught more wisdom than their fellows. [30]

Here we have a maxim; add the reason or explanation, and the whole thing is an enthymeme; thus—

It makes them idle; and therewith they earn  
III-will and jealousy throughout the city.<sup>21</sup>

Again, [1394<sup>b</sup>1]

There is no man in all things prosperous,<sup>22</sup>

and

There is no man among us all is free,

are maxims; but the latter, taken with what follows it, is an enthymeme—  
[5]

For all are slaves of money or of chance.<sup>23</sup>

From this definition of a maxim it follows that there are four kinds of maxims. In the first place, the maxim may or may not have a supplement. Proof is needed where the statement is paradoxical or disputable; no supplement is wanted where the [10] statement contains nothing paradoxical, either because the view expressed is already a known truth, e.g.

Chiefest of blessings is health for a man, as it seemeth to me,<sup>24</sup>

this being the general opinion; or because, as soon as the view is stated, it is clear at [15] a glance, e.g.

No love is true save that which loves for ever.<sup>25</sup>

Of the maxims that do have a supplement attached, some are part of an enthymeme, e.g.

Never should any man whose wits are sound,

Others have the essential character of enthymemes, but are not stated as parts of enthymemes; these latter are reckoned the best; they are those in which the reason [20] for the view expressed is simply implied, e.g.

O mortal man, nurse not immortal wrath.<sup>26</sup>

To say 'it is not right to nurse immortal wrath' is a maxim; the added words 'O mortal man' give the reason. Similarly, with the words

[25] Mortal creatures ought to cherish mortal, not immortal thoughts.<sup>27</sup>

What has been said has shown us how many kinds of maxim there are, and to what subjects the various kinds are appropriate. They must not be given without supplement if they express disputed or paradoxical views: we must, in that case, either put the supplement first and make a maxim of the conclusion, e.g. you might [30] say, 'For my part, since both unpopularity and idleness are undesirable, I hold that it is better not to be educated'; or you may say this first, and then add the previous clause. Where a statement, without being paradoxical, is not obviously true, the reason should be added as concisely as possible. In such cases both laconic and [1395<sup>a1</sup>] enigmatic sayings are suitable: thus one might say what Stesichorus said to the Locrians, 'Insolence is better avoided, lest the cicadas chirp on the ground'.

The use of maxims is appropriate only to elderly men, and in handling subjects in which the speaker is experienced. For a young man to use them is—like telling [5] stories—unbecoming; to use them in handling things in which one has no experience is silly and ill-bred: a fact sufficiently proved by the special fondness of country fellows for coining maxims, and their readiness to air them.

To declare a thing to be universally true when it is not is most appropriate when working up feelings of horror and indignation in our hearers; especially by [10] way of preface, or after the facts have been

proved. Even hackneyed and commonplace maxims are to be used, if they suit one's purpose: just because they are commonplace, everyone seems to agree with them, and therefore they are taken for truth. Thus, anyone who is calling on his men to risk an engagement without obtaining favourable omens may quote:

One omen of all is best, that we fight for our fatherland.<sup>28</sup>

Or, if he is calling on them to attack a stronger force—

The War-God showeth no favour.<sup>29</sup> [15]

Or, if he is urging people to destroy the innocent children of their enemies—

Fool, who slayeth the father and leaveth his sons to avenge him.

Some proverbs are also maxims, e.g. 'An Attic neighbour.' You are not to avoid uttering maxims that contradict such sayings as have become public property (I mean such sayings as 'know thyself and 'nothing in excess'), if doing so will raise [20] your hearers' opinion of your character, or convey an effect of strong emotion—e.g. an angry speaker might well say, 'It is not true that we ought to know ourselves: anyhow, if this man had known himself, he would never have thought himself fit for an army command.' It will raise people's opinion of our character to say, for [25] instance, 'We ought not to follow the saying that bids us treat our friends as future enemies: much better to treat our enemies as future friends.' Our choice should be implied partly by the very wording of our maxim. Failing this, we should add our reason: e.g. having said 'We should treat our friends, not as the saying advises, but as if they were going to be our friends always', we should add 'for the other behaviour is that of a traitor': or we might put it, 'I disapprove of that saying. A true [30] friend will treat his friend as if he were going to be his friend for ever'; and again, 'Nor do I approve of the saying "nothing in excess": we are bound to hate bad men excessively'.

One great advantage of maxims to a speaker is due to the want of intelligence [1395<sup>b1</sup>] in his hearers, who love to hear him succeed in expressing as a universal truth the opinions which they hold themselves about particular cases. I will explain what I mean by this, indicating at the same time how we are to hunt down the maxims required. The maxim, as has been already said, is a general statement, and people [5] love to hear stated in general terms what they already believe in some

particular connexion: e.g. if a man happens to have bad neighbours or bad children, he will agree with any one who tells him, 'Nothing is more annoying than having neighbours', or 'Nothing is more foolish than to be the parent of children'. The orator has therefore to guess the subjects on which his hearers really hold views [10] already, and what those views are, and then must express, as general truths, these same views on these same subjects. This is one advantage of using maxims. There is another which is more important—it invests a speech with character. There is character in every speech in which the choice is conspicuous; and maxims always [15] produce this effect, because the utterance of them amounts to a general declaration of what should be chosen; so that, if the maxims are sound, they display the speaker as a man of sound character. So much for the maxim—its nature, varieties, proper use, and advantages.

[20] **22** · We now come to the enthymemes, and will begin the subject with some general consideration of the proper way of looking for them, and then proceed to what is a distinct question, the commonplaces to be embodied in them. It has already been pointed out that the enthymeme is a deduction, and in what sense it is so. We have also noted the differences between it and the deduction of dialectic. [25] Thus we must not carry its reasoning too far back, or the length of our argument will cause obscurity; nor must we put in all the steps that lead to our conclusion, or we shall waste words in saying what is manifest. It is this simplicity that makes the uneducated more effective than the educated when addressing popular audiences—makes them, as the poets<sup>30</sup> tell us, 'charm the crowd's ears more finely'. [30] Educated men lay down broad general principles; uneducated men argue from common knowledge and draw obvious conclusions. We must not, therefore, start from any and every opinion, but only from those of definite groups of people—our judges or those whose authority they recognize; and there must, moreover, be no [1396<sup>a</sup>1] doubt in the minds of most, if not all, of our judges that the opinions put forward really are of this sort. We should also base our arguments upon what happens for the most part as well as upon what necessarily happens.

The first thing we have to remember is this. Whether our argument is made in [5] a political gathering or in one of any other sort, we must know some, if not all, of the facts about the subject on which we are to speak and argue. Otherwise we can have no materials out of which to construct arguments. I mean, for instance, how could we advise the

Athenians whether they should go to war or not, if we did not know [10] their strength, whether it was naval or military or both, and how great it is; what their revenues amount to; who their friends and enemies are; what wars, too, they have waged, and with what success; and so on? Or how could we eulogize them if we knew nothing about the sea-fight at Salamis, or the battle of Marathon, or what they did for the Heracleidae, or any other facts like that? All eulogy is based upon [15] the noble deeds—real or imaginary—that stand to the credit of those eulogized. On the same principle, invectives are based on facts of the opposite kind: the orator looks to see what base deeds—real or imaginary—stand to the discredit of those he is attacking, such as treachery to the cause of Hellenic freedom, or the enslavement [20] of their gallant allies against the barbarians (Aegina, Potidaea), or any other misdeeds of this kind that are recorded against them. So, too, in a court of law: whether we are prosecuting or defending, we must pay attention to the existing facts of the case. It makes no difference whether the subject is the Lacedaemonians or the [25] Athenians, a man or a god; we must do the same thing. Suppose it to be Achilles whom we are to advise, to praise or blame, to accuse or defend; here too we must take the facts, real or imaginary; these must be our material, whether we are to praise or blame him for the noble or base deeds he has done, to accuse or defend him for his just or unjust treatment of others, or to advise him about what is or is not to [30] his interest. The same thing applies to any subject whatever. Thus, in handling the question whether justice is or is not a good, we must start with the real facts about justice and goodness. We see, then, that this is the only way in which any one ever proves anything, whether his arguments are strictly cogent or not: not all facts can [1396<sup>b</sup>1] form his basis, but only those that bear on the matter in hand: nor, plainly, can proof be effected otherwise by means of the speech. Consequently, as appears in the *Topics*, we must first of all have by us a selection of arguments about questions that may arise and are suitable for us to handle; and then we must try to think out [5] arguments of the same type for special needs as they emerge; not vaguely and indefinitely, but by keeping our eyes on the actual facts of the subject we have to speak on, and gathering in as many of them as we can that bear closely upon it; for the more actual facts we have at our command, the more easily we prove our case; [10] and the more closely they bear on the subject, the more they will seem to belong to that speech only instead of being common. By ‘common’ I mean, for example, eulogy of Achilles because he is a human being or a demi-god, or because he joined the expedition against Troy:

these things are true of many others, so that this kind of eulogy applies no better to Achilles than to Diomedes. The special facts are those [15] that are true of Achilles alone; such facts as that he slew Hector, the bravest of the Trojans, and Cynus the invulnerable, who prevented all the Greeks from landing, and again that he was the youngest man who joined the expedition, and was not bound by oath to join it, and so on.

Here, then, we have our first principle of selection of enthymemes—that which [20] refers to the commonplaces. We will now consider the elements of enthymemes. (By an element of an enthymeme I mean the same thing as a commonplace.) We will begin, as we must begin, by observing that there are two kinds of enthymemes. One kind proves some affirmative or negative proposition; the other kind disproves one. [25] The difference between the two kinds is the same as that between refutation and deduction in dialectic. The probative enthymeme makes an inference from what is accepted, the refutative makes an inference to what is unaccepted.

We may now be said to have in our hands the commonplaces for the various *special* subjects that it is useful or necessary to handle, having selected the [30] propositions suitable in various cases. We have, in fact, already ascertained the commonplaces applicable to enthymemes about good and evil, the noble and the base, justice and injustice, and also to those about types of character, emotions, and states of mind. Let us now lay hold of certain facts about the whole subject, [1397<sup>a</sup>1] considered from a different and more general point of view. In the course of our discussion we will take note of refutative and demonstrative commonplaces, and also of those used in what seem to be enthymemes, but are not, since they are not deductions at all. Having made all this clear, we will proceed to classify objections and refutations, showing how they can be brought to bear upon enthymemes. [5]

**23** · One probative commonplace is based upon consideration of the opposite of the thing in question. Observe whether that opposite has the opposite quality. If it has not, you refute the original proposition; if it has, you establish it. E.g. [10] ‘Temperance is beneficial; for licentiousness is hurtful’. Or, as in the Messenian speech, ‘If war is the cause of our present troubles, peace is what we need to put things right again’.<sup>31</sup> Or—

For if not even evil-doers should

Anger us if they meant not what they did,

[15] Then can we owe no gratitude to such



Or—

Since in this world liars may win belief,  
Be sure of the opposite likewise—that this world  
Hears many a true word and believes it not.<sup>33</sup>

[20] Another commonplace is got by considering some modification of the key-word, and arguing that what can or cannot be said of the one, can or cannot be said of the other: e.g. ‘just’ does not always mean ‘beneficial’, or ‘justly’ would always mean ‘beneficially’, whereas it is *not* desirable to be justly put to death.

Another is based upon correlative ideas. If it is true that one man *gave* noble or just treatment to another, you argue that the other must have *received* noble or just [25] treatment; or that where it is right to command obedience, it must have been right to obey the command. Thus Diomedon, the tax-farmer, said of the taxes: ‘If it is no disgrace for you to sell them, it is no disgrace for us to buy them’. Further, if ‘well’ or ‘justly’ is true of the person to whom a thing is done, you argue that it is true of the doer. But it is possible to draw a false conclusion here. It may be just that he [30] should be treated in a certain way, and yet *not* just that he should be so treated by you. Hence you must ask yourself two distinct questions: Is it right that he should be [1397<sup>b</sup>1] thus treated? Is it right that you should thus treat him? and apply your results in whichever way is suitable. Sometimes in such a case the two answers differ: you may quite easily have a position like that in the *Alcmaeon* of Theodectes:

And was there none to loathe thy mother’s crime?

to which question Alcmaeon in reply says,

[5] Why, there are two things to examine here.

And when Alphisiboea asks what he means, he rejoins:

They judged *her* fit to die, not *me* to slay her.

[[Again there is the lawsuit about Demosthenes and the men who killed Nicanor; as

they were judged to have killed him justly, it was thought that he was killed justly. And in the case of the man who was killed at Thebes, the judges were requested to [10] decide whether it was unjust that he

should be killed, since if it was not, it was argued that it could not have been unjust to kill him.]]<sup>34</sup>

Another is the *a fortiori*. Thus it may be argued that if even the gods are not omniscient, certainly human beings are not. The principle here is that, if a quality does not in fact exist where it is *more* likely to exist, it clearly does not exist where it is *less* likely. Again, the argument that a man who strikes his father also strikes his [15] neighbours follows from the principle that, if the less likely thing is true, the more likely thing is true also; for a man is less likely to strike his father than to strike his neighbours. The argument, then, may run thus. Or it may be urged that, if a thing is not true where it is more likely, or if it is true where it is less likely, etc.—according as we have to show that a thing *is* or is *not* true. This argument might also be used in a case of parity, as in the lines:

Thou hast pity for *thy* sire, who has lost his sons:

Hast none for Oeneus, whose brave son is dead?<sup>35</sup> [20]

And, again, ‘if Theseus did no wrong, neither did Paris’; or ‘if the sons of Tyndareus did no wrong, neither did Paris’; or ‘if Hector did well to slay Patroclus, Paris did well to slay Achilles’. And ‘if other followers of an art are not bad men, neither are philosophers’. And ‘if generals are not bad men because it often happens that they are condemned to death, neither are sophists’. And the remark that ‘if each [25] individual among you ought to think of his own city’s reputation, you ought all to think of the reputation of Greece as a whole’.

Another is based on considerations of time. Thus Iphicrates, in the case against Harmodius, said, ‘if before doing the deed I had bargained that, if I did it, I should have a statue, you would have given me one. Will you not give me one now that I *have* done the deed? You must not make promises when you are expecting a thing to [30] be done for you, and refuse to fulfil them when the thing has been done’. And, again, to induce the Thebans to let Philip pass through their territory into Attica, it was [1398<sup>a1</sup>] argued that ‘if he had insisted on this before he helped them against the Phocians, they would have promised to do it. It is monstrous, therefore, that just because he threw away his advantage then, and trusted their honour, they should not let him pass through now’.

Another line is to apply to the other speaker what he has said against yourself. It is an excellent turn to give to a debate, as may be seen in the *Teucer*. It was employed by Iphicrates in his reply to Aristophon. ‘Would you’, he asked, ‘take a [5] bribe to betray the fleet?’ ‘No’, said Aristophon; and Iphicrates replied, ‘Very good: if you, who are Aristophon, would not

betray the fleet, would I, who am Iphicrates?’ Only, it must be recognized beforehand that the other man is more likely than you are to commit the crime in question. Otherwise you will make yourself ridiculous; if [10] it is Aristides who is prosecuting, you cannot say that sort of thing to him. The purpose is to discredit the prosecutor, who as a rule would have it appear that his character is better than that of the defendant, a pretension which it is desirable to upset. But the use of such an argument is in all cases ridiculous if you are attacking others for what you do or would do yourself, or are urging others to do what you neither do nor would do yourself.

[15] Another is secured by defining your terms. Thus, ‘What is the supernatural? Surely it is either a god or the work of a god. Well, anyone who believes that the work of a god exists, cannot help also believing that gods exist’. Or take the argument of Iphicrates, ‘Goodness is true nobility; neither Harmodius nor Aristogeiton [20] had any nobility before they did a noble deed’. He also argued that he himself was more akin to Harmodius and Aristogeiton than his opponent was. ‘At any rate, my deeds are more akin to those of Harmodius and Aristogeiton than yours are’. Another example may be found in the *Alexander*. ‘Everyone will agree that by incontinent people we mean those who are not satisfied with the enjoyment of one body’. A further example is to be found in the reason given by Socrates for [25] not going to the court of Archelaus. He said that ‘one is insulted by being unable to requite benefits, as well as by being unable to requite injuries’. All the persons mentioned define their term and get at its essential meaning, and then use the result when reasoning on the point at issue.

Another is founded upon the various senses of a word. Such a word is ‘sharp’, as has been explained in the *Topics*.<sup>36</sup>

Another line is based upon logical division. Thus, ‘All men do wrong from one [30] of three motives, A, B, or C: in my case A and B are out of the question, and even the accusers do not allege C.

Another line is based upon induction. Thus from the case of the woman of Peparethus it might be argued that women everywhere can settle correctly the facts [1398<sup>b</sup>1] about their children. Another example of this occurred at Athens in the case between the orator Mantias and his son, when the boy’s mother revealed the true facts: and yet another at Thebes, in the case between Ismenias and Stilbon, when Dodonis proved that it was Ismenias who was the father of her son Thettaliscus, and he was in consequence always regarded as being so. A further instance of induction [5] may be taken from the *Law* of Theodectes: ‘If we do not

hand over our horses to the care of men who have mishandled other people's horses, nor ships to those who have wrecked other people's ships, and if this is true of everything else alike, then men who have failed to secure other people's safety are not to be employed to secure our [10] own'. Another instance is the argument of Alcidas: 'Everyone honours the wise. Thus the Parians have honoured Archilochus, in spite of his bitter tongue; the Chians Homer, though he was not their countryman; the Mytilenaeans Sappho, though she was a woman; the Lacedaemonians actually made Chilon a member of their senate, though they are the least literary of men; the inhabitants of Lampsacus [15] gave public burial to Anaxagoras, though he was an alien, and honour him even to this day.' [[The Athenians became prosperous under Solon's laws and the Lacedaemonians under those of Lycurgus, while at Thebes no sooner did the leading men become philosophers than the country began to prosper.]]<sup>37</sup>

Another is founded upon some decision already pronounced, whether on the same subject or on one like it or contrary to it. Such a proof is most effective if everyone has always decided thus; but if not everyone, then at any rate most people; [20] or if all, or most, wise or good men have thus decided, or the actual judges of the present question, or those whose authority they accept, or anyone whose decision they cannot contradict because he has complete control over them, or those whom it is not seemly to contradict, as the gods, or one's father, or one's teachers. Thus [25] Autocles said, when attacking Mixidemides, that it was a strange thing that the Dread Goddesses could without loss of dignity submit to the judgement of the Areopagus, and yet Mixidemides could not. Or as Sappho said, 'Death is an evil thing; the gods have so judged it, or they would die'. Or again as Aristippus said in reply to Plato when he spoke somewhat too dogmatically, as Aristippus thought: [30] 'Well, anyhow, our *friend*', meaning Socrates, 'never spoke like that'. And Hegesippus, having previously consulted Zeus at Olympia, asked Apollo at Delphi 'whether his opinion was the same as his father's', implying that it would be [1399<sup>a1</sup>] shameful for him to contradict his father. Thus too Isocrates argued that Helen must have been a good woman, because Theseus decided that she was; and Paris a good man, because the goddesses chose him before all others; and Evagoras also, says Isocrates, was good, since when Conon met with his misfortune he betook [5] himself to Evagoras without trying anyone else on the way.

Another consists in taking separately the parts of a subject. Such is that given in the *Topics*:<sup>38</sup> 'What *sort* of motion is the soul? for it must be

this or that'. The *Socrates* of Theodectes provides an example: 'What temple has he profaned? What gods recognized by the state has he not honoured?' [10]

Again, since it happens that any given thing usually has both good and bad consequences, another line of argument consists in using those consequences as a reason for urging that a thing should or should not be done, for prosecuting or defending anyone, for eulogy or censure. E.g. education leads both to unpopularity, which is bad, and to wisdom, which is good. Hence you either argue, 'It is therefore not well to be educated, since it is not well to be unpopular,' or you answer, 'No, it is well to be educated, since it is well to be wise'. The *Art of Rhetoric* of Callippus is [15] made up of this commonplace, with the addition of those of possibility and the others of that kind already described.

Another is used when we have to urge or discourage a course of action that may be done in either of two opposite ways, and have to apply the method just mentioned to both. The difference between this one and the last is that, whereas in the last any two things are contrasted, here the things contrasted are opposites. For [20] instance, the priestess enjoined upon her son not to take to public speaking: 'For', she said, 'if you say what is right, men will hate you; if you say what is wrong, the gods will hate you'. The reply might be, 'On the contrary, you *ought* to take to public speaking: for if you say what is right, the gods will love you; if you say what is [25] wrong, men will love you'. This amounts to the proverbial 'buying the marsh with the salt'. And this is 'bending back'—when each of two opposites has both a good and a bad consequence opposite respectively to each other.

Another is this: the things people approve of openly are not those which they [30] approve of secretly: openly, their chief praise is given to justice and nobleness; but in their hearts they prefer their own advantage. Try, in face of this, to establish the point of view which your opponent has not adopted. This is the most effective of the forms of argument that contradict common opinion.

Another line is that of rational correspondence. E.g. Iphicrates, when they were trying to compel his son, a youth under the prescribed age, to perform one of the state duties because he was tall, said 'If you count tall boys men, you will next be [1399<sup>b</sup>1] voting short men boys'. And Theodectes in his *Law* said, 'You make citizens of such mercenaries as Strabax and Charidemus, as a reward of their merits; will you not make exiles of such citizens as those who have done irreparable harm among the [5] mercenaries?'

Another line is the argument that if two results are the same their antecedents are also the same. For instance, it was a saying of Xenophanes that to assert that the gods had birth is as impious as to say that they die; the consequence of both statements is that there is a time when the gods do not exist. This line of proof assumes generally that the result of any given thing is always the same: e.g. ‘you are [10] going to decide not about Isocrates, but about the value of the whole profession of philosophy’. Or, ‘to give earth and water’ means slavery; or, ‘to share in the Common Peace’ means obeying orders. We are to make either such assumptions or their opposite, as suits us best.

Another is based on the fact that men do not always make the same choice on a [15] later as on an earlier occasion, but reverse their previous choice. E.g. the following enthymeme: ‘When we were exiles, we fought in order to return; now we have returned, it would be strange to choose exile in order not to have to fight’. On one occasion, that is, they chose to be true to their homes at the cost of fighting, and on the other to avoid fighting at the cost of deserting their homes.

[20] Another is the assertion that some possible motive for an event or state of things is the real one: e.g. that a gift was given in order to cause pain by its withdrawal. This notion underlies the lines:

God gives to many great prosperity,  
Not of good will towards them, but to make  
The ruin of them more conspicuous.<sup>39</sup>

[25] Or take the passage from the *Meleager* of Antiphon:

To slay no boar, but to be witnesses  
Of Meleager’s prowess unto Greece.<sup>40</sup>

Or the argument in the *Ajax* of Theodectes, that Diomedes chose out Odysseus not to do him honour, but in order that his companion might be a lesser man than himself—such a motive for doing so is quite possible.  
[30]

Another is common to forensic and deliberative oratory, namely, to consider inducements and deterrents, and the motives people have for doing or avoiding the actions in question. These are the conditions which make us bound to act if they are for us, and to refrain from action if they are against us: that is, we are bound to act if the action is possible, easy, and useful to ourselves or our friends or hurtful to our [35] enemies; this is true even if the action entails loss, provided the loss is outweighed by the solid advantage. These same arguments also form the materials for

accusation [1400<sup>a</sup>1] or defence—the deterrents being pointed out by the defence, and the inducements by the prosecution. This topic forms the whole *Art of Rhetoric* both of Pamphilus and of Callippus.

Another refers to things which are supposed to happen and yet seem [5] incredible. We may argue that people could not have believed them, if they had not been true or nearly true. And that they are the more likely to be true because they are incredible; for the things which men believe are either facts or probabilities: if, therefore, a thing that *is* believed is improbable and incredible, it must be true, since it is certainly not believed because it is at all probable or credible. An example is what Androcles of the deme Pitthus said in his arraignment of the law. The audience tried to shout him down when he observed that the laws required a law to [10] set them right. ‘Why’, he went on, ‘fish need salt’, improbable and incredible as this might seem for creatures reared in salt water; ‘and olive-cakes need oil’, incredible as it is that what produces oil should need it.

Another line is to refute our opponent’s case by noting any disagreements: [15] first, in the case of our opponent [[if there is any disagreement among all his dates, sections, and statements]],<sup>41</sup> e.g. ‘He says he is devoted to you, yet he conspired with the Thirty’; secondly, bearing on our own conduct, e.g. ‘He says I am litigious, and yet he cannot prove that I have been engaged in a single lawsuit’; thirdly, referring to both of us together, e.g. ‘*He* has never even *lent* anyone a penny, but *I* have [20] *ransomed* quite a number of you’.

Another line that is useful for men and causes that have been really or seemingly slandered, is to show why the facts are not as supposed; pointing out that there is a reason for the false impression given. Thus a woman, who had palmed off her son on another woman, was thought to be the lad’s mistress because she [25] embraced him; but when her action was explained the charge was shown to be groundless. Another example is from the *Ajax* of Theodectes, where Odysseus tells Ajax the reason why, though he is really braver than Ajax, he is not thought so.

Another is to show that if the *cause* is present, the *effect* is present, and if absent, absent. For cause and effect go together, and nothing can exist without a [30] cause. Thus Thrasybulus accused Leodamas of having had his name recorded as a criminal on the slab in the Acropolis, and of erasing the record in the time of the Thirty Tyrants: to which Leodamas replied, ‘Impossible: for the Thirty would have [35] trusted me all the more if my quarrel with the commons had been inscribed on the slab’.

Another line is to consider whether the accused person can take or

could have taken a better course than that which he is recommending or taking, or has taken. If [1400<sup>b</sup>1] so, it is clear that he is not guilty, since no one voluntarily and knowingly chooses what is bad. This argument is, however, fallacious, for it often becomes clear after the event how the action could have been done better, though before the event this was far from clear.

Another line is, when a contemplated action is inconsistent with any past [5] action, to examine them both together. Thus, when the people of Elea asked Xenophanes if they should or should not sacrifice to Leucothea and mourn for her, he advised them not to mourn for her if they thought her a goddess, and not to sacrifice to her if they thought her a mortal woman.

Another line is to make previous mistakes the grounds of accusation or [10] defence. Thus, in the *Medea* of Carcinus the accusers allege that Medea has slain her children; ‘at all events’, they say, ‘they are not to be seen’—Medea having made the mistake of sending her children away. In defence she argues that it is not her children, but Jason, whom she would have slain; for it would have been a mistake on [15] her part not to do this if she *had* done the other. This enthymematic commonplace and type forms the whole of the *Art of Rhetoric* in use before Theodorus.

Another line is to draw meanings from names. Sophocles, for instance, says,

O steel in heart as thou art steel in name.<sup>42</sup>

This is common in praises of the gods. Thus, too, Conon called Thrasybulus *rash in [20] counsel*. And Herodicus said of Thrasymachus, ‘You are always *bold in battle*’; of Polus, ‘you are always *a colt*’; and of the legislator Draco that his laws were those not of a human being but of a *dragon*, so savage were they. And, in Euripides, Hecuba says of Aphrodite,

Her name and Folly’s rightly begin alike,<sup>43</sup>

and Chaeremon writes:

[25] Pentheus—a name foreshadowing grief to come.<sup>44</sup>

The refutative enthymeme has a greater reputation than the demonstrative, because within a small space it works out two opposing arguments, and arguments put side by side are clearer to the audience. But of all deductions, whether refutative [30] or demonstrative, those are most applauded of which we foresee the conclusions from the beginning,



so long as they are not obvious at first sight—for part of the pleasure we feel is at our own intelligent anticipation; or those which we follow well enough to see the point of them as soon as the last word has been uttered.

24 · Besides genuine deductions there may be deductions that look genuine but are not; and since an enthymeme is a deduction of a particular kind, it follows [35] that, besides genuine enthymemes, there may be those that look genuine but are not.

Among the commonplaces that form the spurious enthymeme the first is that [1401<sup>a</sup>1] which arises from the particular words employed. One variety of this is when—as in dialectic, without having gone through any reasoning process, we make a final statement as if it were the conclusion of such a process, ‘Therefore so-and-so is not true’, ‘Therefore also so-and-so must be true’—so too in enthymemes a compact and antithetical utterance passes for an enthymeme, such language being the proper [5] province of enthymeme, so that it is seemingly the form of wording here that causes the illusion mentioned. In order to produce the effect of genuine reasoning by our form of wording it is useful to summarize the results of a number of previous reasonings: as ‘some he saved—others he avenged—the Greeks he freed’. Each of [10] these statements has been previously proved from other facts; but the collocation of them gives the impression of establishing some fresh conclusion.

Another variety is based on homonymy; e.g. the argument that the mouse must be a noble creature, since it gives its name to the most august of all religious rites—for such the Mysteries are. Or one may introduce, into a eulogy of the dog, [15] the dog-star; or Pan, because Pindar said:

O thou blessed one!

Thou whom they of Olympus call

The hound of manifold shape

That follows the Mother of Heaven;<sup>45</sup>

or we may argue that, because there is much disgrace in there *not* being a dog about, there is honour in *being* a dog. Or that Hermes is readier than any other god [20] to go shares, since we never say ‘shares all round’ except of him. Or that speech is a very excellent thing, since good men are not said to be worth money but to be worthy of esteem—the phrase ‘worthy of esteem’ also having the meaning of ‘worth speech’.

Another line is to assert of the whole what is true of the parts, or of the parts what is true of the whole. A whole and its parts are supposed to

be identical, though [25] often they are not. You have therefore to adopt whichever of these two lines better suits your purpose. That is how Euthydemus argues; e.g. that anyone knows that there is a trireme in the Peiraeus, since he knows the separate details that make up this statement. There is also the argument that one who knows the letters knows the whole word, since the word is the same thing as the letters which compose it; or that, if a double portion of a certain thing is harmful to health, then a single portion must not [30] be called wholesome, since it is absurd that two good things should make one bad thing. Put thus, the enthymeme is refutative; put as follows, demonstrative: 'For one good thing cannot be made up of two bad things'. The whole commonplace is fallacious. Again, there is Polycrates' saying that Thrasybulus put down thirty [35] tyrants, where the speaker adds them up one by one. Or the argument in the *Orestes* of Theodectes, where the argument is from part to whole:

'Tis right that she who slays her lord should die.

'It is right, too, that the son should avenge his father. Very good: these two things [1401<sup>b</sup>1] are what Orestes has done'. Still, perhaps the two things, once they are put together, do not form a right act. The fallacy might also be said to be due to omission, since the speaker fails to say by whose hand a husband-slayer should die.

Another commonplace is the use of indignant language, whether to support your own case or to overthrow your opponent's. We do this when we paint a [5] highly-coloured picture of the situation without having proved the facts of it: if the defendant does so, he produces an impression of his innocence; and if the prosecutor does,<sup>46</sup> he produces an impression of the defendant's guilt. Here there is no genuine enthymeme: the hearer infers guilt or innocence, but no proof is given, and the inference is fallacious accordingly.

[10] Another line is to use a sign, which, again, yields no deduction. Thus, it might be said that lovers are useful to their countries, since the love of Harmodius and Aristogeiton caused the downfall of the tyrant Hipparchus. Or, again, that Dionysius is a thief, since he is a vicious man—there is, of course, no deduction here; not every vicious man is a thief, though every thief is a vicious man.

[15] Another line relies on the accidental. An instance is what Polycrates says of the mice, that they came to the rescue because they gnawed through the bowstrings. Or it might be maintained that an invitation to dinner is a great honour, for it was because he was *not*

invited that Achilles was angered with the Greeks at Tenedos. In fact, what angered him was the insult involved; it was a mere accident that this was the particular form that the insult took.

[20] Another is the argument from consequence. In the *Alexander*, for instance, it is argued that Paris must have had a lofty disposition, since he despised society and lived by himself on Mount Ida: because lofty people do this kind of thing, therefore Paris too, we are to suppose, had a lofty soul. Or, if a man dresses fashionably and roams around at night, he is a rake, since that is the way rakes behave. Another [25] similar argument points out that beggars sing and dance in temples, and that exiles can live wherever they please, and that such privileges are at the disposal of those we account happy; and therefore every one might be regarded as happy if only he has those privileges. What matters, however, is the *circumstances* under which the privileges are enjoyed. Hence this line too falls under the head of fallacies by omission.

[30] Another line consists in representing as causes things which are not causes, on the ground that they happened along with or before the event in question. They assume that, because B happens *after* A, it happens *because* of A. Politicians are especially fond of taking this line. Thus Demades said that the policy of Demosthenes was the cause of all the mischief, for after it the war occurred.

Another line consists in leaving out any mention of time and circumstances. [35] E.g. the argument that Paris was justified in taking Helen, since her father left her free to choose: here the freedom was presumably not perpetual; it could only refer to her first choice, beyond which her father's authority could not go. Or again, one might say that to strike a free man is an act of wanton outrage; but it is not so in [1402<sup>a</sup>1] every case—only when it is unprovoked.

Again, a spurious deduction may, as in eristical discussions, be based on the confusion of the absolute with that which is not absolute. As, in dialectic, for instance, it may be argued that what-is-not *is* on the ground that what-is-not *is* [5] what-is-not; or that the unknown can be known, on the ground that it can be known to *be* unknown: so also in rhetoric a spurious enthymeme may be based on the confusion of some particular probability with absolute probability. Now no particular probability is universally probable: as Agathon says,

One might perchance say this was probable— [10]

That things improbable oft will hap to men.<sup>47</sup>

For what is improbable does happen, and therefore it is probable that improbable things *will* happen. Granted this, one might argue that what is improbable is probable. But this is not true absolutely. As, in eristic, the imposture comes from not adding any clause specifying relationship or reference or manner; so here it arises [15] because the probability in question is not general but specific. It is of this commonplace that Corax's *Art of Rhetoric* is composed. If the accused is not open to the charge—for instance if a weakling is tried for violent assault—the defence is that he was not likely to do such a thing. But if he is open to the charge—i.e. if he is a *strong* man—the defence is still that he was not likely to do such a thing, since he [20] could be sure that people would think he *was* likely to do it. And so with any other charge: the accused must be either open or not open to it: both seem probable, but one is probable and the other not so absolutely but only in the way we have described. This sort of argument illustrates what is meant by making the worse argument seem the better. Hence people were right in objecting to the training [25] Protagoras undertook to give them. It was a fraud; the probability it handled was not genuine but spurious, and has a place in no art except Rhetoric and Eristic.

25 · Enthymemes, genuine and apparent, have now been described; the next [30] subject is their refutation.

An argument may be refuted either by a counter-deduction or by bringing an objection. It is clear that counter-deductions can be built up from the same commonplaces; for the materials of deductions are reputable opinions, and such opinions often contradict each other. Objections, as appears in the *Topics*.<sup>48</sup> may be [35] raised in four ways—either by directly attacking your opponent's own statement, or by putting forward another statement like it, or by putting forward a statement contrary to it, or by quoting previous decisions.

By 'attacking your opponent's own statement' I mean, for instance, this: if his enthymeme should assert that love is always good, the objection can be brought in two ways, either by making the general statement that all want is an evil, or by making the particular one that there would be no talk of Caunian love if there were not evil loves as well as good ones.

An objection from a contrary statement is raised when, for instance, the [5] opponent's enthymeme having concluded that a good man does good to all his friends, you object, 'But a bad man does not do evil to all

his friends’.

An example of an objection from a like statement is, the enthymeme having shown that ill-used men always hate their ill-users, to reply, ‘But well-used men do not always love those who used them well’.

The decisions mentioned are those proceeding from well-known men; for instance, if the enthymeme employed has concluded that some allowance ought to [10] be made for drunken offenders, since they did not know what they were doing, the objection will be, ‘Pittacus, then, deserves no approval, or he would not have prescribed specially severe penalties for offences due to drunkenness’.

Enthymemes are based upon one or other of four things: probabilities, examples, evidences, signs. Enthymemes based upon probabilities are those which [15] argue from what is, or is supposed to be, usually true. Enthymemes based upon example are those which proceed from one or more similar cases, arrive at a general proposition, and then argue deductively to a particular inference. Enthymemes based upon evidences are those which argue from the inevitable and invariable. [20] Enthymemes based upon signs are those which argue from some universal or particular proposition, true or false.

Now as a probability is that which happens usually but not always, enthymemes founded upon probabilities can, it is clear, always be refuted by raising some objection. The refutation is not genuine but spurious; for it consists in showing not that your opponent’s premiss is not probable, but only in showing that it is not [25] inevitably true. Hence it is always in defence rather than in accusation that it is possible to gain an advantage by using this fallacy. For the accuser uses probabilities to prove his case: and to refute a conclusion as improbable is not the same thing as to refute it as not inevitable. Any argument based upon what usually happens is always open to objection: otherwise it would not happen usually and be a [30] probability but hold always and be necessary. But the judges think, if the refutation takes this form, either that the accuser’s case is not probable or that they must not decide it; which, as we said, is a false piece of reasoning. For they ought to decide by considering not merely what *must* be true but also what is *likely* to be true: this is, indeed, the meaning of ‘giving a verdict in accordance with one’s honest opinion’. Therefore it is not enough for the defendant to refute the accusation by proving that [35] the charge is not *bound* to be true: he must do so by showing that it is not *likely* to be true. For this purpose his objection must state what is more usually true than the statement attacked. It may do so in either of two ways: either in respect

of time or in [1403<sup>a</sup>1] respect of the facts. It will be most convincing if it does so in both respects; for if the thing in question happens *oftener* thus, the probability is greater.

Signs, and enthymemes based upon them, can be refuted even if the facts are correct, as was said at the outset. For we have shown in the *Analytics*<sup>49</sup> that every [5] sign is non-deductive.

Enthymemes depending on examples may be refuted in the same way as probabilities. If we have a single negative instance, the argument is refuted, in so far as it is proved not inevitable, even though the positive examples are more similar and more frequent. Otherwise, we must contend that the present case is dissimilar, or that its conditions are dissimilar, or that it is different in some way or other. [10]

It will be impossible to refute evidences and enthymemes resting on them, by showing in any way that they are non-deductive: this, too, we see from the *Analytics*.<sup>50</sup> All we can do is to show that the fact alleged does not exist. If there is no doubt that it does, and that it is an evidence, refutation now becomes impossible; [15] for this is equivalent to a demonstration which is clear in every respect.

26 · Amplification and depreciation are not an element of enthymeme. By an element I mean the same thing as a commonplace; for an element is a commonplace embracing a large number of particular kinds of enthymeme. Amplification and depreciation are used to show that a thing is great or small; just [20] as there are other kinds used to show that a thing is good or bad, just or unjust, and anything else of the sort. All these things are the *subject-matter* of deductions and enthymemes; none of these is a commonplace for an enthymeme; no more, therefore, are amplification and depreciation.

Nor are refutative enthymemes a species. For it is clear that refutation consists [25] either in offering proof or in raising an objection, and that we prove the opposite of our adversary's statements. Thus, if he shows that a thing has happened, we show that it has not; if he shows that it has not happened, we show that it has. This, then, could not be the distinction, since the same means are employed by both parties, [30] enthymemes being adduced to show that the fact is or is not so-and-so. An objection, on the other hand, is not an enthymeme at all, but as was said in the *Topics*.<sup>51</sup> it consists in stating some opinion from which it will be clear that our opponent has not reasoned correctly or has made a false assumption.

Three points must be studied in making a speech; and we have now completed the account of examples, maxims, enthymemes, and in general the *thought-element*—the way to invent and refute arguments. We have next to discuss [1403<sup>b</sup>1] language and arrangement.

## BOOK III

1 · In making a speech one must study three points: first, the means of [5] producing persuasion; second, the language; third, the proper arrangement of the various parts of the speech. We have already specified the sources of persuasion. We [10] have shown that these are three in number; what they are; and why there are only these three; for persuasion is in every case effected either by working on the emotions of the judges themselves, by giving them the right impression of the speakers' character, or by proving the truth of the statements made.

Enthymemes also have been described, and the sources from which they should be derived; there being both special lines of argument for enthymemes and commonplaces.

[15] Our next subject will be language. For it is not enough to know *what* we ought to say; we must also say it *as* we ought; much help is thus afforded towards producing the right impression of a speech. The first question to receive attention was naturally the one that comes first naturally—how persuasion can be produced [20] from the facts themselves. The second is how to set these facts out in language. A third would be the proper method of delivery; this is a thing that affects the success of a speech greatly; but hitherto the subject has been neglected. Indeed, it was long before it found a way into the arts of tragic drama and epic recitation: at first poets acted their tragedies themselves. It is plain that delivery has just as much to do with [25] oratory as with poetry. (In connexion with poetry, it has been studied by Glaucon of Teos among others.) It is, essentially, a matter of the right management of the voice to express the various emotions—of speaking loudly, softly, or between the two; of [30] high, low, or intermediate pitch; of the various rhythms that suit various subjects. These are the three things—volume of sound, modulation of pitch, and rhythm—that a speaker bears in mind. It is those who *do* bear them in mind who usually win prizes in the dramatic contests; and just as in drama the actors now count for more than the poets, so it is in the contests of public life, owing to the defects of our [35] political institutions. No systematic treatise upon the rules of delivery has yet been composed; indeed, even the study of language made no progress till late in the day. [1404<sup>a</sup>1] Besides, delivery is—very properly—not regarded as an elevated subject of inquiry. Still, the whole business of rhetoric being concerned with appearances, we must pay attention to the subject of delivery, unworthy though it is, because we



cannot do without it. The right thing in speaking really is that we should be satisfied not to [5] annoy our hearers, without trying to delight them: we ought in fairness to fight our case with no help beyond the bare facts; nothing, therefore, should matter except the proof of those facts. Still, as has been already said, other things affect the result considerably, owing to the defects of our hearers. The arts of language cannot help [10] having a small but real importance, whatever it is we have to expound to others: the way in which a thing is said does affect its intelligibility. Not, however, so much importance as people think. All such arts are fanciful and meant to charm the hearer. Nobody uses fine language when teaching geometry.

When the principles of delivery have been worked out, they will produce the same effect as on the stage. But only very slight attempts to deal with them have been made and by a few people, as by Thrasyarchus in his 'Appeals to Pity'. [15] Dramatic ability is a natural gift, and can hardly be systematically taught. The principles of language can be so taught, and therefore we have men of ability in this direction too, who win prizes in their turn, as well as those speakers who excel in delivery—speeches of the written kind owe more of their effect to their language than to their thought.

It was naturally the poets who first set the movement going; for words [20] represent things, and they had also the human voice at their disposal, which of all our organs can best represent other things. Thus the arts of recitation and acting were formed, and others as well. Now it was because poets seemed to win fame through their fine language when their thoughts were simple enough, that language [25] at first took a poetical colour, e.g. that of Gorgias. Even now most uneducated people think that poetical language makes the finest discourses. That is not true: the language of prose is distinct from that of poetry. This is shown by the state of things to-day, when even the language of tragedy has altered its character. Just as iambics [30] were adopted, instead of tetrameters, because they are the most prose-like of all metres, so tragedy has given up all those words, not used in ordinary talk, which decorated the early drama and are still used by the writers of hexameter poems. It is [35] therefore ridiculous to imitate a poetical manner which the poets themselves have dropped; and it is now plain that we have not to treat in detail the whole question of language, but may confine ourselves to that part of it which concerns our present subject, rhetoric. The other part of it has been discussed in the treatise on the *Art of Poetry*.

2 · We may, then, start from the observations there made, and the stipulation [1404<sup>b</sup>1] that language to be good must be clear, as is proved by the fact that speech which fails to convey a plain meaning will fail to do just what speech has to do. It must also be appropriate, avoiding both meanness and undue evaluation; poetical language is certainly free from meanness, but it is not appropriate to prose. Clearness is secured by [5] using the words (nouns and verbs alike) that are current and ordinary. Freedom from meanness, and positive adornment too, are secured by using the other words mentioned in the *Art of Poetry*. Such variation makes the language appear more stately. People do not feel towards strangers as they do towards their own countrymen, and the same thing is true of their feeling for language. It is therefore well to give to everyday speech [10] an unfamiliar air: people like what strikes them, and are struck by what is out of the way. In verse such effects are common, and there they are fitting: the persons and things there spoken of are comparatively remote from ordinary life; for even in poetry, it is not quite appropriate that fine language should be used by a slave or a very young man, or about very trivial subjects: even in poetry the style, to be appropriate, must [15] sometimes be toned down, though at other times heightened. All the more so in prose, where the subject-matter is less exalted. We can now see that a writer must disguise his art and give the impression of speaking naturally and not artificially. Naturalness is persuasive, artificiality is the contrary; for our hearers are prejudiced and think we have some design against them, as if we were mixing their wines for them. It is like the [20] difference between the quality of Theodorus' voice and the voices of all other actors: his really seems to be that of the character who is speaking, theirs do not. We can hide our purpose successfully by taking the single words of our composition from [25] the speech of ordinary life. This is done in poetry by Euripides, who was the first to show the way to his successors.

Language is composed of nouns and verbs. Nouns are of the various kinds considered in the treatise on poetry. Strange words, compound words, and invented [30] words must be used sparingly and on few occasions: on what occasions we shall state later. The reason for this restriction has been already indicated: they depart from what is suitable, in the direction of excess. In the language of prose, besides the regular and proper terms for things, metaphorical terms only can be used with advantage. This we gather from the fact that these two classes of terms, the proper [35] or regular and the metaphorical—these and no others—are used by everybody in conversation. We can now see that a good

writer can produce a style that is distinguished without being obtrusive, and is at the same time clear, thus satisfying our definition of good oratorical prose. Words of ambiguous meaning are chiefly useful to enable the sophist to mislead his hearers. Synonyms are useful to the poet, [1405<sup>a</sup>1] by which I mean words whose ordinary meaning is the same, e.g. πορεύεσθαι (*advancing*) and βαδίζειν (*proceeding*); these two are ordinary words and have the same meaning.

In the *Art of Poetry*, as we have already said, will be found definitions of these [5] kinds of words; a classification of metaphors; and mention of the fact that metaphor is of great value both in poetry and in prose. Prose-writers must, however, pay specially careful attention to metaphor, because their other resources are scantier than those of poets. Metaphor, moreover, gives style clearness, charm, and distinction as nothing else can: and it is not a thing whose use can be taught by one [10] man to another. Metaphors, like epithets, must be fitting, which means that they must fairly correspond to the thing signified: failing this, their inappropriateness will be conspicuous: the want of harmony between two things is emphasized by their being placed side by side. It is like having to ask ourselves what dress will suit an old man; certainly not the crimson cloak that suits a young man. And if you wish to pay [15] a compliment, you must take your metaphor from something better in the same line; if to disparage, from something worse. To illustrate my meaning: since opposites are in the same class, you do what I have suggested if you say that a man who begs prays, and a man who prays begs; for praying and begging are both varieties of [20] asking. So Iphicrates called Callias a mendicant priest instead of a torch-bearer, and Callias replied that Iphicrates must be uninitiated or he would have called him not a mendicant priest but a torch-bearer. Both are religious titles, but one is honourable and the other is not. Again, somebody calls actors hangers-on of Dionysus, but they call themselves artists: each of these terms is a metaphor, the one [25] intended to throw dirt at the actor, the other to dignify him. And pirates now call themselves purveyors. We can thus call a crime a mistake, or a mistake a crime. We can say that a thief took a thing, or that he plundered his victim. An expression like that of Euripides' Telephus,

[30] King of the oar, on Mysia's coast he landed,<sup>1</sup>

is inappropriate; the word 'king' goes beyond the dignity of the subject, and so the art is *not* concealed. A metaphor may be amiss because the very syllables of the words conveying it fail to indicate sweetness of vocal

utterance. Thus Dionysius the Brazen in his elegies calls poetry ‘Calliope’s screech’. Poetry and screeching are both, to be sure, vocal utterances. But the metaphor is bad, because the sounds of screeching, unlike those of poetry, are discordant and unmeaning. Further, in using [35] metaphors to give names to nameless things, we must draw them not from remote but from kindred and similar things, so that the kinship is clearly perceived as soon as the words are said. Thus in the celebrated riddle

I marked how a man glued bronze with fire to another man’s  
body,<sup>2</sup> [1405<sup>b</sup>1]

the process is nameless; but both it and gluing are a kind of application, and that is why the application of the cupping-glass is here called a ‘gluing’. Good riddles do, in general, provide us with satisfactory metaphors; for metaphors imply riddles, and [5] therefore a good riddle can furnish a good metaphor. Further, the materials of metaphors must be beautiful; and the beauty, like the ugliness, of all words may, as Licymnius says, lie in their sound or in their meaning. Further, there is a third consideration—one that upsets the fallacious argument of the sophist Bryson, that there is no such thing as foul language, because in whatever words you put a given [10] thing your meaning is the same. This is untrue. One term may describe a thing more truly than another, may be more like it, and set it more intimately before our eyes. Besides, two different words will represent a thing in two different lights; so on this ground also one term must be held fairer or fouler than another. For both of two [15] terms will indicate what *is* fair, or what *is* foul, but not simply their fairness or their foulness, or if so, at any rate not in an equal degree. The materials of metaphor must be beautiful to the ear, to the understanding, to the eye or some other physical sense. It is better, for instance, to say ‘rosy-fingered morn’, than ‘crimson-fingered’ or, [20] worse still, ‘red-fingered morn’. The epithets that we apply, too, may have a bad and ugly aspect, as when Orestes is called a mother-slayer; or a better one, as when he is called his father’s avenger.<sup>3</sup> Simonides, when the victor in the mule-race offered him a small fee, refused to write him an ode, because, he said, it was so unpleasant [25] to write odes to half-asses; but on receiving an adequate fee, he wrote

Hail to you, daughters of storm-footed steeds,

though of course they were daughters of asses too. The same effect is attained by the use of diminutives, which make a bad thing less bad and a good thing less good. Take, for instance, the banter of Aristophanes in the

*Babylonians* where he uses [30] 'goldlet' for 'gold', 'cloaklet' for 'cloak', 'scofflet' for 'scoff', and 'plaguelet'. But alike in using epithets and in using diminutives we must be wary and must observe the mean.

3 · Frigidities in language may take any of four forms:—The misuse of compound words. Lycophron, for instance, talks of the 'many-visaged heaven' [35] above the 'giant-crested earth', and again the 'strait-pathed shore'; and Gorgias of [1406<sup>a</sup>1] the 'pauper-poet flatterer' and 'oath-breaking and ever-oath-keeping'. Alcidas uses such expressions as 'the soul filling with rage and face becoming flameflushed', and 'he thought their enthusiasm would be issue-fraught' and 'issue-fraught [5] he made the persuasion of his words', and 'sombre-hued is the floor of the sea'. The way all these words are compounded makes them, we feel, fit for verse only. This, then, is one form in which bad taste is shown.

Another is the employment of strange words. For instance, Lycophron talks of 'the towering Xerxes' and 'spoliative Sciron', Alcidas of 'a toy for poetry' and [10] 'the witlessness of nature', and says 'whetted with the unmitigated temper of his spirit'.

A third form is the use of long, unseasonable, or frequent epithets. It is appropriate enough for a poet to talk of 'white milk', but in prose such epithets are sometimes lacking in appropriateness or, when spread too thickly, plainly reveal the author turning his prose into poetry. Of course we must use some epithets, since [15] they lift our style above the usual level and give it an air of distinction. But we must aim at the due mean, or the result will be worse than if we took no trouble at all; we shall get something actually bad instead of something merely not good. That is why the epithets of Alcidas seem so frigid; he does not use them as the seasoning of [20] the meat, but as the meat itself, so numerous and swollen and obtrusive are they. For instance, he does not say 'sweat', but 'the moist sweat'; not 'to the Isthmian games', but 'to the world-concourse of the Isthmian games'; not 'laws', but 'the laws that are monarchs of states'; not 'at a run', but 'his heart impelling him to speed of foot'; not 'a school of the Muses', but 'Nature's school of the Muses had he [25] inherited'; and so 'frowning care of heart', and 'achiever' not of 'popularity' but of 'universal popularity', and 'dispenser of pleasure to his audience', and 'he concealed it' not 'with boughs' but 'with boughs of the forest trees', and 'he clothed' not 'his [30] body' but 'his body's nakedness', and 'his soul's desire was counter-imitative' (this at one and the same time a compound and an epithet, so that it seems a poet's

effort), and ‘so extravagant the excess of his wickedness’. We thus see how the inappropriateness of such poetical language imports absurdity and frigidity into speeches, as well as the obscurity that comes from all this verbosity—for when the [35] sense is plain, you only obscure and spoil its clearness by piling up words.

The ordinary use of compound words is where there is no term for a thing and some compound can be easily formed, like ‘pastime’ (χρονотριβεῖν); but if this is [1406<sup>b</sup>1] much done, the prose character disappears entirely. We now see why the language of compounds is just the thing for writers of dithyrambs, who love sonorous noises; strange words for writers of epic poetry, which is a proud and stately affair; [and metaphor for iambic verse, the metre which (as has been already said) is widely used to-day.]<sup>4</sup>

[5] There remains the fourth region in which frigidity may be shown, metaphor. Metaphors like other things may be inappropriate. Some are so because they are ridiculous; they are indeed used by comic as well as tragic poets. Others are too grand and theatrical; and these, if they are far-fetched, may also be obscure. For instance, Gorgias talks of ‘events that are green and full of sap’, and says ‘foul was the deed you sowed and evil the harvest you reaped’. That is too much like poetry. [10] Alcidas, again, called philosophy ‘a bulwark of the laws’, and the *Odyssey* ‘a goodly looking-glass of human life’, and talked about ‘offering no such toy to poetry’: all these explanations fail, for the reasons given, to carry the hearer with them. The address of Gorgias to the swallow, when she had let her droppings fall on [15] him as she flew overhead, is in the best tragic manner. He said, ‘Nay, shame, O Philomela’. Considering her as a bird, you could not call her act shameful; considering her as a girl, you could; and so it was a good gibe to address her as what she was once and not as what she is.

4 · The simile also is a metaphor; the difference is but slight. When the poet [20] says:

He leapt on the foe as a lion,<sup>5</sup>

this is a simile; when he says of him ‘the lion leapt’, it is a metaphor—here, since both are courageous, he has transferred to Achilles the name of ‘lion’. Similes are useful in prose as well as in verse; but not often, since they are of the nature of [25] poetry. They are to be employed just as metaphors are employed, since they are really the same thing except

for the difference mentioned.

The following are examples of similes. Androtion said of Idrieus that he was like a terrier let off the chain, that flies at you and bites you—Idrieus too was savage now that he was let out of *his* chains. Theodamas compared Archidamus to [30] a Euxenus who could not do geometry—a proportional simile, implying that Euxenus is an Archidamus who *can* do geometry. In Plato's *Republic* those who strip the dead are compared to curs which bite the stones thrown at them but do not touch the thrower; and there is the simile about the Athenian people, who are compared to a ship's captain who is strong but a little deaf; and the one about poets' [35] verses, which are likened to persons who lack beauty but possess youthful freshness—when the freshness has faded the charm perishes, and so with verses when broken up into prose.<sup>6</sup> Pericles compared the Samians to children who take [1407<sup>a</sup>1] their pap but go on crying; and the Boeotians to holm-oaks, because they were ruining one another by civil wars just as one oak causes another oak's fall. Demosthenes said that the Athenian people were like sea-sick men on board ship. [5] Again, Democrates compared the political orators to nurses who swallow the bit of food themselves and then smear the children's lips with the spittle. Antisthenes compared the lean Cephisodotus to frankincense, because it was his consumption that gave one pleasure. All these ideas may be expressed either as similes or as [10] metaphors; those which succeed as metaphors will obviously do well also as similes, and similes, with the explanation omitted, will appear as metaphors. But the [15] proportional metaphor must always apply reciprocally to either of its co-ordinate terms. For instance, if a drinking bowl is the shield of Dionysus, a shield may fittingly be called the drinking-bowl of Ares.

5 · Such, then, are the ingredients of which speech is composed. The [20] foundation of good style is correctness of language, which falls under five heads. First, the proper use of connecting words, and the arrangement of them in the natural sequence which some of them require. For instance, the connective μέν (e.g. ἐγὼ μέν) requires the correlative δέ (e.g. ó δέ). The answering word must be brought in before the first has been forgotten, and not be widely separated from it; nor, [25] except in the few cases where this is appropriate, is another connective to be introduced before the one required. Consider the sentence, 'But I, as soon as he told me (for Cleon had come begging and praying), took them along and set out'. In this sentence many connecting

words are inserted in front of the one required to [30] complete the sense; and if there is a long interval, the result is obscurity. One merit, then, of good style lies in the right use of connecting words. The second lies in calling things by their own special names and not by vague general ones. The third is to avoid ambiguities; unless, indeed, you definitely desire to be ambiguous, as those do who have nothing to say but are pretending to mean something. Such [35] people are apt to put that sort of thing into verse. Empedocles, for instance, by his long circumlocutions imposes on his hearers; these are affected in the same way as most people are when they listen to diviners, whose ambiguous utterances are received with nods of acquiescence—

Croesus by crossing the Halys will ruin a mighty realm.

[1407<sup>b</sup>1] Diviners use these vague generalities about the matter in hand because their predictions are thus, as a rule, less likely to be falsified. We are more likely to be right, in the game of ‘odd and even’, if we simply guess ‘even’ or ‘odd’ than if we guess at the actual number; and the oracle-monger is more likely to be right if he simply says that a thing will happen than if he says *when* it will happen, and [5] therefore he refuses to add a definite date. All these ambiguities have the same sort of effect, and are to be avoided unless we have some such object as that mentioned. A fourth rule is to observe Protagoras’ classification of nouns into masculine, feminine and neuter; for these distinctions also must be correctly given. ‘Upon her arrival she said her say and departed (ἡ δ’ ἐλθοῦσα καὶ διαλεχθεῖσα ᾤχετο)’. A fifth [10] rule is to express the singular and the plural by the correct wording, e.g. ‘Having come, they struck me (οἱ δ’ ἐλθόντες ἔτυπόν με)’.

It is a general rule that a written composition should be easy to read and therefore easy to deliver. This cannot be so where there are many connecting words or clauses, or where punctuation is hard, as in the writings of Heracleitus. To [15] punctuate Heracleitus is no easy task, because we often cannot tell whether a particular word belongs to what precedes or what follows it. Thus, at the outset of his treatise he says, ‘Though this truth is always men understand it not’, where it is not clear to which of the two clauses the word ‘always’ belongs. Further, solecism will result if you annex to two terms a third which does not suit them both. Thus if you are talking of sound and colour ‘perceive’ will apply to both, ‘see’ will not. [20] Obscurity is also caused if, when you intend to insert a number of details, you do not first make your meaning clear; for instance, if you say, ‘I meant, after telling him this, that, and the other



thing, to set out', rather than something of this 'I meant to set out after telling him; then this, that, and the other thing occurred'. [25]

6 · The following suggestions will help to give your language impressiveness. Describe a thing instead of naming it: do not say 'circle', but 'that surface which extends equally from the middle every way'. To achieve conciseness, do the opposite—put the name instead of the description. When mentioning anything ugly or unseemly, use its name if it is the description that is ugly, and describe it if it is [30] the name that is ugly. Represent things with the help of metaphors and epithets, being careful to avoid poetical effects. Use plural for singular, as in poetry, where one finds

Unto havens Achaeans,<sup>7</sup>

though only one haven is meant, and

Here are my letter's many-leaved folds.<sup>8</sup> [35]

Do not bracket two words under one article, but put one article with each; e.g. τῆς γυναικὸς τῆς ἡμετέρας. The reverse to secure conciseness; e.g. τῆς ἡμετέρας γυναικὸς. Use plenty of connecting words; conversely, to secure conciseness, dispense with connectives, while still preserving connexion; e.g. 'having gone and spoken', and [1408<sup>a</sup>1] 'having gone, I spoke', respectively. And the practice of Antimachus, too, is useful—to describe a thing by mentioning attributes it does not possess; as he does in talking of Teumessus—

There is a little wind-swept knoll. . .

A subject can be developed indefinitely along these lines. You may apply this method of treatment by negation either to good or to bad qualities, according to [5] which your subject requires. It is from this source that the poets draw expressions such as the 'stringless' or 'lyreless' melody, thus forming epithets out of negations. This device is popular in proportional metaphors, as when the trumpet's note is called 'a lyreless melody'.

7 · Your language will be *appropriate* if it expresses emotion and character, [10] and if it corresponds to its subject. 'Correspondence to subject' means that we must neither speak casually about weighty

matters, nor solemnly about trivial ones; nor must we add ornamental epithets to commonplace nouns, or the effect will be comic, as in the works of Cleophon, who can use phrases as absurd as 'queenly [15] fig-tree'. To express emotion, you will employ the language of anger in speaking of outrage; the language of disgust and discreet reluctance to utter a word when speaking of impiety or foulness; the language of exultation for a tale of glory, and that of humiliation for a tale of pity; and so in all other cases.

[20] This aptness of language is one thing that makes people believe in the truth of your story: their minds draw the false conclusion that you are to be trusted from the fact that others behave as you do when things are as you describe them; and therefore they take your story to be true, whether it is so or not. Besides, an emotional speaker always makes his audience feel with him, even when there is [25] nothing in his arguments; which is why many speakers try to overwhelm their audience by mere noise.

Furthermore, this way of proving your story by displaying these signs of its genuineness expresses your personal character. Each class of men, each type of disposition, will have its own appropriate way of letting the truth appear. Under 'class' I include differences of age, as boy, man, or old man; of sex, as man or woman; of nationality, as Spartan or Thessalian. By 'dispositions' I here mean those [30] dispositions only which determine the character of a man's life, for it is not every disposition that does this. If, then, a speaker uses the very words which are in keeping with a particular disposition, he will reproduce the corresponding character; for a rustic and an educated man will not say the same things nor speak in the same way. Again, some impression is made upon an audience by a device which speech-writers employ to nauseous excess, when they say 'Who does not know this?' [35] or 'It is known to everybody'. The hearer is ashamed of his ignorance, and agrees with the speaker, so as to have a share of the knowledge that everybody else possesses.

All the variations of oratorical style are capable of being used in season or out [1408<sup>b</sup>1] of season. The best way to counteract any exaggeration is the well-worn device by which the speaker puts in some criticism of himself; for then people feel it must be all right for him to talk thus, since he certainly knows what he is doing. Further, it is better not to have everything always just corresponding to everything else—your [5] purpose will thus be hidden. I mean for instance, if your words are harsh, you should not extend this harshness to your voice and your

countenance and have everything else in keeping. If you do, the artificial character of each detail becomes apparent; whereas if you adopt one device and not another, you are using art all the same and yet nobody notices it. (To be sure, if mild sentiments are expressed in harsh tones [10] and harsh sentiments in mild tones, you become comparatively unconvincing.) Compound words, fairly plentiful epithets, and strange words best suit an emotional speech. We forgive an angry man for talking about a wrong as 'heaven-high' or 'colossal'; and we excuse such language when the speaker has his hearers already in [15] his hands and has stirred them deeply either by praise or blame or anger or affection, as Isocrates, for instance, does at the end of his *Panegyric*, with his 'name and fame' and 'in that they brooked'. Men do speak in this strain when they are deeply stirred, and so, once the audience is in a like state of feeling, approval of course follows. This is why such language is fitting in poetry, which is an inspired thing. This language, then, should be used either under stress of emotion, or ironically, after the manner of Gorgias and of the passages in the *Phaedrus*. [20]

8 · The form of a prose composition should be neither metrical nor destitute of rhythm. The metrical form destroys the hearer's trust by its artificial appearance, and at the same time it diverts his attention, making him watch for metrical recurrences, just as children catch up the herald's question, 'Whom does the [25] freedman choose as his advocate?', with the answer 'Cleon!' On the other hand, unrhythmical language is too unlimited; we do not want the limitations of metre, but some limitation we must have, or the effect will be vague and unsatisfactory. Now it is number that limits all things; and it is the numerical limitation of the form of a composition that constitutes rhythm, of which metres are definite sections.

Prose, then, is to be rhythmical, but not metrical, or it will become not prose [30] but verse. It should not even have too precise a prose rhythm, and therefore should only be rhythmical to a certain extent.

Of the various rhythms, the heroic has dignity, but lacks the tones of the spoken language. The iambic is the very language of ordinary people, so that in common talk iambic lines occur oftener than any others: but in a speech we need [35] dignity and the power of taking the hearer out of his ordinary self. The trochee is too much akin to wild dancing: we can see this in tetrameter verse, which is one of the [1409<sup>a</sup>1] trochaic rhythms.

There remains the paean, which speakers began to use in the time of Thrasymachus, though they had then no name to give it. The paean is a third class of rhythm, closely akin to both the two already mentioned; it has in it the ratio of three to two, whereas the other two kinds have the ratio of one to one, and two to one [5] respectively. Between the two last ratios comes the ratio of one-and-a-half to one, which is that of the paean.

Now the other two kinds of rhythm must be rejected in writing prose, partly for the reasons given, and partly because they are too metrical; and the paean must be adopted, since from this alone of the rhythms mentioned no definite metre arises, and therefore it is the least obtrusive of them. At present the same form of paean is [10] employed at the beginning as at the end of sentences, whereas the end should differ from the beginning. There are two opposite kinds of paean, one of which is suitable to the beginning of a sentence, where it is indeed actually used; this is the kind that begins with a long syllable and ends with three short ones, as

$$\Delta\bar{\alpha}\lambda\bar{o}\gamma\bar{\epsilon}\nu\bar{\epsilon}\varsigma \mid \bar{\epsilon}\bar{\iota}\bar{\tau}\bar{\epsilon} \Lambda\bar{\upsilon}\bar{\kappa}\bar{\iota} \mid \bar{\alpha}\bar{\nu},$$

and

$$X\rho\bar{\upsilon}\sigma\bar{\epsilon}\bar{o}\bar{\kappa}\bar{o}\bar{\mu} \mid \bar{\alpha} \text{ " } \bar{\epsilon}\bar{\kappa}\bar{\alpha}\bar{\tau}\bar{\epsilon} \mid \pi\bar{\alpha}\bar{\iota} \Delta\bar{\iota}\bar{o}\bar{\varsigma} [15]$$

The other paean begins, conversely, with three short syllables and ends with a long one, as

$$\bar{\mu}\bar{\epsilon}\bar{\tau}\bar{\alpha} \bar{\delta}\bar{\epsilon} \gamma\bar{\alpha}\bar{\nu} \mid \bar{\upsilon}\bar{\delta}\bar{\alpha}\bar{\tau}\bar{\alpha} \bar{\tau} \bar{\omega}\bar{\kappa} \mid \bar{\epsilon}\bar{\alpha}\bar{\nu}\bar{o}\bar{\nu} \bar{\eta} \mid \phi\bar{\alpha}\bar{\nu}\bar{\iota}\bar{\sigma}\bar{\epsilon} \bar{\nu}\bar{\upsilon}\bar{\xi}.$$

This kind of paean makes a real close: a short syllable can give no effect of finality, and therefore makes the rhythm appear truncated. A sentence should break off [20] with the long syllable: the fact that it is over should be indicated not by the scribe, or by his full stop, but by the rhythm itself.

We have now seen that our language must be rhythmical and not destitute of rhythm, and what rhythms, in what particular shape, make it so.

9 · The language of prose must be either free-running, with its parts united [25] by nothing except the connecting words, like the preludes in dithyrambs; or compact and antithetical, like the strophes of the old poets. The free-running style is the ancient one, e.g. ‘Herein is set forth the inquiry of Herodotus the Thurian’.<sup>9</sup> Every one used this method

formerly; not many do so now. By 'free-running' style I [30] mean the kind that has no natural stopping-places, and comes to a stop only because there is no more to say of that subject. This style is unsatisfying just because it goes on indefinitely—one always likes to sight a stopping-place in front of one: it is only at the goal that men in a race faint and collapse; while they see the end of the course before them, they can keep going. Such, then, is the free-running kind of style; the [35] compact is that which is in periods. By a period I mean a portion of speech that has in itself a beginning and an end, being at the same time not too big to be taken in at [1409<sup>b</sup>1] a glance. Language of this kind is satisfying and easy to follow. It is satisfying, because it is just the reverse of indefinite; and moreover, the hearer always feels that he is grasping something and has reached some definite conclusion; whereas it is unsatisfactory to see nothing in front of you and get nowhere. It is easy to follow, [5] because it can easily be remembered; and this because language when in periodic form can be numbered, and number is the easiest of all things to remember. That is why verse, which is measured, is always more easily remembered than prose, which is not: the measures of verse can be numbered. The period must, further, not be completed until the sense is complete: it must not be capable of breaking off abruptly, as may happen with the following iambic lines

[10] Calydon's soil is this; of Pelops' land<sup>10</sup>

By a wrong division of the words the hearer may take the meaning to be the reverse of what it is: for instance, in the passage quoted, one might imagine that Calydon is in the Peloponnesus.

A period may be either divided into several members or simple. The period of several members is a portion of speech complete in itself, divided into parts, and [15] easily delivered at a single breath—as a whole, that is; not by fresh breath being taken at the division. A member is one of the two parts of such a period. By a 'simple' period, I mean that which has only one member. The members, and the whole periods, should be neither curt nor long. A member which is too short often [20] makes the listener stumble; he is still expecting the rhythm to go on to the limit his mind has fixed for it; and if meanwhile he is pulled back by the speaker's stopping, the shock is bound to make him, so to speak, stumble. If, on the other hand, you go on too long, you make him feel left behind, like people who pass beyond the boundary before turning back. So too if a period is too long you turn it into a speech, [25] or something like a dithyrambic prelude. The result is much like the preludes that

Democritus of Chios jeered at Melanippides for writing instead of antistrophic stanzas—

He that sets traps for another man's feet  
Is like to fall into them first;  
And long-winded preludes do harm to us all,  
But the preluder catches it worst.

Which applies likewise to long-membered orators. Periods whose members are [30] altogether too short are not periods at all; and the result is to bring the hearer down with a crash.

The periodic style which is divided into members is of two kinds. It is either simply divided, as in 'I have often wondered at the conveners of national gatherings and the founders of athletic contests';<sup>11</sup> or it is antithetical, where, in each of the two [35] members, one of one pair of opposites is put along with one of another pair, or the same word is used to bracket two opposites, as 'They aided both parties—not only [1410<sup>a</sup>1] those who stayed behind but those who accompanied them: for the latter they acquired new territory larger than that at home, and to the former they left territory at home that was large enough'. Here the contrasted words are 'staying behind' and 'accompanying', 'enough' and 'larger'. So in the example, 'Both to those who want [5] to acquire property and to those who desire to enjoy it', where 'enjoyment' is contrasted with 'acquisition'. Again, 'it often happens in such enterprises that the wise men fail and the fools succeed'; 'they were awarded the prize of valour immediately, and won the command of the sea not long afterwards'; 'to sail through [10] the mainland and march through the sea, by bridging the Hellespont and cutting through Athos'; 'nature gave them their country and law took it away again'; 'some of them perished in misery, others were saved in disgrace'; 'Athenian citizens keep foreigners in their houses as servants, while the city of Athens allows her allies by [15] thousands to live as the foreigner's slaves'; and 'to possess in life or to bequeath at death'. There is also what some one said about Peitholaus and Lycophron in a lawcourt, 'These men used to sell you when they were at home, and now they have come to you here and bought you'. All these passages have the structure described above. Such a form of speech is satisfying, because the significance of contrasted [20] ideas is easily felt, especially when they are thus put side by side, and also because it has the effect of a logical argument; it is by putting two opposing conclusions side by side that you prove one of them false.

Such, then, is the nature of *antithesis*. *Parisosis* is making the two

members of a period equal in length. *Paromoeosis* is making the extreme words of both members like each other. This must happen either at the beginning or at the end of [25] each member. If at the beginning, the resemblance must always be between whole words; at the end, between final syllables or inflexions of the same word or the same word repeated. Thus, at the beginning

ἀργὸν γὰρ ἔλαβεν ἀργὸν παρ' αὐτοῦ<sup>12</sup>

and

δωρητοὶ τ' ἐπέλοντο παρὰρρητοὶ τ' ἐπέεσσιν.<sup>13</sup>

At the end

[30] ὥηθης ἂν αὐτόν οὐ παιδίον τετοκέναι, ἀλλ' αὐτόν παιδίον γεγονέναι,

and

ἐν πλείσταις δὲ φροντίσι καὶ ἐν ἐλαχίσταις ἐλπίσιν

An example of inflexions of the same word is

ἄξιος δὲ σταθῆναι χαλκοῦς, οὐκ ἄξιος ὦν χαλκοῦ;

Of the same word repeated,

[35] σὺ δ' αὐτόν καὶ ζῶντα ἔλεγες κακῶς καὶ νῦν γράφεις κακῶς.

Of one syllable,

τί ἂν ἔπαθες δεινόν, εἰ ἄνδρ' εἶδες ἀργόν;

[1410<sup>b</sup>1] It is possible for the same sentence to have all these features together—antitheses, *parison*, and *homoeoteleuton*. (The possible beginnings of periods have been pretty fully enumerated in the *Theodectea*.) There are also spurious antitheses, like that of Epicharmus—

[5] There one time I as their guest did stay,

And they were my hosts on another day.<sup>14</sup>

**10** · We may now consider the above points settled, and pass on to say something about the way to devise lively and taking sayings. Their actual invention can only come through natural talent or long practice;

but this treatise may indicate the way it is done. We may deal with them by enumerating the different kinds of them. We will begin by remarking that we all naturally find it agreeable to get hold [10] of new ideas easily: words express ideas, and therefore those words are the most agreeable that enable us to get hold of new ideas. Now strange words simply puzzle us; ordinary words convey only what we know already; it is from metaphor that we can best get hold of something fresh. When the poet calls old age 'a withered stalk',<sup>15</sup> he conveys a new idea, a new fact, to us by means of the general notion of 'lost bloom', which is common to both things. The similes of the poets do the same, [15] and therefore, if they are good similes, give an effect of brilliance. The simile, as has been said before, is a metaphor, differing from it only in the way it is put; and just because it is longer it is less attractive. Besides, it does not say outright that 'this' is 'that', and therefore the hearer is less interested in the idea. We see, then, that both speech and reasoning are lively in proportion as they make us seize a new idea [20] promptly. For this reason people are not much taken either by obvious arguments (using the word 'obvious' to mean what is plain to everybody and needs no investigation), nor by those which puzzle us when we hear them stated, but only by those which convey their information to us as soon as we hear them, provided we had not the information already; or which the mind only just fails to keep up with. [25] These two kinds do convey to us a sort of information: but the obvious and the obscure kinds convey nothing, either at once or later on. It is these qualities, then, that, so far as the meaning of what is said is concerned, make an argument acceptable. So far as the language is concerned, it is the antithetical form that appeals to us, e.g. 'judging that the peace common to all the rest was a war upon [30] their own private interests',<sup>16</sup> where there is an antithesis between war and peace. It is also good to use metaphorical words; but the metaphors must not be far-fetched, or they will be difficult to grasp, nor obvious, or they will have no effect. The words, too, ought to set the scene before our eyes; for events ought to be seen in progress rather than in prospect. So we must aim at these three points: antithesis, metaphor, [35] and actuality.

Of the four kinds of metaphor the most taking is the proportional kind. Thus [1411<sup>a</sup>1] Pericles, for instance, said that the vanishing from their country of the young men who had fallen in the war was 'as if the spring were taken out of the year'. Leptines, speaking of the Lacedaemonians, said that he would not have the Athenians let Greece 'lose one of her two eyes'. When Chares was pressing for leave to be [5] examined upon his share in the Olynthiac war, Cephisodotus was



indignant, saying that he wanted his examination to take place ‘while he had his fingers upon the people’s throat’. The same speaker once urged the Athenians to march to Euboea, ‘with Miltiades’ decree as their rations’. Iphicrates, indignant at the truce made by [10] the Athenians with Epidaurus and the neighbouring sea-board, said that they had stripped themselves of their travelling-money for the journey of war. Peitholaus called the state-galley ‘the people’s big stick’, and Sestos ‘the corn-bin of the Peiraeus’. Pericles bade his countrymen remove Aegina, ‘that eyesore of the Peiraeus’. And Moerocles said he was no more a rascal than was a certain [15] respectable citizen he named, ‘whose rascality was worth over thirty per cent per annum to him, instead of a mere ten like his own’. There is also the iambic line of Anaxandrides about the way his daughters put off marrying—

My daughters’ marriage-bonds are overdue. [20]

Polyeuctus said of a paralytic man named Speusippus that he could not keep quiet, ‘though fortune had fastened him in the pillory of disease’. Cephisodotus called warships ‘painted millstones’. Diogenes the Dog called taverns ‘the mess-rooms of [25] Attica’. Aesion said that the Athenians had ‘emptied’ their town into Sicily: this is a graphic metaphor. ‘Till all Hellas shouted aloud’ may be regarded as a metaphor, and a graphic one again. Cephisodotus bade the Athenians take care not to hold too [30] many ‘parades’. Isocrates used the same word of those who ‘parade’ at the national festivals. Another example occurs in the Funeral Speech: ‘It is fitting that Greece should cut off her hair beside the tomb of those who fell at Salamis, since her freedom and their valour are buried in the same grave’. Even if the speaker here had only said that it was right to weep when valour was being buried in their grave, it would have been a metaphor, and a graphic one; but the coupling of ‘their valour’ [1411<sup>b</sup>1] and ‘her freedom’ presents a kind of antithesis as well. ‘The course of my words’, said Iphicrates, ‘lies straight through the middle of Chares’ deeds’: this is a proportional metaphor, and the phrase ‘straight through the middle’ makes it [5] graphic. The expression ‘to call in one danger to rescue us from another’ is a graphic metaphor. Lycoleon said, defending Chabrias, ‘They did not respect even that bronze statue of his that intercedes for him yonder’. This was a metaphor for the moment, though it would not always apply; a vivid metaphor, however; Chabrias is [10] in danger, and his statue intercedes for him—that lifeless yet living thing which records his services to his country. ‘Practising in every way littleness of mind’ is metaphorical, for practising a quality implies

increasing it. So is 'God kindled our [15] reason to be a lamp within our souls', for both reason and light reveal things. So is 'we are not putting an end to our wars, but only postponing them', for both literal postponement and the making of such a peace as this apply to future action. So is such a saying as 'This treaty is a far nobler trophy than those we set up on fields of battle; they celebrate small gains and single successes; it celebrates our triumph in the war as a whole'; for both trophy and treaty are signs of victory. So is 'A country [20] pays a heavy reckoning in being condemned by the judgement of mankind', for a reckoning is damage deservedly incurred.

11 · It has already been mentioned that liveliness is got by using the [25] proportional type of metaphor and by making our hearers see things. We have still to explain what we mean by their 'seeing things', and what must be done to effect this. By 'making them see things' I mean using expressions that represent things as in a state of activity. Thus, to say that a good man is 'four-square' is certainly a metaphor; both the good man and the square are perfect; but the metaphor does not suggest activity. On the other hand, in the expression 'with his vigour in full bloom' there is a notion of activity; and so in 'But you must roam as free as a sacred victim';<sup>17</sup> and in

[30] Thereat up sprang the Hellenes to their feet,<sup>18</sup>

where 'up sprang' gives us activity as well as metaphor, for it at once suggests swiftness. So with Homer's common practice of giving metaphorical life to lifeless things: all such passages are distinguished by the effect of activity they convey. Thus,

Downward anon to the valley rebounded the boulder remorseless;

and

The arrow flew;

and

Flying on eagerly;

and

Stuck in the earth, still panting to feed on the flesh of the heroes; [1412<sup>a</sup>1]

and

And the point of the spear in its fury drove full through his breastbone.<sup>19</sup>

In all these examples the things have the effect of being active because they are made into living beings; shameless behaviour and fury and so on are all forms of activity. And the poet has attached these ideas to the things by means of proportional metaphors: as the stone is to Sisyphus, so is the shameless man to his [5] victim. In his famous similes, too, he treats inanimate things in the same way:

Curving and crested with white, host following host without ceasing.<sup>20</sup>

Here he represents everything as moving and living; and activity is movement.

Metaphors must be drawn, as has been said already, from things that are [10] related to the original thing, and yet not obviously so related—just as in philosophy also an acute mind will perceive resemblances even in things far apart. Thus Archytas said that an arbitrator and an altar were the same, since the injured fly to both for refuge. Or you might say that an anchor and an overhead hook were the same, since both are in a way the same, only the one secures things from below and [15] the other from above. And to speak of states as ‘levelled’ is to identify two widely different things, the equality of a physical surface and the equality of political powers.

Liveliness is specially conveyed by metaphor, and by the further power of surprising the hearer; because the hearer expected something different, his acquisition of the new idea impresses him all the more. His mind seems to say, ‘Yes, [20] to be sure; I never thought of that’. The liveliness of epigrammatic remarks is due to the meaning not being just what the words say: as in the saying of Stesichorus that ‘the cicadas will chirp to themselves on the ground’. Well-constructed riddles are attractive for the same reason; a new idea is conveyed, and there is metaphorical [25] expression. So with the ‘novelties’ of Theodorus. In these the thought is startling, and, as Theodorus puts it, does not fit in with the ideas you already have. They are like the burlesque words that one finds in the comic writers. The effect is produced even by jokes depending upon changes of the letters of a word; this too is a surprise. You find this in verse as well as in prose. The word which comes is not what the hearer imagined: thus

[30] Onward he came, and his feet were shod with his—chilblains,

where one imagined the word would be ‘sandals’. But the point should be

clear the moment the words are uttered. Jokes made by altering the letters of a word consist in meaning, not just what you say, but something that gives a twist to the word used; e.g. the remark of Theodorus about Nikon the harpist, θράττει σε. where he pretends to mean θράττει σε.<sup>21</sup> and surprises us when we find he means something else. So you [1412<sup>b</sup>1] enjoy the point when you see it, though the remark will fall flat unless you are aware that Nikon is a Thracian. Or again: βούλει αὐτὸν πέρσαι. In both these cases the saying must fit the facts. This is also true of such lively remarks as the one to the effect that to the Athenians their empire (ἀρχή) of the sea was not the beginning [5] (ἀρχή) of their troubles, since they gained by it. Or the opposite one of Isocrates, that their empire (ἀρχή) *was* the beginning (ἀρχή) of their troubles. Either way, the speaker says something unexpected, the soundness of which is thereupon recognized. There would be nothing clever in saying empire is empire. Isocrates means more than that, and uses the word with a new meaning. So too with the former [10] saying, which denies that ἀρχή in one sense was ἀρχή in another sense. In all these jokes, whether a word is used in a second sense or metaphorically, the joke is good if it fits the facts. For instance, Ἀνάσχετος (proper name) οὐκ ἀνασχετός: where you say that what is so-and-so in one sense is not so-and-so in another; well, if the man is unpleasant, the joke fits the facts. Again, ‘You should not be more a stranger than a [15] stranger’—or more than you should be. That is the same as: ‘The stranger should not always be a stranger’. Here again is the use of one word in different senses. Of the same kind also is the much-praised verse of Anaxandrides:

Death is most fit before you do

Deeds that would make death fit for you.

This amounts to saying ‘it is a fit thing to die when you are not fit to die’, or ‘it is a fit thing to die when death is not fit for you’, i.e. when death is not the fit return for [20] what you are doing. The type of language employed is the same in all these examples; but the more briefly and antithetically such sayings can be expressed, the more taking they are, for antithesis impresses the new idea more firmly and brevity more quickly. They should always have either some personal application or some [25] merit of expression, if they are to be true without being common-place—two requirements not always satisfied simultaneously. Thus ‘a man should die having done no wrong’ is true but dull: ‘the right man should marry the right woman’ is also true but dull. No, there must be both good qualities together, as in ‘it is fitting to die when you are not fit for death’.

The more a saying has these qualities, the livelier it [30] appears: if, for instance, its wording is metaphorical, metaphorical in the right way, antithetical, and balanced, and at the same time it gives an idea of activity.

Successful similes also, as has been said above, are in a sense metaphors, since they always involve two relations like the proportional metaphor. Thus: a shield, we say, is the ‘drinking-bowl of Ares’, and a bow is the ‘chordless lyre’. This way of [1413<sup>a</sup>1] putting a metaphor is not ‘simple’, as it would be if we called the bow a lyre or the shield a drinking-bowl. There are ‘simple’ similes also: we may say that a flute-player is like a monkey, or that a short-sighted man’s eyes are like a lamp-flame with water dropping on it, since both eyes and flame keep winking. A simile succeeds best when it is a converted metaphor, for it is possible to say that a [5] shield *is like* the drinking-bowl of Ares, or that a ruin *is like* a house in rags, and to say that Niceratus *is like* a Philoctetes stung by Pratys—the simile made by Thrasy-machus when he saw Niceratus, who had been beaten by Pratys in a recitation competition, still going about unkempt and unwashed. It is in these respects that poets fail worst when they fail, and succeed best when they [10] succeed,

Those legs of his curl just like parsley leaves;

and

Just like Philammon struggling with his punch-ball.

These are all similes; and that similes are metaphors has been stated often already.

Proverbs, again, are metaphors from one species to another. Suppose, for [15] instance, a man to start some undertaking in hope of gain and then to lose by it later on, ‘Here we have once more the man of Carpathus and his hare’, says he. For both alike went through the said experience.

It has now been explained fairly completely how liveliness is secured and why it has the effect it has. Successful hyperboles are also metaphors, e.g. the one about [20] the man with a black eye, ‘you would have thought he was a basket of mulberries’; here the ‘black eye’ is compared to a mulberry because of its colour, the exaggeration lying in the quantity of mulberries suggested. The phrase ‘*like so-and-so*’ may introduce a hyperbole under the form of a simile. Thus

*Just like Philammon struggling with his punch-ball*

is equivalent to ‘*you would have thought he was Philammon struggling with his [25] punch-ball*’; and

Those legs of his curl *just like* parsley leaves

is equivalent to ‘his legs are so curly that *you would have thought* they were not legs but parsley leaves’. Hyperboles are for young men to use; they show vehemence of character; [[and this is why angry people use them more than other people. [30]

Not though he gave me as much as the dust or the sands of the sea

. . .

But her, the daughter of Atreus’ son, I never will marry,  
Nay, not though she were fairer than Aphrodite the Golden,  
Defter of hand than Athene . . .<sup>22]</sup><sup>23</sup>

[1413<sup>b</sup>1] [The Attic orators are particularly fond of this method of speech.]<sup>24</sup> Consequently it does not suit an elderly speaker.

**12** · It should be observed that each kind of rhetoric has its own appropriate style. The style of written prose is not that of spoken oratory, nor are those of [5] political and forensic speaking the same. Both written and spoken have to be known. To know the latter is to know how to speak good Greek. To know the former means that you are not obliged, as otherwise you are, to hold your tongue when you wish to communicate something to the general public.

The written style is the more finished: the spoken better admits of dramatic [10] delivery—alike the kind of oratory that reflects character and the kind that reflects emotion. Hence actors look out for plays written in the latter style, and poets for actors competent to act in such plays. Yet poets whose plays are meant to be read *are* read and circulated. Chaeremon, for instance, who is as finished as a professional speech-writer; and Licymnius among the dithyrambic poets. Compared [15] with those of others, the speeches of professional writers sound thin in actual contests. Those of the orators, on the other hand, look amateurish enough when they pass into the hands of a reader. This is just because they are so well suited for an actual tussle, and therefore contain many dramatic touches, which, being robbed of all dramatic rendering, fail to do their own proper work, and consequently look silly. Thus strings of unconnected words, and constant repetitions of words and phrases, [20] are very properly condemned in written speeches: but not in spoken

speeches—speakers use them freely, for they have a dramatic effect. In this repetition there must be variety of tone, paving the way, as it were, to dramatic effect; e.g. ‘This is the villain among you who deceived you, who cheated you, who meant to betray you [25] completely’. This is the sort of thing that Philemon the actor used to do in the *Old Men’s Madness* of Anaxandrides, whenever he spoke the words ‘Rhadamanthus and Palamedes’, and also in the prologue to the *Saints* whenever he pronounced the pronoun ‘I’. If one does not deliver such things cleverly, it becomes a case of ‘the man who swallowed a poker’. So too with strings of unconnected words, e.g. ‘I came [30] to him; I met him; I besought him’. Such passages must be *acted*, not delivered with the same quality and pitch of voice, as though they had only one idea in them. They have the further peculiarity of suggesting that a number of separate statements have been made in the time usually occupied by one. Just as the use of conjunctions makes many statements into a single one, so the omission of conjunctions acts in the reverse way and makes a single one into many. It thus makes everything more important: e.g. ‘I came to him; I talked to him; I entreated him’—what a lot of facts! [1414<sup>a</sup>1] the hearer thinks—‘he paid no attention to anything I said’. This is the effect which Homer seeks when he writes, ‘Nireus likewise from Syme, Nireus, the son of Aglaia, Nireus, the comeliest man’.<sup>25</sup> If many things are said about a man, his name must be mentioned many times; and therefore people think that, if his name is mentioned many times, many things have been said about him. So that Homer, by [5] means of this illusion, has made a great deal of Nireus, though he has mentioned him only in this one passage, and has preserved his memory, though he nowhere says a word about him afterwards.

Now the style of oratory addressed to public assemblies is really just like scene-painting. The bigger the throng, the more distant is the point of view: so that, in the one and the other, high finish in detail is superfluous and looks bad. The [10] forensic style is more highly finished; still more so is the style of language addressed to a single judge, with whom there is very little room for rhetorical artifices, since he can take the whole thing in better, and judge of what is to the point and what is not; the struggle is less intense and so the judgement is undisturbed. This is why the same speakers do not distinguish themselves in all these branches at once; high finish is wanted least where dramatic delivery is wanted most, and here the speaker [15] must have a good voice, and above all, a strong one. It is epideictic oratory that is most literary, for it is meant to be read; and next to it forensic oratory.

To analyse style still further, and add that it must be agreeable or magnificent, is useless; for why should it have these traits any more than restraint, liberality, or [20] any other excellence of character? Obviously agreeableness will be produced by the qualities already mentioned, if our definition of excellence of style has been correct. For what other reason should style be clear, and not mean but appropriate? If it is prolix, it is not clear; nor yet if it is curt. Plainly the middle way suits best. Again, [25] style will be made agreeable by the elements mentioned, namely by a good blending of ordinary and unusual words, by the rhythm, and by the persuasiveness that springs from appropriateness.

This concludes our discussion of style, both in its general aspects and in its special applications to the various branches of rhetoric. We have now to deal with arrangement.

**13** · A speech has two parts. You must state your case, and you must prove [30] it. You cannot either state your case and omit to prove it, or prove it without having first stated it; since any proof must be a proof of something, and the only use of a preliminary statement is the proof that follows it. Of these two parts the first part is called the statement of the case, the second part the argument, just as we [35] distinguish between problem and demonstration. The current division is absurd. For narration surely is part of a forensic speech only: how in a political speech or a speech of display can there be narration in the technical sense? or a reply to a forensic opponent? or an epilogue in closely-reasoned speeches? Again, introduction, [1414<sup>b</sup>1] comparison of conflicting arguments, and recapitulation are only found in political speeches when there is a struggle between two policies. They *may* occur then; so may even accusation and defence, often enough; but they form no essential [5] part of a political speech. Even forensic speeches do not always need epilogues; not, for instance, a short speech, nor one in which the facts are easy to remember, the effect of an epilogue being always a reduction in the apparent length. It follows, then, that the only necessary parts of a speech are the statement and the argument. These are the essential features of a speech; and it cannot in any case have more than introduction, statement, argument, and epilogue. Refutation of the opponent is part of the arguments: so is comparison of the opponent's case with your own, for [10] that process is a magnifying of your own case and therefore a part of the arguments, since one who does this *proves* something. The introduction does nothing like this; nor does the epilogue



—it merely reminds us of what has been said already. If we make such distinctions we shall end, like Theodorus and his followers, by distinguishing narration proper from ‘post-narration’ and ‘pre-narration’, and [15] refutation from ‘final refutation’. But we ought only to bring in a new name if it indicates a real species with distinct specific qualities; otherwise, the practice is pointless and silly, like the way Licymnius invented names in his *Art of Rhetoric*— ‘secundation’, ‘divagation’, ‘ramification’.

14 · The introduction is the beginning of a speech, corresponding to the [20] prologue in poetry and the prelude in flute-music; they are all beginnings, paving the way, as it were, for what is to follow. The musical prelude resembles the introduction to speeches of display; as flute-players play first some brilliant passage they know well and then fit it on to the opening notes of the piece itself, so in [25] speeches of display the writer should proceed in the same way; he should begin with what best takes his fancy, and then strike up his theme and lead into it; which is indeed what is always done. (Take as an example the introduction to the *Helen* of Isocrates—there is nothing in common between the eristics and Helen.) And here, even if you travel far from your subject, it is fitting, rather than that there should be sameness in the entire speech.

[30] The usual subject for the introductions to speeches of display is some piece of praise or censure. Thus Gorgias writes in his *Olympic Speech*, ‘You deserve widespread admiration, men of Greece’, praising thus those who started the festival gatherings. Isocrates, on the other hand, censures them for awarding distinctions to [35] fine athletes but giving no prize for intellectual ability. Or one may begin with a piece of advice, thus: ‘We ought to honour good men and so I myself am praising Aristides’ or ‘We ought to honour those who are unpopular but not bad men, men whose good qualities have never been noticed, like Alexander son of Priam’. Here [1415<sup>a</sup>1] the orator gives advice. Or we may begin as speakers do in the law-courts; that is to say, with appeals to the audience to excuse us if our speech is about something paradoxical, difficult, or hackneyed; like Choerilus in the lines—

But now when allotment of all has been made ...

Introductions to speeches of display, then, may be composed of some piece of [5] praise or censure, of advice to do or not to do something, or of appeals to the audience; and you must choose between making these

preliminary passages connected or disconnected with the speech itself.

Introductions to forensic speeches, it must be observed, have the same value as the prologues of dramas and the introductions to epic poems; the dithyrambic [10] prelude resembling the introduction to a speech of display, as

For thee, and thy gifts, ...<sup>26</sup>

In prologues, and in epic poetry, a foretaste of the theme is given, intended to inform the hearers of it in advance instead of keeping their minds in suspense. Anything vague puzzles them: so give them a grasp of the beginning, and they can hold fast to [15] it and follow the argument. So we find—

Sing, O goddess of song, of the Wrath ...

Tell me, O Muse, of the hero ...<sup>27</sup>

Lead me to tell a new tale, how there came great warfare to  
Europe  
Out of the Asian land ...

The tragic poets, too, let us know the pivot of their play; if not at the outset like Euripides, at least somewhere in the prologue like Sophocles; [20]

[[Polybus was my father ... ;]]<sup>28</sup>

and so in comedy. This, then, is the most essential function and distinctive property of the introduction, to show what the aim of the speech is; and therefore no introduction ought to be employed where the subject is not long or intricate.

The other kinds of introduction employed are remedial in purpose, and may be [25] used in any type of speech. They are concerned with the speaker, the hearer, the subject, or the speaker's opponent. Those concerned with the speaker himself or with his opponent are directed to removing or exciting prejudice. But whereas the defendant will begin by dealing with this sort of thing, the prosecutor will take quite another line and deal with such matters in the closing part of his speech. The reason for this is not far to seek. The defendant, when he is going to bring himself on the [30] stage, must clear away any obstacles, and therefore must begin by removing any prejudice felt against him. But if you are to excite prejudice, you must do so at the close, so that the judges may more

easily remember what you have said.

The appeal to the hearer aims at securing his goodwill, and sometimes at [35] gaining his serious attention to the case—for gaining it is not always an advantage, and speakers will often for that reason try to make him laugh.

You may use any means you choose to make your hearer receptive; among others, giving him a good impression of your character, which always helps to [1415<sup>b</sup>1] secure his attention. He will be ready to attend to anything that touches himself, and to anything that is important, surprising, or agreeable; and you should accordingly convey to him the impression that what you have to say is of this nature. If you wish to distract his attention, you should imply that the subject does not affect him, or is trivial or disagreeable. But observe, all this has nothing to do with [5] the speech itself. It merely has to do with the weak-minded tendency of the hearer to listen to what is beside the point. Where this tendency is absent, no introduction is wanted beyond a summary statement of your subject, to put a sort of head on the main body of your speech. Moreover, calls for attention, when required, may come [10] equally well in any part of a speech; in fact, the beginning of it is just where there is least slackness of interest; it is therefore ridiculous to put this kind of thing at the beginning, when every one is listening with most attention. Choose therefore any point in the speech where such an appeal is needed, and then say ‘Now I beg you to note this point—it concerns you quite as much as myself; or ‘I will tell you that whose like you have never yet heard for terror’—or ‘for wonder’. This is what [15] Prodicus called ‘slipping in a bit of the fifty-drachma show-lecture for the audience whenever they began to nod’. It is plain that such introductions are addressed not to ideal hearers, but to hearers as we find them. The use of introductions to excite prejudice or to dispel misgivings is universal.

[20] [[My lord, I will not say that eagerly ...

or

Why all this preface?]]<sup>29</sup>

Introductions are popular with those whose case is weak, or looks weak; it pays them to dwell on anything rather than the actual facts of it. That is why slaves, instead of answering the questions put to them, make indirect replies with long preambles. [25] The means of exciting in your hearers goodwill and various other feelings of the same kind have already been described. The poet finely says

and these are the two things we should aim at. In speeches of display we must make the hearer feel that the eulogy includes either himself or his family or his way of life [30] or something or other of the kind. For it is true, as Socrates says in the *Funeral Speech*, that ‘the difficulty is not to praise the Athenians at Athens but at Sparta’.

The introductions of political oratory will be made out of the same materials as those of the forensic kind, though the nature of political oratory makes them very rare. The subject is known already, and therefore the *facts* of the case need no [35] introduction; but you may have to say something on account of yourself or your opponents; or those present may be inclined to treat the matter either more or less seriously than you wish them to. You may accordingly have to excite or dispel some prejudice, or to make the matter under discussion seem more or less important than before: for either of which purposes you will want an introduction. You may also want one to add elegance to your remarks, feeling that otherwise they will have a casual air, like Gorgias’ eulogy of the Eleans, in which, without any preliminary [1416<sup>a</sup>1] sparring or fencing, he begins straight off with ‘Happy city of Elis!’

**15** · In dealing with prejudice, one class of argument is that whereby you can dispel objectionable suppositions about yourself. It makes no practical [5] difference whether such a supposition has been put into words or not, so that this distinction may be ignored. Another commonplace is to meet any of the issues directly: to deny the alleged fact: or to say that you have done no harm, or none to him, or not as much as he says; or that you have done him no injustice, or not much; or that you have done nothing disgraceful, or nothing disgraceful enough to matter: these are the sort of questions on which the dispute hinges. Thus Iphicrates, [10] replying to Nausicrates, admitted that he had done the deed alleged, and that he had done Nausicrates harm, but not that he had done him wrong. Or you may admit the wrong, but balance it with other facts, and say that, if the deed harmed him, at any rate it was honourable; or that, if it gave him pain, at least it did him good; or something else like that. Another commonplace is to allege that your action was due to mistake, or bad luck, or necessity—as Sophocles said he was not trembling, as his [15] traducer maintained, in order to make people think him an old man, but because he could not help it; he would rather *not* be eighty years old. You may balance your motive against your actual deed;

saying, for instance, that you did not mean to injure him but to do so-and-so; that you did not do what you are falsely charged with doing—the damage was accidental—‘I should indeed be a detestable person if I had deliberately intended this result’. Another way is open when your calumniator, or [20] any of his connexions, is or has been subject to the same grounds for suspicion. Yet another, when others are subject to the same grounds for suspicion but are admitted to be in fact innocent of the charge: e.g. ‘Must I be an adulterer because I am well-groomed? Then so-and-so must be one too’. Another, if other people have been calumniated by the same man or some one else, or, without being calumniated, have been suspected, like yourself now, and yet have been proved innocent. Another way [25] is to return calumny for calumny and say, ‘It is monstrous to trust the man’s statements when you cannot trust the man himself. Another is when the question has been already decided. So with Euripides’ reply to Hygiaenon, who, in the action for an exchange of properties, accused him of impiety in having written a line encouraging perjury— [30]

My tongue hath sworn: no oath is on my soul.<sup>31</sup>

Euripides said that his opponent himself was guilty in bringing into the law-courts cases whose decision belonged to the Dionysiac contests. ‘If I have not already answered for my words there, I am ready to do so if you choose to prosecute me there’. Another method is to denounce calumny, showing what an enormity it is, [35] and in particular that it raises false issues, and that it means a lack of confidence in the merits of the case. The argument from evidential circumstances is available for [1416<sup>b1</sup>] both parties: thus in the *Teucer* Odysseus says that Teucer is closely bound to Priam, since his mother Hesione was Priam’s sister. Teucer replies that Telamon his father was Priam’s enemy, and that he himself did not betray the spies to Priam. Another method, suitable for the calumniator, is to praise some trifling merit at [5] great length, and then attack some important failing concisely; or after mentioning a number of good qualities to attack one bad one that really bears on the question. This is the method of thoroughly skilful and unscrupulous prosecutors. By mixing up the man’s merits with what is bad, they do their best to make use of them to damage him.

There is another method open to both calumniator and apologist. Since a given [10] action can be done from many motives, the former must try to disparage it by selecting the worse motive of two, the latter to put the better construction on it. Thus one might argue that Diomedes

chose Odysseus as his companion because he supposed Odysseus to be the best man for the purpose; and you might reply to this that it was, on the contrary, because he was the only hero so worthless that [15] Diomedes need not fear his rivalry.

16 · We may now pass from the subject of calumny to that of narration. Narration in epideictic oratory is not continuous but intermittent. There must, of course, be some survey of the actions that form the subject-matter of the speech. The speech is a composition containing two parts. One of these is not provided by the orator's art, viz. the actions themselves, of which the orator is in no sense author. [20] The other part is provided by his art, namely, the proof (where proof is needed) that the actions were done, the description of their quality or of their extent, or even all these three things together. Now the reason why sometimes it is not desirable to make the whole narrative continuous is that the case thus expounded is hard to keep in mind. Show, therefore, from one set of facts that your hero is, e.g. brave, and from other sets of facts that he is able, just, etc. A speech thus arranged is [25] comparatively simple, instead of being complicated and elaborate. You will have to recall well-known deeds among others; and because they are well-known, the hearer usually needs no narration of them; none, for instance, if your object is the praise of Achilles; we all know the facts of his life—what you have to do is to apply those facts. But if your object is the praise of Critias, you must narrate his deeds, which not many people know of. . .<sup>32</sup>

[30] Nowadays it is said, absurdly enough, that the narration should be rapid. Remember what the man said to the baker who asked whether he was to make the cake hard or soft: 'What, can't you make it *right*?' Just so here. We are not to make long narrations, just as we are not to make long introductions or long arguments. [35] Here, again, rightness does not consist either in rapidity or in conciseness, but in the happy mean; that is, in saying just so much as will make the facts plain, or will lead the hearer to believe that the thing has happened, or that the man has caused injury [1417<sup>a</sup>1] or wrong to some one, or that the facts are really as important as you wish them to be thought: or the opposite facts to establish the opposite arguments.

You may also narrate as you go anything that does credit to yourself, e.g. 'I kept telling him to do his duty and not abandon his children'; or discredit to your adversary, e.g. 'But he answered me that, wherever he

might find himself, there he [5] would find other children', the answer Herodotus<sup>33</sup> records of the Egyptian mutineers. Slip in anything else that the judges will enjoy.

The defendant will make less of the narration. He has to maintain that the thing has not happened, or did no harm, or was not unjust, or not so bad as is alleged. He must therefore not waste time about what is admitted fact, unless this [10] bears on his own contention; e.g. that the thing was done, but was not wrong. Further, we must speak of events as past and gone, except where they excite pity or indignation by being represented as present. The story told to Alcinous is an example of a brief chronicle, when it is repeated to Penelope in sixty lines. Another instance is the epic cycle as treated by Phayllus, and the prologue to the [15] *Oeneus*.

The narration should depict character; to which end you must know what makes it do so. One such thing is the indication of choice; the quality of purpose indicated determines the quality of character depicted and is itself determined by the end pursued. Thus it is that mathematical discourses depict no character; they have nothing to do with choice, for they represent nobody as pursuing any end. On [20] the other hand, the Socratic dialogues do depict character. This end will also be gained by describing the manifestations of various types of character, e.g. 'he kept walking along as he talked', which shows the man's recklessness and rough manners. Do not let your words seem inspired so much by intelligence, in the manner now current, as by choice: e.g. 'I willed this; aye, it was my choice; true, I [25] gained nothing by it, still it is better thus'. For the other way shows good sense, but this shows good character; good sense making us go after what is useful, and good character after what is noble. Where any detail may appear incredible, then add the cause of it; of this Sophocles provides an example in the *Antigone*, where Antigone says she had cared more for her brother than for husband or children, since if the [30] latter perished they might be replaced,

But since my father and mother in their graves  
Lie dead, no brother can be born to me.<sup>34</sup>

If you have no such cause to suggest, just say that you are aware that no one will believe your words, but the fact remains that such is your nature, however hard the [35] world may find it to believe that a man deliberately does anything except what pays him.

Again, you must make use of the emotions. Relate the familiar manifestations of them, and those that distinguish yourself and your opponent; for instance, ‘he [1414<sup>b</sup>1] went away scowling at me’. So Aeschines described Cratylus as ‘hissing with fury and shaking his fists’. These details carry conviction: the audience take the truth of what they know as so much evidence for the truth of what they do not. Plenty of such details may be found in Homer:

[5] Thus did she say: but the old woman buried her face in her hands:<sup>35</sup>  
a true touch—people beginning to cry do put their hands over their eyes.

Bring yourself on the stage from the first in the right character, that people may regard you in that light; and the same with your adversary; but do not let them see what you are about. How easily such impressions may be conveyed we can see [10] from the way in which we get some inkling of things we know nothing of by the mere look of the messenger bringing news of them. Have some narrative in many different parts of your speech; and sometimes let there be none at the beginning of it.

In political oratory there is very little opening for narration; nobody can ‘narrate’ what has not yet happened. If there is narration at all, it will be of past events, the recollection of which is to help the hearers to make better plans for the [15] future. [[Or it may be employed to attack someone’s character, or to eulogize him.]]<sup>36</sup> Only then you will not be doing what the political speaker, as such, has to do.

If any statement you make is hard to believe, you must guarantee its truth, and at once offer an explanation, and then furnish it with such particulars as will be expected. Thus Carcinus’ Jocasta, in his *Oedipus*, keeps guaranteeing the truth of her answers to the inquiries of the man who is seeking her son; and so with Haemon [20] in Sophocles.

**17** · The duty of the arguments is to attempt demonstrative proofs. These proofs must bear directly upon the question in dispute, which must fall under one of our heads. If you maintain that the act was not committed, your main task in court [25] is to prove this. If you maintain that the act did no harm, prove this. If you maintain that the act was less than is alleged, or justified, prove these facts in the same way. If the dispute is about whether the act took place, do not forget that in this sort of dispute alone is it true that one of the two parties is necessarily a rogue. Here ignorance cannot be pleaded, as it might if the dispute were whether the act was [30] justified or not. This argument must therefore



be used in this case only, not in the others.

In epideictic speeches you will develop your case mainly by arguing that what has been done is, e.g., noble and useful. The facts themselves are to be taken on trust; proof of them is only submitted on those rare occasions when they are not easily credible or when they have been set down to some one else.

[35] In political speeches you may maintain that a proposal is impracticable; or that, though practicable, it is unjust, or will do no good, or is not so important as its proposer thinks. Note any falsehoods about irrelevant matters—they will look like proof that his other statements also are false. Argument by example is highly suitable for political oratory, argument by enthymeme better suits forensic. [1418<sup>a</sup>1] Political oratory deals with future events, of which it can do no more than quote past events as examples. Forensic oratory deals with what is or is not *now* true, which can better be demonstrated, because not contingent—there is no contingency in what has now already happened. Do not use a continuous succession of enthymemes: [5] intersperse them with other matter, or they will spoil one another's effect. There are limits to their number—

Friend, you have spoken as much as a sensible man would have spoken<sup>37</sup>—

‘as much’ says Homer, not ‘as well’. Nor should you try to make enthymemes on every point; if you do, you will be acting just like some students of philosophy, whose [10] conclusions are more familiar and believable than the premisses from which they draw them. And avoid the enthymeme form when you are trying to rouse feeling; for it will either kill the feeling or will itself fall flat: all simultaneous motions tend to cancel each other either completely or partially. Nor should you go after the [15] enthymeme form in a passage where you are depicting character—the process of demonstration can express neither character nor choice. Maxims should be employed in the arguments—and in the narration too—since these do express character: ‘I have given him this, though I am quite aware that one should “Trust no man”’. Or if you are appealing to the emotions: ‘I do not regret it, though I have been wronged; if he has the profit on his side, I have justice on mine’. [20]

Political oratory is a more difficult task than forensic; and naturally so, since it deals with the future, whereas the pleader deals with the past, which, as Epimenides of Crete said, even the diviners already know. (Epimenides did not practise divination about the future; only about the obscurities of the past.) Besides, in [25] forensic oratory you have a basis in the law; and once you have a starting-point, you can prove anything

with comparative ease. Then again, political oratory affords few chances for those leisurely digressions in which you may attack your adversary, talk about yourself, or work on your hearers' emotions; fewer chances, indeed, than any other affords, unless your set purpose is to divert your hearer's attention. Accordingly, if you find yourself in difficulties, follow the lead of the Athenian speakers, and that of Isocrates, who makes regular attacks upon people in the [30] course of a political speech, e.g. upon the Lacedaemonians in the *Panegyricus*, and upon Chares in the speech about the allies. In epideictic oratory, intersperse your speech with bits of episodic eulogy, like Isocrates, who is always bringing someone forward for this purpose. And this is what Gorgias meant by saying that he always found something to talk about. For if he speaks of Achilles, he praises Peleus, then [35] Aeacus, then Zeus; and in like manner the virtue of valour, describing its good results, and saying what it is like.

Now if you have proofs to bring forward, bring them forward, and also talk about character; if you have no enthymemes, then fall back on character: after all, it [1418<sup>b</sup>1] is more fitting for a good man to display himself as an honest fellow than as a subtle reasoner. Refutative enthymemes are more popular than demonstrative ones: their logical cogency is more striking: the facts about two opposites always stand out clearly when the two are put side by side.

[5] The reply to the opponent is not a separate division of the speech but part of the arguments. Both in political speaking and when pleading in court, if you are the first speaker you should put your own arguments forward first, and then meet the arguments on the other side by refuting them and pulling them to pieces beforehand. If, however, the case for the other side contains a great variety of [10] arguments, begin with these, like Callistratus in the Messenian assembly, when he demolished the arguments likely to be used against him before giving his own. If you speak later, you must first, by means of refutation and counter-deduction, attempt some answer to your opponent's speech, especially if his arguments have [15] been well received. For just as our minds refuse a favourable reception to a *person* against whom they are prejudiced, so they refuse it to a speech when they have been favourably impressed by the speech on the other side. You should, therefore, make room in the minds of the audience for your coming speech; and this will be done by getting your opponent's speech out of the way. So attack that first—either the whole of it, or the most important, successful, or vulnerable points in it, and thus [20] inspire confidence in what you have to say yourself—

First, champion will I be of Goddesses. . .

Never, I ween, would Hera. . .<sup>38</sup>

where the speaker has attacked the silliest argument first. So much for the arguments.

With regard to the element of character: there are assertions which, if made [25] about yourself, may excite dislike, appear tedious, or expose you to the risk of contradiction; and other things which you cannot say about your opponent without seeming abusive or ill-bred. Put such remarks, therefore, into the mouth of some third person. This is what Isocrates does in the *Philippus* and in the *Antidosis*, and Archilochus in his satires. The latter represents the father himself as attacking his daughter in the lampoon

Think nought impossible at all,

[30] Nor swear that it shall not befall. . .<sup>39</sup>

and puts into the mouth of Charon the carpenter the lampoon which begins

Not for the wealth of Gyges. . .<sup>40</sup>

So too Sophocles makes Haemon appeal to his father on behalf of Antigone as if it were others who were speaking.

Again, sometimes you should restate your enthymemes in the form of maxims; e.g. 'Wise men will come to terms in the hour of success; for they will gain most if [35] they do'. Expressed as an enthymeme, this would run, 'If we ought to come to terms when doing so will enable us to gain the greatest advantage, then we ought to come to terms in the hour of success'.

**18** · Next as to interrogation. The best moment to employ this is when your opponent has so answered one question that the putting of just one more lands him [1419<sup>a</sup>1] in absurdity. Thus Pericles questioned Lampon about the way of celebrating the rites of the Saviour Goddess. Lampon declared that no uninitiated person could be told of them. Pericles then asked, 'Do you know them yourself?' 'Yes', answered Lampon. 'Why,' said Pericles, 'how can that be, when you are uninitiated?' [5]

Another good moment is when one premiss of an argument is

obviously true, and you can see that your opponent must say 'yes' if you ask him whether the other is true. Having first got this answer about the other, do not go on to ask him about the obviously true one, but just state the conclusion yourself. Thus, when Meletus denied that Socrates believed in the existence of gods, Socrates proceeded to ask whether supernatural beings were not either children of the gods or in some way [10] divine? 'Yes', said Meletus, 'Then', replied Socrates, 'is there any one who believes in the existence of children of the gods and yet not in the existence of the gods themselves?'<sup>41</sup> Another good occasion is when you expect to show that your opponent is contradicting either his own words or what everyone believes. A fourth is when it is impossible for him to meet your question except by an evasive answer. If he answers 'True, and yet not true', or 'Partly true and partly not true', or 'True in [15] one sense but not in another', the audience thinks he is in difficulties, and applauds his discomfiture. In other cases do not attempt interrogation; for if your opponent gets in an objection, you are felt to have been worsted. You cannot ask a series of questions owing to the incapacity of the audience to follow them; and for this reason you should also make your enthymemes as compact as possible.

In replying, you must meet ambiguous questions by drawing reasonable [20] distinctions, not by a curt answer. In meeting questions that seem to involve you in a contradiction, offer the explanation at the outset of your answer, before your opponent asks the next question or draws his conclusion. For it is not difficult to see the drift of his argument in advance. This point, however, as well as the various means of refutation, may be regarded as known to us from the *Topics*.

When your opponent in drawing his conclusion puts it in the form of a [25] question, you must justify your answer. Thus when Sophocles was asked by Peisander whether he had, like the other members of the Board of Safety, voted for setting up the Four Hundred, he said 'Yes'. 'Why, did you not think it wicked?'— 'Yes'.—'So *you* committed this wickedness?'—'Yes', said Sophocles, 'for [30] there was nothing better to do'. Again, the Lacedaemonian, when he was being examined on his conduct as ephor, was asked whether he thought that the other ephors had been justly put to death. 'Yes', he said. 'Well then', asked his opponent, 'did not *you* propose the same measures as they?'—'Yes'.—'Well then, would not [35] *you* too be justly put to death?'—'Not at all', said he; '*they* were bribed to do it, and I did it from conviction'. Hence you should not ask any further questions after drawing the conclusion, nor put the conclusion itself in the form of a further [1419<sup>b</sup>1] question,

unless there is a large balance of truth on your side.

As to jests. These are supposed to be of some service in controversy. Gorgias said that you should kill your opponents' earnestness with jesting and their jesting [5] with earnestness; in which he was right. Jests have been classified in the *Poetics*. Some are becoming to a gentleman, others are not; see that you choose such as become you. Irony better befits a gentleman than buffoonery; the ironical man jokes to amuse himself, the buffoon to amuse other people.

[10] **19** · The epilogue has four parts. You must make the audience well-disposed towards yourself and ill-disposed towards your opponent, magnify or minimize the leading facts, excite the required state of emotion in your hearers, and refresh their memories.

[15] Having shown your own truthfulness and the untruthfulness of your opponent, the natural thing is to commend yourself, censure him, and hammer home your points. You must aim at one of two objects—you must make yourself out a good man and him a bad one either in yourselves or in relation to your hearers. The commonplaces by which this should be established have been stated.

[20] The facts having been proved, the natural thing to do next is to magnify or minimize their importance. The facts must be admitted before you can discuss how important they are; just as the body cannot grow except from something already present. The proper commonplaces to be used for this purpose of amplification and depreciation have already been set forth.

[25] Next, when the facts and their importance are clearly understood, you must excite your hearers' emotions. These emotions are pity, indignation, anger, hatred, envy, emulation, pugnacity. The commonplaces to be used for these purposes also have been previously mentioned.

Finally you have to review what you have already said. Here you may properly do what some wrongly recommend doing in the introduction—repeat your points [30] frequently so as to make them easily understood. What you *should* do in your introduction is to state your subject, in order that the point to be judged may be quite plain; in the epilogue you should summarize the arguments by which your case has been proved. The first step in this reviewing process is to observe that you have done what you undertook to do. You must, then, state what you have said and why you have said it. Your method may be a comparison of your own case with

that [35] of your opponent; and you may compare the ways you have both handled the same point or make your comparison direct: 'My opponent said so-and-so on this point; I [1420<sup>a</sup>1] said so-and-so, and this is why I said it'. Or with modest irony, e.g. 'He certainly said so-and-so, but I said so-and-so'. Or 'How vain he would have been if he had proved all this instead of that!' Or put it in the form of a question, 'What has not been proved by me?' or 'What has my opponent proved?' You may proceed, then, either in this way by setting point against point, or by following the natural order of the arguments as spoken, first giving your own, and then separately, if you wish [1420<sup>b</sup>1] those of your opponent.

For the conclusion, the disconnected style of language is appropriate, and will mark the difference between the oration and the peroration. 'I have done. You have heard me. The facts are before you. I ask for your judgement'.

**\*\*TEXT:** R. Kassel, Berlin, 1976

<sup>1</sup>Excised by Kassel.

<sup>2</sup>See *Topics* 101<sup>a</sup>30.

<sup>3</sup>Kassel regards this passage as a later addition to the text by Aristotle himself.

<sup>4</sup>*Topics* I 12.

<sup>5</sup>See *Prior Analytics* I 8; 12–14; 27.

<sup>6</sup>‘Evidence’ renders τεκμήριον which Aristotle connects, *via* τέκμαρ, with τέρας and πεπερασμένος (‘completed’).

<sup>7</sup>*Prior Analytics* II 27.

<sup>8</sup>Kassel marks a lacuna.

<sup>9</sup>Excised by Kassel.

<sup>10</sup>Reading τούτω for τούτον.

<sup>11</sup>Homer, *Iliad* I 255.

<sup>12</sup>*Iliad* II 160.

<sup>13</sup>*Iliad* II 298.

<sup>14</sup>Excised by Kassel.

<sup>15</sup>Pindar, *Olympian* I 1.

<sup>16</sup>Kassel marks this as a later addition by Aristotle himself.

<sup>17</sup>See *Iliad* IX 592–4.

<sup>18</sup>*Odyssey* XXII 347.

<sup>19</sup>ἄριστοκρατία from ἄριστος (‘best’).

<sup>20</sup>Excised by Kassel.

<sup>21</sup>Excised by Kassel.

<sup>22</sup>See Plato, *Menexenus* 235D.

<sup>23</sup>Kassel marks this and the following paragraph as a later addition by Aristotle himself.

<sup>24</sup>Excised by Kassel.

<sup>25</sup>Excised by Kassel.

<sup>26</sup>Excised by Kassel.

<sup>27</sup>The text of this sentence is uncertain.

<sup>28</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>29</sup>Excised by Kassel.

<sup>30</sup>Evenus, frag. 8 West.

<sup>31</sup>Excised by Kassel.

<sup>32</sup>Kassel marks this passage as a later addition by Aristotle himself.

<sup>33</sup>Euripides, frag. 133 Nauck.

<sup>34</sup>*Odyssey* XV 400.

<sup>35</sup>*Iliad* XVIII 109.

<sup>36</sup>*Iliad* XXIII 108; *Odyssey* IV 183.

<sup>37</sup>Euripides, *Orestes* 234.

<sup>38</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>39</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>40</sup>Deleting the full stop after εἶναι.

<sup>41</sup>Euripides, frag. 183 Nauck.

<sup>42</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>43</sup>*Antigone* 456–7.

<sup>44</sup>Frag. 135 Diels-Kranz.

<sup>45</sup>The sense of this clause is obscure.

<sup>46</sup>*Antigone* 456, 458.

<sup>47</sup>Frag. 22a West.

<sup>1</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>2</sup>*Iliad* XVIII 109.



<sup>3</sup>*Iliad* I 356; IX 648.

<sup>4</sup>*Iliad* II 196; I 82.

<sup>5</sup>Excised by Kassel.

<sup>6</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>7</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>8</sup>*Odysseus* IX 504.

<sup>9</sup>*Iliad* XXIV 54.

<sup>10</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>11</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>12</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>13</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>14</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>15</sup>See *Iliad* XI 542.

<sup>16</sup>Marked by Kassel as a later addition by Aristotle himself. The quoted line is Aeschylus, frag. 305 Nauck.

<sup>17</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>18</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>19</sup>Frag. 8 Nauck.

<sup>20</sup>The text is uncertain.

<sup>21</sup>Euripides, *Medea* 294–7.

<sup>22</sup>*id.*, frag. 661 Nauck.

<sup>23</sup>*id.*, *Hecuba* 864–5.

<sup>24</sup>Epicharmus, frag. 19 Diels-Kranz.

<sup>25</sup>Euripides, *Troades* 1051.

<sup>26</sup>Frag. adesp. 79 Nauck.

<sup>27</sup>Epicharmus, frag. 20 Diels-Kranz.

<sup>28</sup>*Iliad* XII 243.

<sup>29</sup>*Iliad* XVIII 309.

<sup>30</sup>Cf. Euripides, *Hippolytus* 989.

<sup>31</sup>Alcidamas, frag. 2.

<sup>32</sup>Frag, adesp. 80 Nauck.

<sup>33</sup>Euripides, frag. 396 Nauck.

<sup>34</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>35</sup>Frag, adesp. 81 Nauck.

<sup>36</sup>See *Topics* 106<sup>a</sup>13, etc.

<sup>37</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>38</sup>See *Topics* 111<sup>b</sup>5.

<sup>39</sup>Frag, adesp. 82 Nauck.

<sup>40</sup>Frag. 2 Nauck.

<sup>41</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>42</sup>Frag. 597 Nauck.

<sup>43</sup>*Troades* 990.

<sup>44</sup>Frag. 4 Nauck.

<sup>45</sup>Frag. 96 Snell.

<sup>46</sup>Omitting ὄρον.

<sup>47</sup>Frag. 9 Nauck.

<sup>48</sup>See *Topics* VIII 10.

<sup>49</sup>*Prior Analytics* II 27.

<sup>50</sup>*Prior Analytics* II 27.

<sup>51</sup>*Topics* I 10.

<sup>1</sup>Frag. 705 Nauck.

<sup>2</sup>Cleobulina, frag. 1 West.

<sup>3</sup>Euripides, *Orestes* 1587–8.

<sup>4</sup>Excised by Kassel.

<sup>5</sup>*CF Iliad* XX 164.

<sup>6</sup>*Republic* 469E, 488A, 601B.

<sup>7</sup>Frag, adesp. 83 Nauck.

<sup>8</sup>Euripides, *Iphigenia in Tauris*, 727.

<sup>9</sup>Herodotus I i.

<sup>10</sup>Euripides, frag. 515 Nauck.

<sup>11</sup>This and the following quotations are from Isocrates' *Panegyricus*.

<sup>12</sup>Aristophanes, frag. 649 Kock.

<sup>13</sup>*Iliad* IX 526.

<sup>14</sup>Frag. 20a Diels-Kranz.

<sup>15</sup>*Odyssey* XIV 213.

<sup>16</sup>Isocrates, *Philippus* 73.

<sup>17</sup>Isocrates, *Philippus* 10, 127

<sup>18</sup>Euripides, *Iphigenia in Aulis* 80.

<sup>19</sup>*Odyssey* XI 598; *Iliad* XIII 587; IV 126; XI 574; XV 542.

<sup>20</sup>*Iliad* XIII 799.

<sup>21</sup>Text uncertain.

<sup>22</sup>*Iliad* IX 385, 388–90.

<sup>23</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>24</sup>Excised by Kassel.

<sup>25</sup>*Iliad* II 671–3.

<sup>26</sup>Text uncertain.

<sup>27</sup>*Iliad* I 1; *Odyssey* I 1.

<sup>28</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>29</sup>Sophocles, *Antigone* 223; Euripides, *Iphigenia at Tauris* 1162. Marked by Kassel as a later addition by Aristotle himself.

<sup>30</sup>*Odyssey* VI 327.

<sup>31</sup>Euripides, *Hippolytus* 612.

<sup>32</sup>Kassel marks a lacuna.

<sup>33</sup>II 30.

<sup>34</sup>Sophocles, *Antigone* 911–2.

<sup>35</sup>*Odyssey* XIX 361.

<sup>36</sup>Marked by Kassel as a later addition by Aristotle himself.

<sup>37</sup>*Odyssey* IV 204.

<sup>38</sup>“Euripides, *Troades* 969–71.

<sup>39</sup>Frag. 122 West.

<sup>40</sup>Frag. 19 West.

<sup>41</sup>Plato, *Apology* 27C.

# RHETORIC TO ALEXANDER\*\*

*E. S. Forster*

[1420<sup>a</sup>5] <sup>1</sup>[Aristotle to Alexander. Salutation.

You write that you have often sent persons to me to urge upon me the project of noting down for you the principles of public speaking. It is not through indifference that I have put off doing so all this time, but because I was seeking how to write on [10] this subject with more exactitude than any one else who has concerned himself therewith. It was only natural that I should have such an intention; for just as you are desirous to have more splendid raiment than other men, so you ought to strive to attain to a more glorious skill in speech than other men possess. For it is far more [15] honourable and kingly to have the mind well ordered than to see the bodily form well arrayed. For it is absurd that one who in deeds excels all men should in words manifestly fall short of ordinary mortals, especially when he knows full well that, whereas among those whose political constitution is democracy the final appeal on [20] all matters is to the law, among those who are under kingly rule the appeal is to reason. Just as their public law always directs self-governing communities along the best path, so might reason, as embodied in you, guide along the path of their [25] advantage those who are subject to your rule. For law can be simply described as reason defined by the common consent of the community, regulating action of every kind. Furthermore, I think that you are well aware that we praise as good men and true those who employ reason and prefer always to act under its guidance, while we [1420<sup>b</sup>5] abhor as savage and brutish those who act in any matter without reason. It is for this reason too that we punish wicked men when they show their wickedness and admire the good when they display their excellence. Thus we have discovered a means of preventing possible wickedness, while we enjoy the benefits of existing goodness. In [10] this way we escape annoyances which threaten us and secure advantages which we did not previously possess. Just as a life free from pain is an object of desire, so is wise reason an object of contentment.

Again, you must realize that the model set before most men is either

the law or else your life and your reason. In order therefore that you may excel all Greeks and [15] barbarians, you must exert yourself to the utmost, so that those who spend their lives in these pursuits, using the elements of excellence in them to produce a beautiful copy of the model thus set before them, may not direct themselves towards ignoble ends but make it their desire to partake in the same excellence.

Moreover, deliberation is the most divine of human activities. Therefore you [20] must not waste your energies on subordinate and worthless pursuits, but desire to drink at the very fountain-head of good counsel. For what man of sense could doubt that, while it is a sign of foolishness to act without deliberation, it is the mark of true [25] culture to accomplish under the guidance of reason anything that reason commands? It is plain to see that all the greatest politicians of Greece resort to reason first and then to deeds, and further that those who have won the highest repute among the barbarians have employed reason before action, knowing full well that the consideration of expediency by the light of reason is a very citadel of [1421<sup>a</sup>1] salvation. It is reason which we must regard as an impregnable citadel, and not look on any fortress built by man as a sure safeguard.

But I hesitate to say another word, lest I should seem to be writing for effect, [5] bringing forward proofs of facts which are fully known as though they were not generally admitted. I will therefore say no more, after mentioning only one topic, in enlarging on which one might spend one's whole life, namely, that reason is the thing wherein we are superior to all other animals; and we who have received the highest honour which heaven can bestow will have this above other men. For all [10] animals display the appetites and desire and the like, but none save man possesses reason. Now it would be most strange if, when it is by virtue of reason alone that we live happier lives than all other animals, we should through indifference despise and [15] renounce that which is the cause of our well-being. Though you have long been exhorted thereto, I urge you to embrace with the utmost zeal the study of reasoned speech. For just as health preserves the body, so is education the recognized preserver of the mind. Under its guidance you will never take a false step in anything that you do, but you will keep safe practically all the advantages which [20] you already possess. Moreover, if physical sight is a pleasure, to see clearly with the eyes of the soul is a thing to be admired. Again, as the general is the saviour of his army, so is reason, allied with education, the guide of life. These, then, and like [25] sentiments I think I may well dismiss at the present moment.

In your letter you urge me not to let this book fall into other hands than yours, and this knowing full well that, just as parents love their own offspring more than supposititious children, so those who have invented something have more affection [30] for it than those to whom the discovery is merely imparted. For men have died in defence of their words, as they have died for their offspring. For the so-called Parian sophists, because what they teach is not of their own production, in their gross indifference feel no affection and barter it away for money. For this reason I exhort [35] you to watch over these precepts, that while they are yet young they may be corrupted by no moneys, and, sharing in your well-ordered life, when they come to man's estate, may win unsullied glory.

Following the lesson taught by Nicanor, we have adopted from other authors anything on the same subjects which was particularly well expressed in their [1421<sup>b</sup>1] treatises. You will find two such books, one of which is my own, viz. the Oratorical Art which I wrote for Theodectes, while the other is the treatise of Corax. The other points connected with public and forensic exhortations have all been dealt with [5] specially in these treatises. So in these commentaries written expressly for you you will find material for amplifying these two treatises. Farewell.]

1 · Public speeches fall into three classes, deliberative, epideictic, and [10] forensic. They are of seven kinds, being employed in persuasion, dissuasion, eulogy, vituperation, accusation, defence, and inquiry either by itself or in relation to something else. Such are the different kinds of discourses and their number. We shall employ them in public harangues, in lawsuits about contracts, and in private [15] conversation. We shall treat of them most conveniently if we take them each separately and enumerate their qualities, their uses, and their actions. And first let us discuss persuasion and dissuasion, since they are used most of all in private [20] conversations and in public harangues. To speak generally, persuasion is an exhortation to some choice or speech or action, while dissuasion is the prevention of some choice or speech or action. Such being the definition of these things, he who [25] persuades must show that those things to which he exhorts are just, lawful, expedient, honourable, pleasant, and easy of accomplishment. Failing that, when he is exhorting to that which is difficult, he must show that it is practicable and that its execution is necessary. He who dissuades, by pursuing the opposite course, must exert a hindering influence, showing that the

proposed action is neither just nor [30] lawful nor expedient nor honourable nor pleasant nor practicable; if he cannot do that, he must urge that it is toilsome and unnecessary. All actions can have both these sets of attributes applied to them, so that no-one who can urge one of these two sets of fundamental qualities is at a loss for anything to say. It is for these qualities therefore that those who seek to persuade or dissuade must look. I will now attempt [35] to define them one by one and show whence we shall supply them for our discourses.

That which is just is the unwritten custom of all or the majority of men which draws a distinction between what is honourable and what is base. We may take as examples the honouring of parents, doing good to one's friends, and returning good to one's benefactors. These and similar duties are not enjoined upon mankind by [1422<sup>a</sup>1] written laws, but they are observed by unwritten custom and universal practice. So much for just actions.

Law is a common agreement made by the community, which ordains in writing how the citizens ought to act under every kind of circumstance.

[5] Expediency is the safeguarding of existing advantages, or the acquisition of those not already possessed, or the riddance of existing disadvantages, or the prevention of harm which threatens to occur. For individuals you can divide up expediency according as it applies to the body or the soul or external possessions. [10] For the body, strength, beauty, and health are expedient; for the soul, courage, wisdom, and justice. External possessions are friends, wealth, and property. The contraries of these are inexpedient. For a community such things as concord, strength for war, wealth, a plentiful supply of revenue, and excellence and abundance of allies are expedient. In a word we look upon anything of this kind as [15] expedient and the contrary as inexpedient. Honourable things are those from which good repute and creditable distinction will accrue to the doers. Pleasant things are those which cause joy. Easy things are those which are accomplished with the least expenditure of time, trouble, and money. Practicable things are all those which admit of performance. Necessary things are those the execution of which does not [20] depend upon us but takes place as it were by some necessity divine or human. Such, then, is the nature of things just, lawful, expedient, honourable, easy, practicable, and necessary.

It will be easy to speak about such subjects by the use of the considerations mentioned above and by ones analogous to them and by ones opposed to them and [25] by employing judgements pronounced by the gods or by men or by judges of repute or by our opponents.



We have already described the nature of that which is just. The following are cases where there is an analogy to that which is just: 'As we consider it just to obey [30] parents, on the same principle it behoves sons to imitate the actions of their fathers'; or again, 'As it is just to do good in return to those who do good to us, so it is just to abstain from harming those who have done us no ill'. It is by this method that we must get analogies to justice. Then we ought to make it plain from contraries in the [35] following way: 'As it is just to punish those who do us a wrong, so it behoves us to do good in return to our benefactors'. You will discover what is just in the judgement of men of repute by a consideration such as the following: 'Not only do we hate and do harm to our enemies, but the Athenians also and the Lacedaemonians judge that it [40] is just to punish their enemies'. By following this system you will often discover What is just. [1422<sup>b</sup>1]

We have already defined the nature of that which is lawful. When it serves our purpose we must introduce the law itself, and any case of analogy to the written law. For example, 'As the lawgiver punishes thieves with very serious penalties, so we [5] ought to inflict heavy chastisement on those who deceive, for they steal away the understanding'; or again, 'Just as the lawgiver has made the nearest relatives the heirs of those who die childless, so I ought in the present case to have authority over the possessions of a freedman; for since those who set him free are dead and I am the [10] nearest relative of the deceased persons, I am justified in assuming control over their freedmen'. This is an example of the way in which an analogy to that which is ordained by law is obtained. The following is an illustration of what is contrary to that which is lawful: 'If the law prohibits the distribution of public property, it was [15] clearly the judgement of the lawgiver that all who divide up such property are doing wrong; for if the laws ordain that those who govern the state well and justly should be honoured, they clearly regard those who make away with public property as deserving of punishment'. The nature of the lawful is thus clearly shown by taking [20] cases of the contrary. It can be demonstrated from previous judgements by a consideration such as this: 'Not only do I hold that the lawgiver made this law to cover such cases as these, but on a former occasion, when Lysithidas gave an explanation similar to that which I am now putting forward, the jury voted in favour [25] of this interpretation of the law'. By this method we shall often be able to demonstrate what is lawful.

The nature of the expedient itself has already been defined. We must,

as in the cases already mentioned, introduce the expedient, wherever it is available, into our arguments and often bring it to light, pursuing the same method which we [30] employed for the lawful and the just. The following would be instances of analogies to the expedient: 'As in war it is expedient to station the bravest men in the front rank, so in the state it is advantageous that the wisest and justest men should be the leaders of the people'; or again, 'As it is expedient for the healthy to be on their [35] guard against disease, so too in communities which live in harmony it is expedient to provide against possibilities of faction'. By following this method you will be able to make many analogies to the expedient. The expedient will also be clear if you take [40] contrary cases such as the following: 'If it is advantageous to honour good citizens, it would be expedient also to punish the wicked'; or again, 'If you think it inexpedient that we should make war unaided on the Thebans, it would be expedient to make [1423a1] the Lacedaemonians our allies and then make war on the Thebans'. This is the method by which you will demonstrate the expedient by arguing from the contrary. You can discover what has been judged to be expedient by judges of repute by [5] considerations such as the following: 'The Lacedaemonians, when they had conquered the Athenians, thought it expedient not to enslave their city, and on another occasion the Athenians and Thebans, when it was within their power to depopulate Sparta, thought it expedient to allow the Lacedaemonians to survive'.

[10] By pursuing this method you will have plenty to say about the just, the lawful, and the expedient. You must employ the same methods in the case of the honourable, the easy, the pleasant, the practicable, and the necessary. We shall thus have abundant material on these topics also.

2 · Next let us determine the number and character of the subjects which we [15] discuss in the council-chamber and in the popular assembly. If we have a clear knowledge of these, the actual circumstances will provide us with something appropriate to say on each occasion when we are giving advice. If we have long been familiar with the characteristics common to each class of subject, we shall always be able to apply them readily in practice. We must therefore distinguish the various [20] subjects about which all men hold public deliberation.

To sum the matter up, there are seven subjects on which we shall speak in public. For whether we are addressing the council or the people, we must necessarily deliberate and speak about either sacred rites or laws

or the political constitution or [25] alliances and contracts with other states or war or peace or the provision of resources. These, then, are the subjects about which we shall deliberate and address the people. Let us take each of them separately and see how they can be treated in a speech.

There are three ways in which we must deal with the subject of sacred rites; for [30] we shall urge either that they ought to be retained in their existing form, or that they ought to be changed so as to be more magnificent or else less sumptuous. When we are maintaining that the existing form should be retained, we should derive material from the argument of justice, urging that it is regarded by all men as unjust to transgress the customs of our forefathers, and that all the oracles [35] command men to make their sacrifices according to the usages of their forefathers, and that it is of the utmost importance that the religious observances should be continued which were prescribed by those who originally founded cities and set up temples to the gods. On the ground of expediency we shall urge that, if the sacrifices are offered according to ancestral usage, it will be expedient either for individuals or [1423<sup>b</sup>1] the community at large in view of the payments of money which will be involved, and that it will benefit the citizens by creating a feeling of self-confidence; for if heavy-armed troops, horsemen, and light-armed soldiers join in a religious procession, the citizens, priding themselves on such things, would feel greater confidence [5] in themselves. It can be urged on the ground of what is honourable, if it results in the spectacle of splendid festivals<sup>2</sup>; on the ground of pleasure, because a variety in the sacrifices to the gods is introduced into the spectacle; and on the ground of practicability, if neither defect nor excess has characterized the celebration. Thus when we are speaking in support of the existing state of affairs, we must pursue our [10] inquiry by the above or similar methods and treat the question under discussion as the nature of the subject permits.

When we are advising a change to greater magnificence in the celebration of sacred rites, we shall have a plausible pretext for altering ancestral usages, if we urge that an addition to existing rites involves not their destruction but their [15] extension; again, that it is reasonable to suppose that the gods too are more favourably disposed to those who honour them more; again, that even our fathers used not to perform their sacrifices always in the same way, but regulated their service to the gods, both as a community and as private individuals, according to the [20] occasion and their own prosperity; again, that this is a principle which we follow in all other matters in the government of our cities and our private

establishments. You must also mention any advantage in brilliance or enjoyment which is likely to result to the city from the alteration, following the methods which we have described above.

When we are urging a reduction of the scale of our sacred rites, we must in the [25] first place direct our remarks to the circumstances of the moment and show in what respect the citizens are less prosperous now than formerly. Next we must show that it is reasonable to suppose that the gods rejoice, not in the costliness of the sacrifices, but in the piety of those who offer them; again, that both gods and men deem those who do anything beyond their means to be guilty of great folly; next, that public [30] expenditure is not merely a personal question but depends on prosperity and adversity. These and others of the same kind are the arguments which we shall offer on the subject of sacrifices.

But in order that we may know how to give some indications and offer rules as [35] to the conditions of the ideal sacrifice, let us define it thus: the best sacrifice of all is one which is pious towards the gods, moderate in costliness, splendid from a spectacular point of view, and likely to bring advantage in war. It will be pious [1424<sup>a</sup>1] towards the gods, if ancestral usage is not violated; it will be moderate in costliness, if the accompaniments of the ceremony are not all wasted; it will be splendid from a spectacular point of view, if gold and such things as are not actually consumed are [5] used lavishly; and it will be advantageous for war, if horsemen and infantry in full panoply accompany the procession. By following these rules we shall best provide for the service of the gods. From what has been said above we shall know how to speak in public about the performance of sacred rites of every kind.

[10] Let us next deal similarly with laws and the political constitution. Laws may be briefly described as common agreements made by the community which define and ordain in writing how the citizens should act under various circumstances.

In democratic states legislation ought to provide for appointment by lot to the less important and the majority of the offices (for thus faction will be avoided), [15] while the most important magistrates should be elected by the votes of the multitude. In this way the people, having the power to bestow honours on whomsoever they like, will not be jealous of those who obtain them, while the more prominent men will be encouraged to practice virtue, knowing that it will be to their advantage to have a good repute among their fellow-citizens. Such are the laws [20] which ought to be laid down regarding elections in a democratic state. It would be a lengthy task to go into detail about the rest of the

administration. But, to put the matter briefly, care must be taken that the laws may prevent the multitude from entertaining designs against the possessors of property and may instil into the [25] wealthy citizens an eagerness to spend money in undertaking public burdens. The laws will ensure this if certain distinctions are set aside by law for the owners of property in return for their expenditure in the service of the state, and if the laws [30] show more consideration for the tillers of the soil and the sailors among the poorer classes than for the poor; so that the rich may willingly serve the state, and the people may prefer work to dishonest means of gain. In addition stringent laws must be laid down forbidding the distribution of lands and the confiscation of the [35] property of those who have served the state, and heavy penalties must be imposed on those who commit these transgressions. Also public land in a good position in front of the city must be set apart for the burial of those who are killed in war, and their children must be supported at the public expense until they grow up. Such must be the character of legislation in a democratic state.

In oligarchical states the laws ought to distribute the magistracies impartially [1424<sup>b</sup>1] to all who possess the rights of citizenship; most of them should be bestowed by lot, but the most important should be assigned by secret vote under oath and with the strictest precautions. Under an oligarchy the penalties inflicted on those who offer affronts to any of the citizens ought to be very heavy, for the people are not so much [5] annoyed at being debarred from holding office as they are angered at being affronted. Differences between citizens ought to be settled as quickly as possible and not be allowed to continue. Nor ought the lower classes to be allowed to collect from the country into the city; for the result of such assemblages is that the populace unites and overthrows the oligarchy. Speaking generally, in democratic [10] states the laws ought to hinder the populace from entertaining designs on the property of the rich; in oligarchical states they ought to check the possessors of political rights from insulting those who are weaker than themselves and from imposing upon the citizens. From what I have said you will not fail to perceive what aims the laws and political constitution ought to keep in view. [15]

Anyone who wishes to speak in favour of a law must show that it affects all equally, that it harmonizes with the rest of the laws, and that it is beneficial to the city, particularly in promoting concord; failing this, he must show that it will conduce to virtue among the citizens or that it will benefit the public revenue or the [20] good repute of the city as a whole, or that it will strengthen the power of the state, or that it will confer

some similar advantage. If you are speaking against a law, you must consider whether it does not apply to all the citizens; and next, whether, so far from agreeing with the other laws, it is actually opposed to them; and further, whether it will conduce to none of the benefits which we have mentioned, being on [25] the contrary harmful. These considerations will provide us with abundant arguments for making proposals and speaking about laws and the political constitution.

We will now proceed to deal with alliances and contracts with other states. Contracts and arrangements must necessarily be regulated by public agreements. [30] Alliances must be formed on occasions when one party is too weak by itself, or when a war is expected to break out or because they think they will thus prevent certain people from making war. These and a number of similar circumstances are the reasons which induce states to make allies.

When you wish to support the formation of an alliance, you must make it clear [35] that the occasion for doing so exists, and show if possible that the proposed allies are just men, and that they have previously conferred some benefit upon the state, and that they are possessed of considerable power, and that they are situated near at hand. If all these advantages are not present, you must collect in your speech any of them which do exist. When you are trying to prevent an alliance, it is open to you to [1425<sup>a</sup>1] show in the first place that it is unnecessary at the moment; or again, that the proposed allies are not just men, or that they have wronged us on a previous occasion. . . .<sup>3</sup> Failing that, you can object to them on the ground that they live too far away and are not in a position to help us at the proper moment. With these and [5] similar arguments we shall have abundant material for speaking against and in support of the formation of alliances.

Again, on the subject of peace and war let us use a similar method to obtain our chief kinds of argument. The pretexts for making war on another state are as [10] follows: when we have been the victims of aggression, we must take vengeance on those who have wronged us, now that a suitable opportunity has presented itself; or else, when we are actually being wronged, we must go to war on our own behalf or [15] on behalf of our kindred or benefactors; or else we must help our allies when they are wronged; or else we must go to war to gain some advantage for the city, in respect either of glory, or of resources, or of strength, or of something similar.

When we are exhorting anyone to go to war we must collect as many of these [20] pretexts as possible, and afterwards show that those whom

we are exhorting possess most of the advantages which bring success in warfare. Now men are always successful either by the favour of the gods, which we call good fortune, or through the number and strength of their troops, or through the abundance of their resources or the wisdom of their general or the excellence of their allies, or through [25] their superiority of position. From these, then, and similar advantages we shall select and demonstrate those which are most applicable to the circumstances, when our advice is in favour of war, belittling the points of superiority possessed by the enemy and exaggerating those which we ourselves enjoy. If we are trying to prevent a war which is likely to take place, we must first of all show either that the pretexts [30] do not exist at all or else that the grievances are small and insignificant; next we must show that it is not expedient to go to war, dwelling on the disasters that befall men in warfare; and further, that the advantages which conduce to victory (which [35] have just been enumerated) are possessed by the enemy rather than by us. These are the means which we must employ to avert a war which is likely to occur. When we are trying to stop a war which has actually started, if those to whom our advice is offered are stronger than their foes, the first point on which we must insist is that sensible men ought not to wait until they have a fall, but should make peace while they are strong; also, that it is characteristic of war to ruin many even of those who [1425<sup>b</sup>1] are successful in it, but of peace to save the vanquished and to allow the victorious to enjoy the possessions which they have gained in warfare.<sup>4</sup> We must also dwell upon the numerous and incalculable vicissitudes of warfare. Such are the methods by [5] which we must exhort to peace those who are victorious in war. Those who have already met with failure we must urge to make peace on the ground of actual events, and because they ought to learn from their misfortunes and not be exasperated by those who have already injured them, and because of the dangers which have already resulted from not making peace, and because it is better to sacrifice a part [10] of their possessions to an enemy stronger than themselves than to be conquered and lose their lives as well as their property. And, to put the matter briefly, we must realize that it is the universal custom of mankind to abandon mutual warfare, either when they think that the demands of the enemy are just, or when they are at [15] variance with their allies, or weary of war, or afraid of their enemy, or suffering from internal strife. If, therefore, you collect from amongst all these and similar arguments those which are most applicable to the circumstances, you will have no lack of material for speaking about peace and war.

[20] Lastly, it remains for us to treat of the provision of resources. First, then, we must inquire whether any property belonging to the city is neglected, neither bringing in any revenue nor being dedicated to the gods: I mean, for example, any public lands which are neglected and might bring in revenue to the city if they were sold or leased to private persons; for this is a very common source of income. If this [25] expedient is lacking, we must impose taxes on rateable property, or order the poor to give their personal service in time of danger, the rich to pay money, and the craftsmen to provide arms. In a word, when we are treating of ways and means, we must say that they affect all the citizens equally and are permanent and ample, [30] while the exact opposite is true of our adversaries' proposals.

From what has now been said we are acquainted with the subjects on which we shall speak in public, when we are seeking to persuade or dissuade, and with their component parts, which will supply us with the material of our orations. Next in order let us set forth and treat of the eulogistic and the vituperative kinds of [35] oratory.

3 · To speak generally, the eulogistic kind is the amplification of creditable choices, deeds, and words, and the attribution of qualities which do not exist; while the vituperative kind is the opposite of this and consists in the minimizing of creditable qualities and the amplification of those which are discreditable. Things worthy of praise are those which are just, lawful, expedient, honourable, pleasant, [1426<sup>a</sup>1] and easy of execution. The nature of these qualities and the sources from which we can obtain abundant material about them have already been stated. He who is eulogizing must show in his speech that one of these praiseworthy qualities is connected with a certain person because it has either been brought about by his [5] personal exertions, or has been produced through his agency, or has resulted from a certain action of his, or has been done for some object, or could not have come to pass except under certain circumstances which are due to him. Similarly he who is censuring must show that the contrary of this is true of the person whom he is censuring. . . .<sup>5</sup> The following are examples of the results of action; bodily health is the result of a fondness for gymnastics; a man falls into ill-health as the result of not [10] caring for exercise, or becomes wiser as the result of studying philosophy, or lacks the necessities of life as the result of his own carelessness. The following are actions done with an object: men endure many toils and dangers with the object of being



crowned by their fellow-citizens, or neglect everything else with the object of [15] pleasing those whom they love. Instances of things which can only take place under certain circumstances are the following: victories at sea can only take place when there are sailors to win them, and drunkenness can only occur as the result of drinking. By pursuing this method on the lines already laid down you will have abundant material for eulogy and vituperation.

Generally speaking you will be able to amplify and minimize under all such [20] circumstances by the following method: first, by showing, as I explained just now, that many good or bad results have been caused by a certain person's actions. This is one kind of amplification. A second method is to introduce something judged to be great—a great good, if you are eulogizing, and an evil if you are censuring—and [25] then set side by side with it what you have to say and compare the two together, making as much as possible of your own case and as little as possible of the other; the result will be that your own case is magnified. A third plan is to compare that about which you are speaking with the least thing which falls under the same [30] category; for the former will then appear magnified, just as persons of moderate height appear taller than they really are when they stand side by side with persons of unusually small stature. The following is another safe method of amplification: if a certain thing has been considered a great good, then its contrary, if you mention it, will appear to be a great evil, and similarly, if a thing is considered to be a great evil, [35] its contrary, if you mention it, will appear to be a great good. You can also magnify good and bad actions by showing that the doer of them acted intentionally, proving that he had long premeditated doing them, that he purposed to do them often, that he did them over a long period, that no one else ever tried to do them, that he acted in company with others with whom no one else ever acted, or following those whom [1426<sup>b</sup>1] no one else ever followed, or that he acted voluntarily or designedly, and that we should be fortunate, or unfortunate, if we all did as he did. You must also prove your point by drawing parallels and amplifying as follows, building them as it were one [5] on the top of another: 'If a man cares for his friends, it is natural to suppose that he honours his parents, and he who honours his parents will also desire to benefit his fatherland'. Generally speaking: if you can prove that a man is the cause of *many* good or bad things, these things will appear to be important. You must also examine the topic on which you are speaking and see whether it appears to have more weight [10] when divided into parts or when treated as a whole, and you must treat it in the

manner in which it appears to have more weight. By pursuing these methods you will be able to make the most frequent and effective amplifications.

You will minimize good and bad things in your speeches by following the [15] opposite method to that which we have prescribed for amplification. The best thing is to show that a man's action has produced no result at all, or, if that is impossible, only the smallest and most insignificant results. From these instructions we know how to amplify or minimize any point which we are bringing forward, when we are eulogizing or censuring. These materials for amplification are useful in other kinds [20] of oratory, but they are most effective in eulogy and vituperation. We shall thus be provided with ample material on these topics.

4 · Let us next similarly define the kinds of oratory employed in accusation [25] and defence and the elements of which they are composed and the uses to which they are to be put. The oratory of accusation is, to put the matter briefly, the exposition of errors and crimes; defensive oratory is the disproving of errors and crimes of which a man is accused or suspected. Both styles, then, having these [30] qualities, he who is accusing, when he charges his opponents with wickedness, must declare that their acts are unjust and illegal and detrimental to the interests of the mass of citizens; when he is accusing an adversary of folly, he must declare his acts to be both inexpedient for the actual doer of them and disgraceful and odious and [35] impracticable. These and similar arguments are those which should be directed against the wicked and foolish. Accusers should also observe against what kinds of offences the punishments ordained by the laws are directed and for what offences juries impose penalties. Where the law has laid down a definite punishment, the accuser must make it his sole object to prove that the offence has been committed. When the jury has to assess the penalty, . . .<sup>6</sup> then the errors committed by one's [1427<sup>a</sup>1] opponents must be amplified, and, if possible, it must be shown that the offence was committed voluntarily, and not with ordinary intent but after every possible preparation. If you cannot do this, and think that your opponent intends to show [5] that he has somehow made a mistake or that he intended to act honourably in the matter but met with misfortune you must deprive him of any claim to pardon by telling your hearers that evil-doers, instead of declaring that they have made a mistake after they have

acted, ought to be careful before they act; and further that, [10] even if he has made mistakes or met with misfortune, he is more deserving of punishment for his misfortunes and mistakes than one who has done neither of these things. Moreover the legislator has not let those who make mistakes go free, but has made them liable to punishment, in order to prevent them from making mistakes again. You must also point out that if they listen to one who makes this kind of [15] defence, they will have many persons doing wrong by choice; for if they are successful, they will simply do what they like, while, if they are unsuccessful, they will declare that they have met with ill-fortune, and they then will be excused from punishment. By such arguments must accusers deprive their adversaries of any claim to pardon, and by means of the amplifications already described their acts [20] must be shown to have caused many evils. These are the component parts of which the oratory of accusation is made up.

Defensive oratory consists of three methods. A man who is defending himself must either prove that he committed none of the acts of which he is accused; or if he [25] is forced to admit them, he must try to show that what he has done is lawful and just and honourable and expedient for the state; if he cannot prove this, he must attribute his acts to an error or to misfortune and show that the harm which has resulted from them is small, and so try to gain pardon. You can define a crime, an [30] error, and a misfortune thus: you must regard as a crime a wicked deed done deliberately, and you must urge that the heaviest penalty be exacted for such deeds; a harmful act done because of ignorance must be called an error; while the failure to [35] accomplish some good intention, not through one's own fault but owing to some one else or to luck, is to be accounted a misfortune. The commission of crime you must declare to be confined to wicked men, while error and misfortune in action are not peculiar to oneself but are common to all men, including those who are sitting in [40] judgement upon you. You must ask for pardon if you are forced to admit that you have committed faults of this kind, pointing out that your hearers are as liable to error and misfortune as you are. A man who is making his defence must observe all [1427<sup>b</sup>1] the offences for which the laws have laid down punishment and juries assess penalties. When the law fixes a definite punishment, he must show that he has not committed the offence at all, or that he has acted legally and justly. But when the [5] jury is empowered to assess the penalty, he must not follow the same course and deny that he has committed the offence, but rather he must try to prove that his action has caused little harm to his

adversary and that it was done involuntarily. If [10] we follow these and similar methods, we shall have abundant material in cases of accusation and defence. It remains for us still to deal with the style of oratory employed in an inquiry.

5 · Inquiry may be summarily described as the elucidation of choices, acts, and words which are contradictory to one another or to the rest of a man's mode of [15] life. He who is making an inquiry must try to discover whether either the statement which he is examining or the acts or choices of the subject of his inquiry are in any respect contradictory to one another. The method to be pursued is as follows: he must consider whether in the past the person in question, after having been originally the friend of another man, next became his enemy and then again the friend of the same person, or whether he has acted, or is likely in the future, if [20] opportunities should occur, to act in a manner which contradicts his former acts. Similarly, you must observe whether †in making some statement now, he is speaking in contradiction of his former words or whether he might speak in contradiction of what he is saying or has said before†,<sup>7</sup> and likewise whether he has [25] formed any choice which contradicts his former choices, or would do so if opportunities should arise. By a similar process you must deal with the contradictions which occur in the mode of life of the person whom you are examining in respect of his other and highly esteemed habits of life. If you thus pursue this [30] branch of oratory, there is no method of examination which you will leave untried.

All the various branches of oratory having now been distinguished, we must employ them, when it is fitting, either each separately or in common with one another by mingling their different qualities. For there are very great differences between them, but in actual practice they have much in common. In this respect [35] they resemble the various classes of human beings, who are partly similar and partly dissimilar in their appearance and in their looks. Having thus distinguished the various kinds of oratory, let us next enumerate the requisites which are common to all kinds and explain how they must be used.

6 · First, then, the just, the lawful, the expedient, the honourable, the [1428<sup>a1</sup>] pleasant, and similar topics are, as I stated at the beginning, common to all the various kinds of oratory, but are chiefly used in persuasive and dissuasive oratory. Secondly amplification and

minimization are necessarily useful in all kinds of oratory, but most use is made of them in eulogy and vituperation. Thirdly, there are [5] the proofs, which must necessarily be employed in every department of oratory, but are particularly useful in accusation and defence, since these need most refutation.<sup>8</sup> Further we must deal with anticipations of arguments, postulates, reiterations, elegancies, prolixity of speech, and moderate length of speech, brevity, and method of statement. For these and similar expedients are useful in all the various branches [10] of oratory.

7 · The just, the lawful, and the like I have already defined and explained their application; I have also dealt with amplification and minimization. I will now [15] explain the other terms, beginning with the proofs.

Proofs are of two kinds; some are derived directly from actual words, acts, and persons, others are supplementary to words and actions. Probabilities, examples, evidences, enthymemes, maxims, signs, and refutations are proofs derived from [20] actual words, persons, and actions. The speaker's opinions, testimonies, evidence given under torture, and oaths are supplementary proofs. We must understand the nature of each of these kinds of proof, and whence we are to derive material for [25] them, and how they differ from one another.

It is a probability when one's hearers have examples in their own minds of what is being said. For instance, if any one were to say that he desires the glorification of his country, the prosperity of his friends, and the misfortunes of his foes, and the like, his statements taken together will seem to be probabilities; for each one of his hearers is himself conscious that he entertains such wishes on these and similar [30] subjects. We must, therefore, always carefully notice, when we are speaking, whether we are likely to find our audience in sympathy with us on the subject on which we are speaking; for in that case they are most likely to believe what we say. Such, then, is the nature of a probability. [35]

We can divide probabilities into three kinds. One kind consists in the inclusion in one's speech of the feelings which are naturally found in mankind—if, for example, certain persons happen to despise or fear a certain other person, or, further, if they feel pleasure or pain or desire, or have ceased from desire, or if they [1428<sup>b</sup>1] have experienced in mind or body or one of the senses any of the feelings whereby we are all affected.

These and similar feelings, being common to all human nature, [5] are well known to our hearers. Such, then, are the natural feelings which are wont to affect mankind, and for these we say that a place ought to be found in our speeches. Another division of probabilities falls under the heading of habit (which is what we do from custom), a third under that of love of gain. For we often for the sake of gain choose to act in a way which does violence to our nature and character. [10]

With these definitions before us, when we are seeking to persuade or dissuade, we must show in regard to the subject in question that the action to which we are exhorting our hearers, or which we are opposing, has the effect which we declare that it has. Failing that, we must show that actions similar to that of which we are [15] speaking either generally or invariably turn out as we say they do. Such must be our application of probabilities in relation to actions. As regards persons you must show, if you can, when you are accusing any one, that he has often committed the act in question on previous occasions; or, if that is impossible, that he has done [20] similar acts. You must also try to prove that it was to his advantage to commit these acts; for most men, themselves preferring what is to their advantage, think that others too always act from this motive. If, therefore, you can derive an argument of [25] probability directly from your adversaries, this is the method by which you must infer it. Failing that, you must take similar persons and adduce their customary procedure; for example, when the man whom you are accusing is young, argue that he has committed acts such as persons of that age are in the habit of committing; for your accusations against him will be believed on the ground of this resemblance. [30] Similarly you will gain credence if you can show that his companions have the character which you declare him to have; for owing to his association with them it will appear likely that he has the same pursuits as his friends. Such must be the employment of the argument from probabilities by those who are accusing.

Those who are speaking in their own defence must make it their chief object to show that none of the acts of which they are accused has ever been committed either [35] by themselves or by any of their friends or by any person who resembles them, and that it would have been of no advantage to them to commit such acts. But if you have manifestly done the same deed on a previous occasion, the fault must be attributed to your youth, or some other excuse must be introduced to provide a reasonable pretext for your having done wrong on that occasion. You must declare also that it was of no benefit to you to have acted thus at the

time and that it would not have been of any advantage to you now. If no act of the kind alleged has ever [1429<sup>a</sup>1] been committed by you, but some of your friends happen to have done such deeds, you must plead that it is not just that you should be slandered because of them, and you must show that others of your associates are honest men; you will thus throw doubt on the crime of which you are accused. If they point out that other persons, [5] who resemble you, have committed the same crimes as they allege against you, you must declare that it is absurd if the fact that other people can be shown to have done wrong is to be regarded as a proof that you have committed any of the deeds of which you are accused. If, then, you deny that you have done the deed with which you are charged, you must thus make your defence by arguing from probabilities; [10] for you will then make the charge appear implausible. If, however, you are obliged to admit the charge, you must point out the resemblance of your acts to the usual practice of mankind, by stating as emphatically as possible that the majority of men, or all men, act under these and similar circumstances exactly as you have [15] done. If you cannot do this, you must take refuge in pleas of misfortune or error, and try to obtain pardon by citing the passions which are common to all mankind and make us lose our reason—love, anger, drunkenness, ambition, and the like. Such is the method by which we shall make the most skilful use of the argument from [20] probability.

8 · Examples are actions which have taken place in the past and are similar to, or the contrary of, those about which we are speaking. They must be used when your statement is not credible and you wish to establish its truth when it does not [25] gain credence from the argument of probability; the object being that your hearers, learning that another action similar to that of which you are speaking has been carried out in the way in which you declare it to have been done, may be more ready to believe what you say.

Examples are of two kinds; for some things turn out according to our expectations, others contrary to them. The former cause credit the latter discredit. [30] For instance, if some one declares that the rich are juster than the poor and instances certain just actions on the part of rich men, such examples are in accordance with our expectation, for one can see that most men think that rich [35] people are juster than poor people. If, on the other hand, some one shows that certain rich individuals have acted unjustly in order to get money, thus employing an example which is

contrary to expectation, he would cause the rich to be distrusted. Similarly, if any one brings forward an example of what seems to be in accordance with our expectation—for instance, that on some occasion the [1429<sup>b</sup>1] Lacedaemonians or Athenians employing a large number of allies utterly defeated their enemies—he then disposes his hearers to take to themselves many allies. For every one is of opinion that large numbers are of no small importance for winning a [5] victory. If, on the other hand, a speaker wishes to prove that numbers do not bring victory, he must give as examples occasions when the unexpected has happened, pointing out, for instance, that the Athenian exiles first seized Phyle with fifty men and then fought a battle against the far more numerous party in the city, who had [10] the Lacedaemonians as their allies, and were thus restored to their own city; or again, that the Thebans, when the Lacedaemonians and practically all the Peloponnesians invaded Boeotia, confronted them alone at Leuctra and conquered [15] the might of the Lacedaemonians; or again, that Dio the Syracusan sailed to Syracuse with three thousand hoplites and defeated Dionysius, whose forces were many times as great; and likewise the Corinthians, when they went to the assistance of the Syracusans with nine triremes, defeated the Carthaginians, although they were blockading the harbours of Syracuse with a hundred and fifty ships and held [20] all the city except the acropolis. To sum the matter up, these and similar instances of unexpected successes often serve to discredit counsels which are based on ordinary probability. Such, then, is the nature of examples. [25]

Examples of both kinds must be employed, when we are urging what may be reasonably expected to happen, in order to show that the suggested course of action for the most part turns out in a particular way; and, when we are predicting some unexpected result, in order to give instances in which satisfactory results have accrued where they seemed to be least expected. If your adversaries use this device, [30] you must show that their instances were the results of good luck, and declare that such things happen rarely, whereas your examples are of common occurrence. This, then, is the method of employing examples. If, on the other hand, we wish to cite instances where the unexpected has happened, we must collect as many of them as [35] possible and show by enumeration that the unexpected happens quite as often as the expected. We must use not only examples derived in this way but also those based on contraries. For instance, you can show that a certain state has acted selfishly towards its allies and that their friendship has thus been dissolved, and then say, ‘We on the other hand, if we behave fairly and impartially towards our allies,



shall [1430<sup>a</sup>1] keep their alliance for a long time'; or again, you can show that certain others have gone to war without due preparation and have consequently been defeated, and then [5] say, 'If we were to go to war properly prepared, we should have better hopes of success'. You will be able to derive a number of examples from past and from present events; for actions are generally partly like and partly unlike one another. [10] For this reason therefore we shall have no lack of examples and no difficulty in contradicting those brought forward by the other side. We now know the different kinds of examples and how we are to employ them and whence we are to derive them in abundance.

**9** · Evidences exist where the direct contrary of that with which the speech is [15] concerned has occurred,<sup>9</sup> and where the speech is self-contradictory. For most listeners conclude from the contraries which occur in connexion with a speech or action that there is nothing sound in what is being said or done. You will often discover evidences by considering whether your adversary's speech is self-contradictory [20] or whether his action itself contradicts his words. Such is the nature of evidences and the method by which you will obtain the greatest number of them.

**10** · Enthymemes arise where contraries occur not only of the speech and [25] action in question but of anything else as well. You will often discover them by pursuing the method prescribed for the oratory of inquiry and by considering whether the speech or the actions are contrary to justice or law or expediency or to what is honourable, practicable, easy, or probable, or to the character of the speaker [30] or the nature of the circumstances. Such are the enthymemes which must be chosen for use against our adversaries. The contraries of these must be employed on our own behalf, and we must prove that our actions and words are the contrary of those [35] which are unjust, unlawful, inexpedient, and of the habits of wicked men—in a word, of those things which are considered evil. We must speak in support of each of these pleas as briefly as possible and express ourselves in the fewest possible words. This then is the way in which we shall obtain a large number of enthymemes and the best method of employing them.

**11** · A maxim is, briefly, the expression of an individual opinion on

general [1430<sup>b</sup>1] matters. There are two kinds of maxims, those which are reputable and those which are paradoxical. When you are using the former, there is no need to bring forward any reasons for your statement for what you say is well known and does not excite incredulity. But when you are uttering a paradox, you must state your reasons [5] briefly, so as to avoid prolixity and not arouse incredulity. The maxims which you quote must be applicable to the circumstances, in order that your words may not seem inept and far-fetched. We shall form a large number of maxims either from [10] the peculiar nature of the circumstances or by means of hyperbole or by drawing parallels. The following are examples of maxims derived from the peculiar circumstances of a case: 'I do not regard it as possible for a man to become a clever general if he is without experience in affairs'; or again, 'It is characteristic of sensible men to profit by the examples of their predecessors and so try to avoid the errors of evil counsel'. Such then are the maxims which we shall form from the [15] peculiar circumstances of a case. Maxims such as the following are formed by hyperbole: 'Thieves are in my opinion worse than plunderers; for the former carry off property secretly, the latter openly'. By this method we shall form a number of maxims by hyperbole. The following are maxims based on parallels: 'Those who [20] appropriate money seem to me to act very like those who betray cities; for both are trusted and wrong those who have trusted them'; or again, 'My opponents seem to me to act very like tyrants; for tyrants claim not to be punished for the wrongs which [25] they have themselves inflicted, while they demand the fullest punishment for the wrongs of which they accuse others; and my adversaries, if they have themselves something which belongs to me, do not restore it, while, if I have received something which belongs to them, they think that they ought to have it restored to them and the interest on it as well'. By following this method then we shall form a number of maxims.

12 · One thing is a sign of another thing, but one thing taken at random is [30] not a sign of something else taken at random, nor is everything a sign of everything else; but the sign of a thing is that which usually occurs before, or simultaneously with, or after it. That which has happened is a sign not only of what has happened but also of what has not happened; and similarly what has not happened is a sign not [35] only of what does not exist but also of what does exist. One sign causes belief, another knowledge; the latter is the best kind of sign, while that which produces the most plausible opinion is second best. To put the

matter briefly, we shall obtain an abundance of signs from anything which has been done or is said or seen, taking each separately and also from the greatness or smallness of the resultant [1431<sup>a</sup>1] disadvantages or advantages. We shall also derive them from testimonies and evidence and from our own supporters or those of our enemies, or from our enemies themselves; also from the challenges issued by the parties and from times and [5] seasons and from many other things. From these sources then we shall have an abundance of signs.

**13** · A refutation is that which cannot be otherwise than as . . .<sup>10</sup> as urged by us, and on what is impossible by nature or impossible as urged by our adversaries. [10] An example of something which is naturally necessary is the statement that living creatures require food, and the like. What is necessary as urged by us is such a statement as that those who are scourged confess what their tormentors tell them to confess. Again, an instance of what is naturally impossible is the statement that a small child stole a sum of money, which he could not possibly carry, and went off [15] with it. It will be an impossibility as urged by an adversary, if for example, he declares that on a certain date we made a contract at Athens, whereas we can prove to our hearers that at that time we were absent in some other city. From these and similar materials we shall form an ample supply of refutations. [20]

We have now briefly described all the proofs which are derived from actual words and from acts and from persons. Let us now consider how they differ from one another.

[25] **14** · A probability differs from an example in this, that the hearers have themselves some notion of the probability, while examples . . .<sup>11</sup> can be derived from contraries and from similars, while evidences can only be constructed from contrarieties of word and deed. Again, an enthymeme always has this distinction [30] from an evidence, that an evidence is a contrariety which is concerned with a word or an action, while an enthymeme selects also contrarieties connected with other kinds of things; in other words, it is impossible for us to obtain an evidence unless there is some contrariety in respect of actions or words, whereas speakers can [35] provide themselves with enthymemes from a variety of sources. Maxims differ from enthymemes in that enthymemes can be constructed only from contrarieties, whereas maxims can be enunciated both in connexion with contrarieties and also by themselves. Signs differ

from maxims and all the other proofs already mentioned, [40] because, while all the others engender an opinion in the minds of those who hear them, certain of the signs cause those who judge to have a clear knowledge; also [1431<sup>a</sup>1] because it is impossible for us ourselves to provide most of the other proofs, while it is easy to obtain a large number of signs. Further, a refutation differs from a sign, because some signs cause those who hear them merely to entertain an opinion, whereas every refutation teaches the truth to the judges. Thus from what has been [5] said we know the nature of the proofs which are derived from actual words and actions and men, and the sources from which we are to derive them, and how they differ from one another.

Let us next deal with each of the supplementary proofs. The opinion of a [10] speaker is the declaration of his own belief about things. You ought to show yourself to be experienced in the matters about which you are speaking, and point out that it is to your advantage to tell the truth concerning them. One who is contradicting ought first and foremost to show that his adversary has no experience of the matters [15] on which he is talking: if however that is impossible, he ought to show that even persons of experience often make mistakes; and if this is inadmissible, he must say that it is contrary to the advantage of his opponents to tell the truth about these matters. Such is the use which we shall make of opinions expressed by speakers, both when we are ourselves expressing them and when we are contradicting others.

[20] **15** · Testimony is a confession made voluntarily by one who knows. That which is testified must be either plausible or implausible or of doubtful credit; similarly the witness must be trustworthy or untrustworthy or of doubtful good faith. When therefore the evidence is plausible and the witness truthful, the [25] testimony needs no further support, unless you wish briefly to introduce a maxim or enthymeme for adornment's sake. But when the witness is under suspicion, you must prove that such a person would not give false evidence to show gratitude or from motives of revenge or gain. You must also make it clear that it is not to his advantage to bear false witness; for the benefits which he gains are small, while [30] detection is a serious matter, and, if he is found out, the laws punish him not only by fining him but also by damaging his reputation and destroying his credit. By these methods then we shall cause witnesses to be believed.

When we are contradicting evidence, we must cast prejudice on the

character of the witness, if he is a bad man, or inquire into the evidence, if it is implausible, or [35] else contradict both the witness and the evidence by bringing together all that is most discreditable to our adversaries. We must also consider whether the witness is a friend to him for whom he is giving evidence, or whether he can in any way be associated with his deed, or whether he is an enemy of the man against whom he is bearing witness, or whether he is poor. For such men are under suspicion of bearing false witness either to show favour or from motives of revenge or for gain. We shall [40] also say that the legislator laid down the law about false testimony to apply to persons of this kind, so that it is absurd that, whereas the legislator did not trust [1432<sup>a</sup>1] witnesses, those should believe them who are sitting in judgement after having sworn to judge according to the laws. By these methods then we shall cause witnesses to be discredited.

It is possible also to disguise evidence by a proceeding such as the following: 'Bear witness', you say, 'in my favour, Callicles'—'By the gods, I will not', he [5] replies, 'for the accused committed these crimes, though I tried to prevent him'. In this way, though he has given false evidence in his refusal, he will not be liable to punishment as a false witness. This then is the way in which we shall treat evidence, when it is to our advantage to disguise it. If our opponents try to do anything of this kind, we shall expose their wickedness and order them to give their evidence in [10] writing. With these instructions then before us we know how to deal with witnesses and evidence.

**16** · Evidence given under torture is a confession on the part of one who knows but is unwilling to state what he knows. When therefore it is to our interest to strengthen such evidence, we must say that individuals take their proofs from [15] evidence under torture in their most serious affairs, and cities in their most important business, and that evidence under torture is more trustworthy than ordinary testimony. For it is often to the interest of witnesses to lie; but those who are under torture gain by telling the truth, for doing so will bring them the speediest relief from their sufferings.

When you wish to discredit evidence given under torture, you must say in the [20] first place that those who are being tortured become hostile to those who have delivered them up to be tortured and for this reason tell many lies against their masters. Secondly, you must say that they often make confessions to their torturers which are not the truth, in

order to end their torments as quickly as possible. You must also point out that even free men have often before now lied against [25] themselves under torture to escape the suffering of the moment; it is therefore much more likely that slaves should wish to avoid punishment by lying against their [30] masters, rather than, when they are enduring great bodily and mental pain, retain from falsehood in order to save other people from suffering. By these and similar arguments we shall cause evidence given under torture to be plausible or implausible.

**17** · An oath is an affirmation without proof accompanied by an invocation [35] of the gods. When we wish to amplify the power of an oath we must say that no one would desire to commit perjury, because he would fear punishment from heaven and disgrace in the eyes of men; we must also point out that, while it is possible to escape the notice of men, it is impossible to elude the gods. When our opponents take refuge in an oath and we wish to belittle it, we must point out that those who do [1432<sup>b</sup>1] evil deeds are the very men who do not scruple to commit perjury; for a man who thinks that the gods take no notice of him when he does wrong, also thinks that he will not be punished even if he forswears himself. By pursuing a method such as the above in the matter of oaths we shall have no lack of material.

[5] We have now briefly carried out our purpose of dealing with all the various kinds of proof and have shown not only the force of each of them, but also how they differ from one another and how they ought to be employed. We will now proceed to explain the other expedients which belong to all seven kinds of oratory and are [10] useful in speeches of every kind.

**18** · Anticipation is the method by which we shall counteract the ill-feeling which is felt against us by anticipating the adverse criticisms of our audience and the arguments of those who are going to speak against us. We shall anticipate the [15] criticisms of our audience by such a statement as, 'Perhaps some of you are astonished that, young as I am, I attempt thus to speak in public on important matters'; or again, 'Let no one oppose me through resentment, because I am going to offer you advice on subjects about which certain other people hesitate to speak [20] openly before you'. In matters then which are likely to annoy your hearers you must by anticipations of this kind bring forward reasons, which will show that you are justified in offering advice, pointing out the

dearth of public speakers or the greatness of the dangers or the public expediency, or giving some other such reason [25] whereby you will remove the ill-feeling which threatens you. If your audience still cries out just as much against you, you must address them briefly in the form of a maxim or enthymeme, saying, for example, that it is absolutely absurd that they should have come together to take the best counsel about the situation and then think that they can take good counsel without deigning to hear what the speakers [30] have to say; or again, you may say that it is only fair that they should either themselves get up and offer some advice, or else listen to those who have advice to offer, and then vote in favour of any course that recommends itself to them. Such must be the method of employing anticipation in public speaking, and this is how outcries must be faced.

[35] In forensic speeches we shall use similar methods of anticipation to the above. If an outcry is raised against us at an early stage of the proceedings, we shall meet it in this manner: 'Is it not absurd that, while the legislator ordained that each party should be allowed to speak twice, you who are sitting in judgement upon us should have sworn to pass sentence according to the law, and then refuse even to listen to a single speech? And that, while he took such measures to secure that you should give [1433<sup>a</sup>1] your vote in accordance with your oath after hearing all that was to be said, you should be so indifferent to his injunctions that, without even listening to the beginnings of the speeches, you already think that you know all the facts perfectly?' Or you can put the matter differently and say, 'How absurd it is that the lawgiver [5] should have ordained that, if the votes are equal, the defendant should win the case, whereas you hold so strongly to the contrary opinion that you do not even listen to the defence offered by those who have been slandered; and that, whereas he granted this advantage in the voting to defendants because they run greater risks, you, while you show no hostility towards the accusers who run no risks, alarm by these outcries [10] those who in terror and danger are defending themselves from the charges brought against them'. Such must be your method of meeting those who raise an outcry against you at the beginning of your speech. If they interrupt you when your speech is well advanced, then, if those who do so are few in number, you must rebuke them [15] and tell them that it is only just that they should listen to you at the moment, in order that they may not prevent the rest from forming a correct judgement, and that, when they have heard you, then they can do what they please. If the majority raises an outcry against you, you should blame yourself and not your judges;

for, if you find fault with them, you only make them angry, whereas, if you blame yourself [20] and say that you have made a mistake in your manner of speaking, you will gain their pardon. You must also beg your judges to give a favourable ear to your speech and not at this early stage to show what view they take about the facts on which they are to give their secret vote. In general, we shall meet interruptions in a summary [25] manner with maxims and enthymemes, pointing out that our interrupters are setting themselves in opposition to justice or the laws or the interests of the city or what is honourable; for such methods as these are best calculated to make one's hearers stop interrupting. We now know from what has been said above how to employ anticipations in dealing with an audience and how to meet interruptions. [30]

I will next show you how to anticipate what is likely to be said by one's opponents. You can say: 'Perhaps he will bewail his poverty, which is not my fault but has been caused by his own way of life'; or again, 'I hear that he intends to say [35] such and such a thing'. If we are speaking first, we must thus anticipate what our opponents are likely to say and so destroy and invalidate their pleas. For even though the arguments which you forestall are quite forcible, they will appear much less weighty to those who have already heard them.

If we are speaking after our opponents and they have anticipated what we [1433<sup>b1</sup>] intend to say, it is necessary to counteract their anticipations and destroy them by speaking as follows, 'My opponent has not only told you many lies to my discredit, but further, well knowing that I shall refute his charges, he has anticipated my plea and discredited it beforehand, in order that you may not give it the attention which [5] you otherwise would, or else that I may not employ it at all, because it has already been torn to pieces by him. I hold, however, that you ought to hear my arguments from my own lips, not from his, even if<sup>12</sup> he has tried to tear my arguments to pieces [10] by saying things which I declare to be a strong sign that he has no sound plea to offer'. Euripides has made a clever use of this device in the following lines of his *Philoctetes*:

E'en though he thinks to have destroyed my pleas  
Escaping charge of wrong, yet will I speak;  
From mine own lips mine arguments shall come,  
Let his words show what kind of man he is.<sup>13</sup>

[15] We know then from the above how to make use of anticipations in relation both to our judges and to our opponents.



19 · Postulates in oratory are the demands which speakers make from their hearers. Some of them are just, others unjust. It is just to ask that they should listen [20] to what you are saying and lead a favourable ear. It is also a just demand that they should give one the assistance which the laws allow and never vote against the laws and that they should make allowances for misfortunes. Any demand which is contrary to the law is unjust, otherwise it is just.<sup>14</sup> Such are the postulates. We have [25] distinguished their different kinds in order that, knowing the just from the unjust, we may use them on the right occasion, and that it may not escape our notice if our adversaries make any unjust demand from the judges. From what has been said we shall have an adequate knowledge on this subject.

20 · Iteration is a means of briefly reminding one's hearers. It must be [30] employed both at the conclusion of a division of a speech and at the final conclusion. In recapitulating we use iteration when arguing or narrating or recommending or questioning using irony. I will show you of what nature each of these is. The [35] following is an example of its use in arguing: 'I cannot say what these men would have done, if they had not manifestly deserted us long ago and were not convicted of having served against our city and of having never fulfilled any of their promises'. Such is the use of iteration in an argument. It can be used as follows in narrating: 'I have shown that they were the first to break the treaty of alliance and the first to [1434<sup>a</sup>1] attack us when we were at war with the Lacedaemonians, and that they displayed the utmost eagerness to enslave our city'. Such is the use of iteration in narrative. The following is an example of its use in reminding your audience under the form of recommending a certain course of action: 'You must remember that ever since we [5] entered into friendship with these men we have never suffered any reverse at the hands of our enemies. For they have often helped us and prevented the Lacedaemonians from devastating our territory, and they have continued to this day to contribute large sums of money'. Thus shall we remind our hearers by recommending [10] a certain course of action. The following is an instance of iteration in the form of a question: 'I should like to hear from them, why it is that they do not pay us the tribute which they owe. For they cannot have the face to say that they are in need of money, when they can be shown to be receiving such large sums of money annually from their land, nor yet can they say that they spend much on the administration of [15] their city;

for they clearly spend less than all the other islanders'. Such will be our use of iteration in the form of a question.

**21** · Irony is to say something and pretend that you are not saying it, or else to call things by the names of their contraries. It may take the following form in a brief reminder of what has already been said: 'I think that I need hardly say that [20] these men, who pretend that they have done the state many services, are shown to have done it much harm, whereas we, whom they declare to be ungrateful, are shown to have often helped them and never to have done any one any injury'. Such is the way briefly to remind your hearers of something under the pretence of omitting [25] it. Secondly, the following is an instance of calling things by contrary names: 'These noble citizens have clearly done great harm to their allies, while we worthless mortals have obviously been the cause of many benefits to them'. In this way we [30] shall briefly remind our hearers and employ iteration at the end of the divisions of our speeches and at their final conclusion.

**22** · We will next explain how one can speak elegantly and prolong a speech to the length which one desires.

We can speak elegantly in the following manner, by introducing, for example, [35] half enthymemes in such a way that our audience can guess the other half; we must also include maxims. To some of these we must give a place in every division of the speech<sup>15</sup> but the actual words must be varied and a similar phrase must never be applied repeatedly in the same connexion. In this way your speech will be elegant.

When you wish to lengthen your speech, you must divide up your subject and [1434<sup>b</sup>1] in each division explain the nature of its contents and their particular and general application and state the grounds of your pleas. If we wish to make our discourse still longer, we must employ a number of words in dealing with each topic. In each [5] division of the speech you must iterate and make your iteration brief; while at the conclusion of your speech you ought to recapitulate as a whole all that you have dealt with in detail, and treat the subject generally. In this way your speech will be [10] of a sufficient length.

If you wish to speak briefly, you should include your whole subject in a single word and that word the shortest which is applicable to the subject. You must also employ few conjunctive particles and connect as

many things as possible together. Such must be your choice of words; you must make your language serve a double [15] purpose, and you must do away with the brief iterations in the separate divisions of the speech and only employ iteration in your final conclusion. This is the way in which we shall make our speeches brief.

If you wish to speak at moderate length, you must pick out the most important divisions of your speech and make them your subject. You must also use the words of medium length and not the longest or the shortest, and not employ a large [20] number on a single topic but observe moderation. You must neither on the one hand do away entirely with conclusions in the intermediate parts of your speech, nor on the other hand introduce them in every division; but you must make special [25] iterations at the end of those parts to which you wish your audience to pay particular attention. On these principles, then, we shall regulate the length of our speeches, whenever we wish to do so.

If you wish to compose a speech which will be elegant, you must take care as far as possible to adapt the character of your speech to that of your audience. You [30] will achieve this, if you observe their character, whether noble or petty or ordinary.

On these points, then, you will have adequate knowledge from what has been said above. We will now treat of the putting together of words; for this too is essential.

**23** · In the first place, then, words are of three kinds, simple, composite, and metaphorical.

[35] Similarly there are three ways in which words can be put together: firstly, you can end one syllable with a vowel and begin the next with a vowel; secondly, you can begin a word with a consonant and end the previous word with a consonant; thirdly, you can put consonants and vowels in juxtaposition.

There are four orders in which words can be arranged. First, you can either put similar words side by side or else disperse them; or again, you can use the same [1435<sup>a</sup>1] words or else change them into others; thirdly, you can describe a thing in one or many words; fourthly, you can name in their proper order the subjects of which you have undertaken to treat, or else transpose them.

I will next show what is the best method of statement which you can employ.

24 · First of all, you must make your statement by means of a twofold [5] division, and, secondly, you must discourse lucidly. The following are the various forms of this two-fold division. First, one can say that one can oneself do one thing and another; secondly, that this man cannot do a certain thing, but that man can; thirdly, that this man can do a certain thing and something else; fourthly, that neither can one do a certain thing oneself nor can any one else do it; fifthly, that one [10] cannot do a certain thing oneself, but that some one else can; sixthly, that one can do something oneself, but the other person cannot do something else. You can see each of these cases in the following examples. An illustration of the case where one can oneself do one thing and another is: 'I have not only achieved this for you, but also, [15] when Timotheus intended to make an expedition against you, I prevented him'. The following is an example of the case where one man cannot do a thing but another man can: 'This man then is unable to go himself on an embassy for you, but here is a man who is a friend of the Spartan state and would be better able than any one else to carry out the negotiations which you wish carried out'. The case where a man can do a certain thing and something else as well can be thus illustrated: 'Not only has [20] he proved himself a strong man in war, but he can also give as good advice as any other citizen'. The following is a case where one cannot oneself do a thing and nobody else can: 'Having but a small force I cannot myself conquer our adversaries, [25] nor could any other citizen do so'. The following is an instance in which another man can do a thing, but one cannot do it oneself: 'Yes, he is physically strong, but I am weak'. The following is an illustration of the case where one can oneself do one thing, but some other person cannot do something else: 'I can steer, but this man cannot even pull an oar'. This then is how you will employ forms of twofold statement, following the same course in every subject. We must next consider how [30] you are to treat your subject lucidly.

25 · First, then, call anything of which you speak by its proper name, avoiding ambiguity. Take care not to put vowels next to one another. Be careful to [35] put the so-called 'articles' in the proper place. Consider how you put words together, so that there may be neither confusion nor transposition; for if your discourse has these qualities it is obscure. When you use an introductory particle, employ the corresponding particle afterwards. The following is an example of the use of corresponding particle: 'I *indeed* (μὲν) came to the place to which I said

I would [1435<sup>b</sup>1] come, *but* (δέ) you, though you promised to come, did not do so'; or again, when the same particle follows: 'You were *both* (καί) the cause of that *and* (καί) the cause of this'. So much for the particles; from these examples you must infer the use of others. [5]

Words must be put together so as to avoid confusion or transposition. The following is an example of such confusion: 'It is a terrible thing that this man should strike this man'. Here it is not clear which man struck the other; but you will make it clear if you say; 'It is a terrible thing that this man should be struck by this man'.<sup>16</sup> [10] This is an example where there is a confusion in the arrangement of words. . . .<sup>17</sup> The following is an instance of care taken to put the article in the right place: 'This man is wronging this man'. In this case the insertion of the articles makes the diction clear, while their omission will make it obscure; the reverse is sometimes [15] true. So much then for the articles.

Never put vowels in juxtaposition, unless it is impossible to make your meaning clear otherwise, or unless a pause or some other division occurs.

The following is a case where ambiguity must be avoided: the same words are sometimes used in several senses, for example we speak of a threshold (ὀδός) of a [20] door and of a way (ὀδός) along which people walk; in such cases we must always add that which gives the word its distinctive meaning.

If we follow these rules we shall be clear in our use of words, and we shall make statements by means of the twofold method of division already described.

**26** · Let us now deal with the antitheses, parisoses, and similarities; for we [25] shall need these also.

An antithesis occurs when both the wording and the sense, or one or other of them, are opposed in a contrast. The following would be an antithesis both of [30] wording and sense: 'It is not fair that my opponent should become rich by possessing what belongs to me, while I sacrifice my property and become a mere beggar'. In the following sentence we have a merely verbal antithesis: 'Let the rich and prosperous give to the poor and needy'; and an antithesis of sense only in the following: 'I tended him when he was sick, but he has been the cause of very great [35] misfortunes to me'. Here there is no verbal antithesis, but the two actions are contrasted. The double antithesis (that is, both of sense and of wording) would be the best to use: but the other two kinds are also true

antitheses.

**27** · Parisosis occurs when a sentence has two equal ‘members’. The equality [1436<sup>a</sup>1] can be that of many small to few great things, and an equality of magnitude can be united with an equality of number. Parisosis takes a form such as the following, ‘either through lack of resources or through the magnitude of the war’. These things are neither like nor opposed to one another, but merely equal to one another.

[5] **28** · Paromoeosis goes further than parisosis; for it makes the ‘members’ not only equal but also similar, being composed of similar words, in the following, for example: ‘If you must imitate the wording, you should simulate the feeling’.<sup>18</sup> Above all you should make the last words similar; for this gives the closest [10] similarity. Words are similar which have similar syllables, in which most of the letters are the same; for example, ‘in numbers deficient, in might sufficient’.

Enough then of these topics. For we are acquainted with the nature of the just, [15] the lawful, the honourable, the expedient and the other qualities, and the sources from which we can derive them in abundance. Similarly we know the nature of [20] amplifications and minimizations, and how we can provide them for our discourses. In like manner we are acquainted with proofs, anticipations, the postulates which we demand from our hearers, iterations, elegances, the means of regulating the length of our speeches, and all the ways of putting words together for purposes of statement. And so knowing from what has been said the qualities which are common to every kind of oratory and their uses, if we accustom and practise [25] ourselves according to the prescribed preparatory exercises, we shall attain to great facility both in writing and speaking.

It is by taking the component parts separately that you can most accurately distinguish the methods of speaking. I will next treat of the manner in which the words must be organically arranged in the various kinds of oratory, and which parts [30] must be put first and how they must be treated.

I deal therefore first with proems; for the proem is common to all seven kinds of oratory and it can be fittingly applied to all subjects.

**29** · The proem can be described in a general way as a preparation

of one's [35] audience and a declaration of the subject in a summary manner for the benefit of the ignorant, in order that they may know with what the speech is concerned and may follow the argument. It also exhorts them to pay attention and tries, as far as is possible in a speech, to influence their minds in our favour. Such is the preparation at which the proem must aim.

I will first show how the proem must be employed in public speaking and persuasive oratory. The following are examples of the way in which to lay your [1436<sup>b</sup>1] subject before your hearers and make it clear to them: 'I stand before you to advise that we should go to war on behalf of the Syracusans', or, 'I stand before you to demonstrate the inadvisability of our helping the Syracusans'. This, then, is the way to summarize your subject.

We shall know how to exhort our hearers to pay attention, if we ourselves call [5] to mind to what arguments and facts we pay most attention when deliberating. Do we not pay the closest attention when the subjects of deliberation are important or alarming or else nearly concern us; or when those who address us claim that they will show us that the measures which they are urging us to adopt are just and [10] honourable and expedient and easy and honest; or when they beg us to listen with attention? Just as, therefore, we ourselves attend to others, so if we take those of the points above mentioned which are most applicable to the subjects of which we are treating and lay them before our hearers, we shall make them attend to what we are [15] saying. These, then, are the ways in which we exhort our hearers to pay attention.

We shall secure their goodwill if we first consider what is in fact their attitude towards us, whether they are well or ill disposed or whether they are indifferent. If they are actually well disposed towards us, it is superfluous to talk about goodwill; [20] if, however, we wish to talk about it at all, we must do so briefly, using irony in the following way: That I am well disposed towards the state, and that you have often acted expediently by following my advice, and that I observe a just attitude towards public affairs, preferring a personal sacrifice to reaping any advantage at the [25] expense of the state,—these are, I think, statements which it is unnecessary for me to make to you who know well the truth of them. My efforts shall be directed rather to showing you that you will be well advised, if on this occasion too you follow my counsels'. This then is the method by which in a public speech you must remind those who are well disposed towards you of their goodwill.

When your hearers are neither prejudiced against you nor well

disposed, you [30] must say that it is right and expedient that they should give a favourable ear to those citizens who have not yet given a proof of their quality as speakers. You must then flatter your audience by praising them, urging them to judge the speeches which they hear with fairness and discrimination as is their custom. Further, you must employ minimization and say, I stand before you not through any confidence in my [35] own cleverness, but because I think that the advice which I am about to offer is beneficial to the state'. By such methods you must secure the goodwill of those who are neither well nor ill disposed towards you.

If you are the object of misrepresentation, the misrepresentation must be connected with yourself or the subject on which you are speaking or your actual words. Misrepresentations of this kind can date either from the present or from the [1437<sup>a1</sup>] past. If then one is under suspicion of wrongdoing in the past, one must employ anticipation in addressing one's audience and say: 'I am well aware that a prejudice [5] exists against me, but I will prove that it is groundless'. You must then make a brief defence in your proem, if you have anything to say on your own behalf, or raise objections to the judgements which have been passed upon you. For whether you have been publicly or privately misrepresented, judgement must either have been passed upon you or be impending in the immediate future, or else those who have [10] laid the charge against you are unwilling to submit the matter to judgement; and you must say that the judgement passed upon you was unfair<sup>19</sup> and that you have been the victim of party plots. If this is impossible, you must say that your previous misfortunes were sufficient, and that it is only fair, now that the matter has been judged and done with, that no further prejudice should be raised against you on the [15] same grounds. If you are expecting to have judgement passed upon you, you must say that you are ready to submit the misrepresentations now to the judgement of your present audience; adding that, if you are proved to have wronged the state, you consider yourself worthy of death. If your accusers do not press their charges against you, you must use this very fact as a sign that their misrepresentations of [20] you are groundless; for it will seem hardly likely that those who are bringing true accusations against you can be unwilling to submit the matter to judgement. You must always denounce misrepresentation and declare it to be outrageous and universal and the cause of endless evil. You must also point out that many have before now been ruined through unjust misrepresentation. You must show moreover [25] that it is foolish that men, when they are consulting about matters of public interest, should allow themselves to be disturbed by the



misrepresentations of individuals instead of listening to the advice of all and then considering what true policy requires. You must also promise to prove that the advice which you have undertaken to give is just and expedient. Such then is the method which those who [30] have been misrepresented in the past must adopt in public speaking in order to refute misrepresentation.

In reference to the present time the first thing which creates a prejudice against speakers is their age. If a man who is quite young or quite old is speaking in public, his hearers feel annoyance; for they think that the former ought not yet to [35] have begun to speak, while the latter ought before now to have ceased speaking. Secondly, a prejudice is created against a man, if he is a frequent speaker, for it looks as if he were a busybody; or again, against a man who has never spoken before, for it looks as if he had some motive of private gain in thus speaking in public contrary to his usual custom. Such, then, are the ways in which prejudices in reference to the present are likely to be created against a public speaker.

Excuses must be made by a young man by urging the dearth of advisers and [1437<sup>b</sup>1] the special suitability of the speaker; for instance, if the question concerns the superintendence of the torch-races or the gymnasium or arms or horses or war—in such matters a young man has no small interest. He must also urge that, if he has not yet the wisdom of years, he has at any rate that wisdom which comes from [5] natural endowments and diligent application. He should also point out that, whereas unsuccessful advice reflects only upon its unhappy proposer, the benefit conferred when the policy succeeds is shared by the whole community. Such then are the excuses which must be urged by a young man. Excuses must be made when an old man is speaking by pointing out the dearth of advisers and his experience of the subject. Furthermore he may urge the magnitude and unusual character of the [10] crisis and the like. When a man is in the habit of speaking too frequently, he may point to his wide experience and urge that it would be wrong that one who was formerly in the constant habit of speaking should not express his opinion on this occasion. One who is not in the habit of speaking must urge the magnitude of the crisis and that it is essential that every one who has a stake in the community should [15] express his opinion on the present situation. Such then are the means by which we shall attempt to break down the prejudices raised against the persons of public speakers.

Prejudice is created against the subject matter of a speech when the speaker advises the rupture of peaceful relations with<sup>20</sup> those from whom

we have received no injury or who are stronger than we, or when he advises a discreditable peace or [20] urges a reduction of the expenditure on sacrifices or makes some other such proposal. On such subjects, first, one should employ anticipation in addressing one's hearers; secondly, one ought to lay the blame upon necessity and fortune and the times and expediency, and say that it is not those who are giving advice but the [25] circumstances which are to be blamed for such proposals. Such are the methods by which we shall free advisers from prejudices which are due to their subject matter.

The actual speech in a public harangue creates a prejudice when it is too lengthy or old-fashioned, or lacks credibility. If it be long, this must be attributed to [30] the abundance of material; if it be old-fashioned, it must be pointed out that such a style is opportune at the moment; if it is implausible, you must promise that you will prove it to be true in the course of your oration. These then are the considerations which will have a place in our public speeches.

Next, what arrangement shall we employ? If there be no prejudice against either ourselves personally or our speech or our subject, we shall lay down our [35] proposition at the very beginning, and we shall afterwards exhort our hearers to pay attention and give our words a favourable hearing. If any prejudice has been created against us in previous speeches, we shall anticipate the judgement of our audience and, after briefly defending and excusing ourselves from the prejudices thus caused, shall then state our proposition and exhort our hearers to give us their attention. [1438<sup>a</sup>1] This, then, is the way in which public speeches should be constituted.

**30** · Next we must either narrate events which have happened in the past or recall them to the minds of our hearers, or explain events which are occurring at the [5] moment or else predict what is likely to occur in the future. When therefore we are reporting the details of an embassy, we must make a lucid statement of everything that was said, in order that our speech may carry weight (for it will be a report and nothing else, and no other style will find its way in); next, if we have been [10] unsuccessful, our object will be to make our hearers think that the failure of the negotiations was due to some other cause and not to our negligence; whereas, if we have met with success, they must be made to suppose that the result has been due not to chance but to our zealous efforts. This they are ready to believe, if, not having [15] been present at

the negotiations, they observe the zeal displayed in our speech in omitting nothing but accurately reporting every detail. So, when we are describing the results of an embassy, we must for the reasons which I have stated report everything just as it happened.

[20] When we are ourselves describing in a public speech some past event or explaining the events of the moment or predicting what will happen in the future, we must do each of these things briefly, clearly, and convincingly. We must be clear, in order that our hearers may grasp the events which we are describing, and concise, in order that they may remember what we have said; and we must speak convincingly, in order that they may not reject our statements before we have [25] supported them with proofs and justifications.

The clearness of our explanations will be due to the facts or to the words which we use; to the facts if we do not present them in an inverted order, but mention first [30] those which have occurred or are occurring or are going to occur first, and arrange the subsequent events in their proper order, and do not desert the subject about which we have undertaken to speak, and deal with some other subject. Thus, then, we shall speak clearly as far as our facts are concerned. Our actual words will be [35] clear, if we describe actions as far as possible in words which are appropriate to them, and if we employ usual words and do not put them in an inverted order but always arrange together those which naturally follow one another. If we observe these rules, our narrative will be clear.

We shall be concise if we omit all facts and words the mention of which is not [1438<sup>b</sup>1] essential, keeping only those the omission of which will render our speech obscure. Our narrative will then be concise.

We shall speak convincingly if, in support of facts which are implausible, we bring forward reasons which will make the events which we describe seem likely to have taken place. We must omit anything the occurrence of which seems too [5] unconvincing. If you are obliged to mention such things, you must make it clear that you have definite knowledge of them, and you must pass lightly over them, weaving them into your speech by the figure of 'pretended omission', and promise to show their truth as your speech progresses, making the excuse that you wish first to demonstrate the truth or justice (or the like) of your previous statements. This is the [10] way in which we shall remedy incredulity in our hearers.

In a word, by employing all the above-mentioned devices we shall make our reports, expositions, and predictions clear, brief, and convincing.

31 · There are three different methods in which we shall arrange them. If [15] the actions about which we are speaking are few in number and well known to our audience, we shall include the narration of them in our poem, in order that this part of our speech may not in itself be too short. If the actions which we are recounting are too numerous and not familiar to our audience, we shall present them in every case in a connected form and show that they are just, expedient, and honourable, in order that we may not only make our tale plain and unembellished by simply [20] relating facts but may also win the attention of our hearers. If the facts which we are recounting are unimportant and unfamiliar, we ought to insert the report or exposition or prediction of them bodily in the poem. This we shall do by recounting [25] them from beginning to end and including nothing extraneous but merely relating the bare facts. We shall thus know how to arrange narratives in our poem.

32 · Next comes confirmation, whereby we confirm that the facts which we have already mentioned are of the nature of which we have undertaken to prove [30] them to be, by adducing proofs and by considerations of justice and expediency. When therefore . . .<sup>21</sup> you must make sure they are connected. The proofs which are best suited to public orations are those based on the customary course of events and examples and supplementary enthymemes and the opinion of the orator; but any [35] other proofs which present themselves may also be employed. They must be arranged in the following way: first, the opinion of the orator must be mentioned, or, if that is not done, the customary course of events must be indicated, showing that what we are asserting, or something similar, is what usually occurs. Following on this we must cite examples, and any point of similarity must be introduced to support what we are saying. The examples which we take must be closely akin to [1439<sup>a</sup>1] our subject and the nearest in time or place to our hearers. In the absence of such examples we must employ the most striking and best known that we can find. Next we must cite maxims. Also, in the parts where we introduce probabilities and [5] examples we must end with enthymemes and maxims. This is the manner then in which we must introduce proofs where facts are concerned.

If our statements of facts are believed as soon as they are made, we must omit all proofs and confirm the facts which we have already stated by appeals to justice [10] and lawfulness and expediency and considerations of what is honourable, pleasant, easy, possible, or

necessary. Where an appeal to justice is possible, it must be given the first place, and we must explain our statements in relation to justice or a resemblance to justice or its contrary or what has been judged to be just. You must also cite examples similar to the cases of justice which you are instancing. You will [15] also be able to produce numerous examples of what is regarded as just under special circumstances and in the actual city in which your speech is made, and in other states. When, following this method, we have said what we have to say, adding at the end maxims and brief enthymemes of different kinds, if this division of our [20] speech is long and we wish it to be remembered by our hearers, we shall give a concise iteration; if, however, it is short and still fresh in their memory, we shall bring the division itself to a close and begin another one. The following is an example of what I mean: 'In what I have already said I think that the justice of our [25] helping the Syracusans has been sufficiently demonstrated; I will now attempt to show the expediency of our doing so'. You will next treat the question of expediency by a similar method to that which we employed above in the case of justice, and at the end of that division add an iteration or definite conclusion, and then bring [30] forward some other considerations with which you have to deal. This is the way in which you must connect one division with another and keep up the thread of your speech. When you have employed every possible means to confirm your advice, you must in addition to all this show in a summary manner with the help of enthymemes [35] and maxims that it is unjust and inexpedient and dishonourable and unpleasant not to adopt your suggestion, and in a summary way you must contrast with this the justice, expediency, honourableness, and pleasure of doing what you are recommending. When you have made a sufficient use of maxims, you must end your exhortations with a definite conclusion. This then is the way in which we shall [1439<sup>b</sup>1] confirm the proposals which we make. The next division of our treatise will be concerned with the anticipation of contrary arguments.

**33** · Anticipation is the method by which you anticipate and demolish the [5] objections which can be brought against your speech. You must minimize the arguments of your opponents and amplify your own, as you have already learnt to do from the instructions about amplification. You must set a single argument against another when yours is the stronger, and several against several and one against many and many against one, using every possible kind of contrast to [10] magnify your own arguments and weaken and minimize those of your adversaries.

This is the manner in which we shall employ anticipations. Having done this we shall conclude with an iteration using the forms of argument or narration or recommendation or questioning or irony which we have already mentioned.

[15] **34** · If we are urging that help should be given to someone, whether to private individuals or to states, it will be fitting briefly to mention any friendship or cause for gratitude or pity which already exists between them and the assembly which you are addressing. For they are most willing to help those who stand in such relations to them. All men feel an affection for those from whom, or from whose [20] friends, they think they themselves, or those for whom they care, have received or are receiving or are going to receive some deserved kindness. They feel gratitude towards those from whom, or from whose friends, they think they themselves or those for whom they care have received, are receiving, or will receive some undeserved benefit. If any feelings of this kind are present in their minds, we must [25] briefly dwell upon them and so move our hearers to pity. We shall have no difficulty in arousing as much pity as we wish, if we realize that all men pity those whom they suppose to be closely connected with themselves or think to be unworthy to suffer misfortune. You must prove that this is the condition of those for whom you wish to [30] excite pity, and show that they either have been or are in an evil plight, or will be so unless your hearers assist them. If this is not possible, you must show that those on whose behalf you are speaking have been or are being or will be deprived of advantages which all or most other people enjoy, or else have been or are without some advantage, or never will obtain it unless those whom you are addressing take [35] pity on them now. These are the ways in which we shall incline our audience to pity.

In dissuasion we shall employ the contrary method, using the same kind of proem and narrating the facts and giving the proofs and showing our hearers that what they are attempting to do is unlawful, unjust, inexpedient, disgraceful, [1440<sup>a</sup>1] unpleasant, impracticable, burdensome, and unnecessary. The arrangement of our speech will be similar to that used in persuasion. Such, then, is the way in which those who are employing dissuasion on their own account must arrange their speech.

Those who are opposing the advice given by others must in the first place state [5] in their proem the views which they intend to oppose and

then add one by one the other parts of the proem. After the proem the speaker must first bring forward separately each of the points in the previous speech and show that the recommendations of his adversary are not just or lawful or expedient or the like. This you will do by proving that what he says is unjust or inexpedient or bears a resemblance to [10] injustice or inexpediency, or is the opposite of the just or expedient or what has been judged to be so. You must treat the other points in a similar manner. This, then, is the most effective method of dissuasion. If this course is impossible, you must try to [15] dissuade your audience by using the technique of omission: for example, if your opponent has shown that a certain course is just, you must attempt to prove that it is discreditable or inexpedient or toilsome or impracticable or whatever else you can; or if he has expediency on his side, you must show that his suggestion is unjust and [20] whatever else you can as well. You must amplify your own contentions and minimize those of your adversary, employing the method already prescribed for persuasive oratory. You must also introduce maxims and enthymemes, as in persuasion, and refute anticipations, and in conclusion employ iteration. [25]

In addition to this we must show, when we are seeking to persuade our hearers, that friendship exists between them and those whom we are urging them to help, or that they owe a debt of gratitude to those who are asking for their assistance; but when we are trying to prevent help from being given, we must show that they are worthy objects of anger or envy or hostility.<sup>†22</sup> We shall implant a sentiment of hostility in those whom we are seeking to dissuade by showing that [30] either they themselves, or those for whom they care, have received undeserved ill-treatment at the hands of the other party or their friends. We shall arouse anger, if we show that they, or those for whom they themselves care, have been wrongfully treated with contempt or injustice by the other party or their friends. We shall create a feeling of envy, to put the matter briefly, against those whom we show to [35] have enjoyed unmerited prosperity, or to be now doing so, or to be likely to do so in the future; or not to have been deprived of some advantage, or not to be being deprived or not likely to be so; or never to have suffered some misfortune in the past, or not to be doing so now, or to be never likely to do so in future. This, then, is the method by which we shall implant envy or hostility or anger; while we shall create [1440b1] feelings of friendship, gratitude, and pity by the methods which we indicated in treating of persuasion. We shall give these sentiments their place and arrangement according to the various methods already mentioned. We now know the nature of persuasive oratory and its

component parts and how it must be employed.

[5] **35** · Let us next set before ourselves the consideration of eulogistic and vituperative oratory.<sup>†</sup> Here too we must first of all state our propositions<sup>†23</sup> in the proem, and refute misrepresentation by the same method as in persuasive oratory. We must also exhort our hearers to give us their attention by the methods already [10] described under public speeches and in particular by saying things which will cause astonishment and attract remark, and showing that the subjects of our speech and those who usually incur praise or blame have acted in the same manner.<sup>24</sup> Speeches of this kind are usually made not in order to fight a case but for display.

[15] First, we shall arrange the proem on the same principle as in persuasive and dissuasive speeches. After the proem, we must distinguish those good qualities of our subject which are outside the sphere of excellence and those which fall within it, as follows<sup>25</sup>: those which fall outside the sphere of excellence we shall divide into good birth, physical strength, personal beauty, and wealth, while we shall divide [20] excellence into wisdom, justice, courage and reputable habits of life. The qualities which pertain to excellence are proper subjects of eulogy; those which fall outside it must be disguised, for we ought to congratulate rather than praise those who are strong and handsome and well-born and wealthy. Having made these distinctions we shall give the genealogy of the subject of our speech the first place after the [25] proem; for this is the first thing which brings repute or disrepute upon men and also upon animals. [We shall therefore be justified in giving the genealogy of a man or any other animal; and when we are praising any one's feeling or action or speech or possession, we shall be justified in beginning our eulogy by mentioning the reputable qualities which he possesses.]<sup>26</sup>

[30] The following is the way to treat a man's genealogy: if his ancestors were good men and true, you ought to mention them all from the earliest times down to the subject of your eulogy and give a brief account of some glorious achievement performed by each of his forefathers. If it is only his earliest ancestors that were good men while the rest failed to do anything remarkable, you must mention the [35] former in the manner already described and omit the undistinguished members of the family, excusing yourself by saying that, his ancestors being so numerous, you do not wish to weary your audience by speaking of them, and that every one knows that men who are born of a good stock



usually resemble their forefathers. If his early ancestors were undistinguished but those who come nearer his own time were men of repute, you must dwell upon his descent from the latter and say that it would be tedious to speak at length about his early forefathers, and you must show that the [1441<sup>a</sup>1] immediate ancestors of those whom you are eulogizing were good men; adding that it is quite clear that *their* ancestors must have been good men and true, for it is hardly likely that such excellent and worthy persons can have been born of bad [5] parents. If there is nothing reputable in the ancestry of the subject of your eulogy, you must insist on his personal nobility and suggest that all those who have a natural predisposition for excellence are well born, and you must censure those other orators who dwell upon ancestral glories, pointing out that many men of reputable ancestry have proved themselves unworthy of their forefathers. You must also insist that your task on the present occasion is to praise the man himself, not his ancestors. A [10] similar use must be made of genealogies to discredit one whose ancestors were men of evil repute. Such then is the place which genealogy must occupy in eulogy and vituperation.

If the subject of your eulogy owes some distinction to good luck, . . .<sup>27</sup> observing [15] this one principle that you say what befits his various ages, and do not speak at too great length. For example, in children it is generally considered that orderliness and self control are due not to themselves but to those who have charge of them, and so they must be dealt with briefly. When you have thus described his early years, after concluding with an enthymeme or maxim at the end of this division of your speech, [20] you will, when you come to the early manhood of the subject of your eulogy, state your subject, viz. his achievements or character or habits, and you must amplify them on the principle which we laid down at the beginning in treating of eulogistic oratory, explaining that it was at this age that such and such a glorious deed was [25] done by him whom you are eulogizing, or through his agency or that he inspired it or supplied the motive or was essential to it. You must also compare the notable achievements of other young men and show that his actions far surpass theirs, relating the least important of their deeds and the most important of the [30] achievements of the subject of your eulogy. You must set deeds of others which are notable but less important side by side with those which you are relating, and so exaggerate the importance of the latter. You must also amplify his achievements by conjectures of the following kind: ‘Yet one who at this early age became so great a philosopher, if he had been older would have advanced yet

further'; or again, 'A [35] man who so stoutly endures the toils of the gymnasium, will gladly welcome the love of toil which philosophy demands'. By conjectures of this kind we shall amplify his good qualities.

When we have dealt with the events of his early manhood, we shall put maxims and enthymemes at the end of this section too; and, after either briefly iterating what [1441<sup>b</sup>1] we have said, or bringing it to a final conclusion, we shall next treat of the achievements of the subject of our eulogy after reaching full manhood, and after setting forth his justice first and amplifying this topic by the method already [5] described we shall proceed to deal with his wisdom, if he possesses this quality; having similarly dealt with this we shall set forth his courage, if he possesses any, and after going through the process of amplifying this also, when we have reached the end of this section and described all his various qualities, we shall repeat and [10] summarize what we have said and bring the whole speech to a conclusion with a maxim or an enthymeme. It will be suitable in eulogies to treat the various points at considerable length and to employ a dignified diction.

[15] We shall use the same method to compose our accusations when we are dealing with wicked men. But we must not scoff at the man with whom we are finding fault, but we must describe his life; for statements have more effect than scoffs, bringing conviction to our hearers and causing annoyance to those with whom we are finding fault; for scoffing is directed against outward appearance and circumstance, while [20] statements about a man are the picture, as it were, of his habits and character. Be on your guard against calling disgraceful actions by disgraceful names, so as not to violate conventional feeling, but express such things by indirect hints and explain the facts in words which are really applicable to different actions. In finding fault [25] you must employ irony and laugh at the points on which your adversary prides himself; in private, and in the presence of a few listeners, you should seek to discredit him, but before the multitude you should abuse him by levelling only ordinary accusations against him. You must employ the same methods of amplification and minimization in finding fault as in eulogy. From what has been said we shall know how to practise these kinds of oratory.

[30] **36** · It remains for us to deal with the oratory of accusation and defence and inquiry. Let us next discuss how we shall compose and arrange these in the forensic type of oratory. We shall first set forth in the

proem, as in the other kinds, the action which is to be the subject of our accusation or defence. We shall exhort our hearers [35] to attention by the same means as we employed in the persuasive and dissuasive styles.

† Again, as regards the goodwill of the audience, when they are well-disposed towards the subject of our speech in connexion with either the past or in the present and he is not the object of prejudice because they are irritated against him or his [1442<sup>a</sup>1] action or his speech, we must secure their goodwill by the method described in dealing with the other kinds of oratory. When they are neither well nor ill-disposed towards him in connexion with either the past or the present, or when his personality [5] or his action or his words are the object of prejudice, we must bring forward reasons for goodwill towards him, sometimes blending them together and sometimes taking them separately.†<sup>28</sup> Such, then, is the method by which we must conciliate goodwill.

Those who are the objects neither of goodwill nor of illwill must briefly eulogize themselves and dispraise their adversaries. They must praise themselves in [10] connexion with the qualities which most nearly concern their hearers, calling themselves, for example, patriotic, true to their friends, grateful, compassionate; while they will dispraise an adversary by applying to him epithets which will arouse the anger of their audience, such as unpatriotic, untrue to his friends, thankless, [15] pitiless, and the like. They must also conciliate the jury by praising their justice and the intelligence which they bring to their task. They must also mention any point in which they are at a disadvantage compared with their opponents, whether in word or deed or anything else which concerns the suit; and they must further introduce the considerations of justice, legality, expediency, and the like. It is by these means [20] that we must win goodwill in the minds of the jury for one who is the object of neither kindly nor unkindly feeling.

When a man is an object of prejudice, if the prejudice dates from the past and is concerned with his person or with what he has said, we know from what has already been remarked how to remove it. If it dates from the present time, it must necessarily be concerned with the man's personality<sup>29</sup> if he is represented as unfit to [25] bring the case in question, or his character as contradicting the charges he brings or consistent with the accusation brought against him. It would be a case of unsuitability if too young or too old a man pleaded on behalf of another; of contradiction, if a strong man accused a weak man of assault, or if a violent man brought a charge of violence against a self-controlled man, or if a very poor man [30] went to law against a very rich man charging him

with embezzlement. These are cases where there is a contradiction between the accusations and those who bring them. There will be consistency with the charge where a strong man is prosecuted for assault by a weak man or one who has the reputation of being a thief is put on his trial for theft. In a word, there will seem to be consistency with the charge in the [35] case of persons who cause an opinion to be formed about them which corresponds with their character. Such, then, will be the misrepresentations which arise at the moment against a man's personality. Prejudice will be raised against a man's action if he goes to law with his own friends or guests or relatives, or on petty or [1442<sup>b1</sup>] discreditable pleas; for these things bring disrepute upon the parties in a suit.

I will now show how we are to get rid of the above mentioned prejudices. I maintain that there are two principles which hold good in all cases. First, when you think your opponents are likely to impress the jury, anticipate them and make the [5] impression yourself. Secondly, when it is a question of acts, you should, if possible, turn the blame upon your adversaries, or failing that, upon some one else, urging as an excuse that you have been dragged into the suit against your will and under compulsion from your opponents. Against each particular prejudice you must urge such excuses as these: a young man, for example, should allege a lack of older [10] friends to fight the case on his behalf, or the enormity or number of his opponent's misdeeds, or the short limit of time allowed, or some other such excuse. If you are speaking on some one else's behalf, you must say that you are pleading his cause from motives of friendship for him or hatred of his opponent, or because you were present at the events in question, or for the public good, or because your client [15] stands in need of friends and is a victim of injustice. If his character agrees with the charge brought against him or is in contradiction to the accusation which he brings, you must make use of anticipation and say that it is not just or lawful or expedient to judge from an opinion or suspicion before listening to the facts. Such, then, is the [20] way in which we shall get rid of prejudices against a man's personality; those which concern his action we shall repudiate by transferring the blame to his adversary, or by accusing the latter of libel or injustice or greed or contentiousness or anger, [25] alleging as an excuse that our client could not possibly obtain justice in any other way. This is how we shall get rid of personal prejudices in the law courts; those which concern a man's public life we shall refute by the various methods prescribed for the kinds of oratory already dealt with.

We shall arrange the proems of forensic speeches in the same manner as those [30] of public orations, and on the same principle we shall include the narration of facts in the proem or show them to be trustworthy and just in detail or else insert them bodily by themselves.

Next will follow confirmation, by means of proofs if the facts are disputed by [35] our opponents, or, if they are admitted, by considerations of justice, expediency, and the like. Of proofs we must put testimony first and admissions made under torture, if there are any. Next we must confirm our statements, if they are plausible, by maxims and enthymemes, but, if they are not entirely plausible, by considerations [1443<sup>a1</sup>] of probability, and afterwards by examples, evidences, signs, and refutations, and lastly by enthymemes and maxims. If the facts are admitted, we must leave proofs [5] alone and make use of justification as already described. Such, then, is the method of confirmation which we shall employ.

After such confirmation we shall next state the arguments which we can urge against our opponents, and anticipate what they are likely to say. If they deny the facts, we must amplify the proofs which we have already stated and criticize and [10] minimize those which they are likely to bring forward. If they admit the actions but intend<sup>30</sup> to show that they are legal and just according to written laws, we must attempt to show that the laws which we bring forward, and laws similar to them, are just and right and to the common advantage of the state, and that this is the opinion [15] generally held about them, while the contrary is true of the laws which our opponents are bringing forward. If it is impossible to say this, you must remind the jury that they have to give their verdict not on a point of law but on a point of fact, and that they have sworn to vote according to the established law, and you must tell them that they must not pass laws now but upon the proper days fixed for that [20] purpose. If it so happens that what has been done contravenes laws which appear to be bad,<sup>31</sup> we must say that here we have not law but the negation of law; for law is laid down for the public benefit, but this law is harmful to the state. We must say [25] that they will not be acting illegally if they vote in contravention of this law, but will be legislating to prevent the use of bad and illegal ordinances. You can also point out that no law forbids the conferring of a public benefit and that it is a benefaction to the state to annul bad laws. Regarding laws, then, of which the meaning is clear, [30] we shall easily be able, by such methods of anticipation, to speak against any of them with which we are concerned. When there is ambiguity, if the jury understand a law in a sense which favours you, you

must give it that interpretation; but if they give it the construction which your opponent puts upon it, you must tell them that this is not what the lawgiver meant but that he interpreted it as you do, and that it is to the advantage of the jury to put the construction which you do upon it. If you cannot twist the law round, point out that it cannot mean anything but what you say [35] it means. If you follow this method you will have no difficulty as to the way in which to deal with laws.

Generally speaking, if they admit the facts and intend to base their defence on pleas of justice and legality, you must employ these methods to anticipate what they [40] are likely to say. But if they admit the facts but claim to be pardoned, you must deprive your opponents of such arguments in the following manner. First, you must [1443<sup>b</sup>1] say that their conduct is all the more reprehensible and that it is only when they have been found out that they admit their mistake in so acting, adding, 'If, therefore, you pardon the defendant, you will absolve every one else from punishment'. You can say, 'If you acquit those who admit their mistakes, how will [5] you be able to condemn those who do not do so'? You must urge that 'even if he has made a mistake, there is no reason why I should suffer through his mistake'. Furthermore, you must say that the lawgiver does not pardon those who make mistakes, and so the jury in giving their verdict according to the laws should not do [10] so either. Such then, as we have stated at the beginning, are the means by which we shall refute their appeals for pardon, and, speaking generally, we shall anticipate by the method already mentioned anything which our opponents intend to say with a view either to proof or justification or pardon.

Next we must iterate the whole story of the case in summary form, and, if [15] possible, in a few words instil into the minds of the jury a feeling of hostility or anger or envy towards our opponents and of goodwill or gratitude or pity for ourselves. How this is done we have already stated in dealing with public speaking and persuasion and dissuasion, and we shall again allude to it finally in treating of the [20] defensive style of oratory. This, then, is the way in which we shall compose and arrange our speech when we are the first to speak and are the accusers in a forensic case.

When we are defending a case, we shall frame our proem in the same way as when accusing, and we shall make no mention of the accusations, of which our [25] opponent has informed our hearers, but after the proem we shall set forth and refute the opinions which he has put into their minds and throw discredit on his witnesses and the testimony given

under torture and the oaths, in the manner already described to you. If the facts are credible, we must put our defense against them [30] . . .<sup>32</sup> changing to the technique of omission, and if the witnesses or those who have been examined under torture are trustworthy, we must have recourse to argument or statement of fact or any other strong point which we can bring against them. If your adversary accuses you by bringing a charge which accords with your advantage or habitual practice, you must defend yourself, if you can, by showing [35] that the crime with which you are charged does not accord with your advantage; or, failing that, you must urge that it has not been the custom either of yourself or of persons like you to do such things, or to do them in such a manner. This is how you will refute the argument of probability. When he employs an example, you must first show, if you can, that it does not resemble the crime with which you are charged, or, failing that, yourself bring forward another example to the contrary which has occurred against probability. If he employs an evidence, you must refute [1444a1] it by giving reasons why it implies the exact opposite, while you must show that his maxims and enthymemes are either paradoxical or ambiguous. His signs you must prove to be signs of a number of other things and not only of the charge which he is bringing against you. This, then, is the way in which we shall cause our adversary's contentions to be discredited by either interpreting them in a contrary sense or [5] reducing them to ambiguity.

If, on the other hand, we admit that we have done the acts with which we are charged, we shall base our plea on justice and legality and try to prove that our acts are juster and more legal. If this is impossible, we must resort to pleas of error or [10] misfortune, and try to win pardon by showing that the harm which has resulted is small, pointing out that error is common to all men, while wrongdoing is peculiar to the wicked. You must urge that it is right and just and expedient to pardon errors; for no man knows whether it may not fall to his lot to commit such an error. You [15] must also point out that your opponent claimed pardon when he committed an error.

Next will come the anticipations which your adversaries have made in their speeches. Anticipations of other kinds we shall easily be able to refute by an appeal to the facts; but if they misrepresent us by saying that we read our speeches or [20] practise them beforehand, or that we are pleading for the sake of some reward, we must meet such accusations with irony and say with regard to the writing of speeches that the law does not forbid a man to read out a written speech any more than it forbids his opponent to speak without notes; for, while it prohibits the

doing of certain actions, it allows a man to make a speech in any way he likes. You must [25] also say: 'My opponent considers that the wrongs which he has committed are so serious that he does not think I am doing justice to the accusation which I am bringing against him, unless I write out and take a long time to think over my speech'. Such then is the way in which we must meet the misrepresentation of having written out our speech. If our opponents declare that we learn and rehearse [30] our speeches, we shall admit it and say: 'We who, according to you, learn what we are going to say, are not litigious, whereas you, who declare that you do not know how to speak, have been convicted of bringing vexatious suits in the past and are doing so now against us'; and we shall draw the conclusion that it would apparently therefore be better for the citizens, if our opponent also learned to be an orator, for [35] then he would not be such a scoundrel and pettifogger. We shall meet the accusation that we are paid to plead in court by a similar argument—admitting it and speaking ironically and pointing out that our accuser and every one else does so. You must distinguish between the different kinds of pay and say that some men [40] plead in court for money, others as a favour, others for vengeance, others for honours. You must show that you are yourself pleading as a favour, and say that [1444<sup>b</sup>1] your opponent pleads for no small payment; for he is going to law that he may make money unjustly, not in order to avoid having to pay it. We must follow the same method if any one accuses us of teaching others how to plead and of composing speeches to be delivered in court. You must point out that every one else, as far as [5] lies within his power, helps his friends by instruction and advice. Thus you will have an answer in such cases in accordance with the rules of rhetoric.

You must not be slow in any questions and answers which occur in cases of this kind; but you must make a clear distinction in your answers between admissions and [10] denials. The following are examples of admissions: 'Did you kill my son?'—'Yes, I did kill him, when he, unprovoked, raised a sword against me'; or again, 'Did you thrash my son?'—'Yes, but he first assaulted me'; or again, 'Did you break my head?'—'Yes, when you were forcing your way into my house at night'. Such [15] admissions are made in reliance on the legality of your action. Denials, on the other hand, aim at diverting the course of law, for example: 'Did you kill my son?'—'No, it was not I, but the law that killed him'. This is the kind of answer which you must always make when one law enjoins, while another forbids, a certain course of action. Out of all these various methods you will gather the means to meet your [20]



adversaries.

Next will follow an iteration by way of brief reminder of what you have said. It is useful on all occasions and should therefore be employed in every part and in every kind of speech. It is very suitable in accusation and defence and also in [25] persuasion and dissuasion. In my opinion we ought here not only to remind our audience, as in eulogistic and vituperative speeches, of what has been said, but we ought also to dispose our judges to be favourable towards ourselves and unfavourable to our opponents; we shall make this the last part of our speech. It is possible to [30] refresh your hearer's memory in a summary manner either by arguing or by narrating the points which you have mentioned, or by picking out the best of your own points and the worst of your opponent's, or, if you like, you can use the form of a question. The nature of these methods we know from what has already been [35] said.

We shall win a favourable hearing for ourselves and an unfavourable one for our opponents if, as in persuasion and dissuasion, we show briefly how we ourselves (or our friends) have benefited or are benefiting or will benefit those who are now seeking to wrong us (or those for whom they care); and point out to them that now is [1445<sup>a</sup>1] the opportunity to show us gratitude for our good services; and also, when it is possible, induce them to pity us. This we shall do by showing that a close tie binds us to our hearers and that we are suffering undeserved misfortune, having been unfairly treated in the past, or being so now, or being likely to be so in the future, [5] unless they help us now. If such arguments are inapplicable, we must describe the advantages of which we have been, or are being, or are likely to be deprived, if our prayers are rejected by our judges; or show that we never have been, or are not now, or are never likely to be in enjoyment of some benefit, unless they help us. For it is [10] by these means that we shall win pity and gain the goodwill of our audience.

We shall cause a prejudice and feelings of envy against our opponents by employing the opposite method and pointing out that our hearers, or those for whom they care, have received undeserved ill-treatment, or are receiving it, or are likely to receive it at the hands of our opponents or their friends; for by such arguments they [15] will be induced to entertain feelings of hatred and anger against them. Where this is impossible, we shall collect together all the arguments by which we can create in our hearers a feeling of envy against our opponents; for envy is very near to hatred. They [20] will be objects of envy, to put the matter briefly, if we can show that they have met with undeserved prosperity and that no

close ties bind them to our hearers, and point out that they have unjustly received, or are receiving, or are about to receive many benefits; or that they have never in the past been without some advantage, or are not without it now, or likely to be so in the future; or that they have never met [25] with some misfortune, or are not now meeting with it, or likely to do so, unless the judges punish them now. By these means then we shall in the peroration of our speech win favour for ourselves and disfavour for our opponents, and by following all the instructions given above we shall be able to arrange speeches for accusation and defence according to the rules of rhetoric.

[30] **37** · The inquisitive kind of oratory generally occurs, not separately, but in connexion with the other styles; it is especially useful in dealing with contradictions. However, in order that we may know the arrangement of this kind of speech also, when we have to inquire into the words or manner of life or deeds of men or the [35] administration of a city, I will describe it also in a summary manner. When conducting an inquiry of this kind we must begin in the same way as when refuting a prejudice; and so, after first adducing plausible pretexts so as to make our action appear reasonable, we shall then proceed to conduct our inquiry. The following are suitable pretexts: in political assemblies, that we are adopting such a course not [1445<sup>b</sup>1] from party-spirit but in order that it may not escape the attention of our hearers, or again, that our adversaries molested us first. In private suits our excuse will be a feeling of hatred or the bad character of the subjects of our inquiry or our friendship towards them in order to make them realize what they are doing and not do it again. [5] In public trials our pretexts will be legality, justice, and the general interest. After first treating of these and similar subjects we shall next in order set forth and inquire into each utterance or deed or intention of our opponents, showing that these [10] are opposed to justice and legality and private and public expediency, and examining them all to see whether in any respect they contradict one another or the practice of good citizens or probability. But, not to be tedious by going into details, the more we can prove to our hearers that the conduct of the subjects of our inquiry [15] is opposed to reputable pursuits, acts, words or habits, the greater will be the disrepute which attaches to them. We ought to conduct our inquiry not in a bitter but in a gentle spirit; for words if thus spoken will appear more persuasive to our hearers, and those who utter them will be less likely to bring prejudice upon [20] themselves. When you have carefully inquired into everything and

amplified the results, you must conclude with a brief iteration and remind your hearers of what you have said. By arranging them thus we shall be able to employ all the various kinds of oratory according to the rules of rhetoric.

[25] **38** · Both in speaking and writing we must try as far as possible to make our words accord with the principles laid down above, and accustom ourselves to practise each principle readily, and we shall have many technical expedients to enable us to make speeches according to the rules of art in private and public suits and in conversation with others; but an orator ought to be careful not only about his [30] words but also about his personal behaviour, regulating it according to the principles already laid down; for the manner of a man's life contributes to the persuasive influence which he exercises and to the establishment of a good reputation.

In the first place you must divide up your subject-matter according to the general system of division in which you have been instructed, and decide what you [35] must treat of first, secondly, thirdly, and fourthly. Next you must prepare your hearers to receive you, as I have described in dealing with the attitude to be taken towards your audience in proems. You will dispose them well towards you, if you are true to your promises and if you keep the same friends all your life and show yourself unchanging in your other habits and always following the same course. [1446<sup>a</sup>1] They will listen attentively to you, if you treat of great and noble deeds and such as promote the public good.

Their goodwill having been won, when you come to practical suggestions they will accept as expedient to themselves those which procure the avoidance of evils [5] and the provision of benefits, and reject those which involve the contrary results.

In order that your exposition may be quick and lucid and may command credit, you ought to make your practical suggestions as follows. You will perform [10] your task quickly, if you do not try to do everything at once, but take the first point first and then the next. You will speak lucidly, if you do not suddenly leave your subject and go on to other points before you have finished it. You will command credit, if you do not act contrary to your usual character, and further if you do not pretend that the same persons are your enemies and your friends. [15]

As regards proof, where we have sure knowledge, we shall prefer to follow its guidance in prescribing plans of action, but, where we lack

knowledge, we shall take what holds for the most part as our guide; for it is safest in such cases to act with a view to what usually happens. [20]

When we have adversaries to contend with, if it is a question of words, we shall obtain confirmation in support of our case from the actual words uttered; in suits about contracts we shall do so by dealing with them in accordance with unwritten and written laws with the support of the best possible testimony and within definite [25] limits of time.

As regards our peroration we shall remind our hearers of what has been said by a summary repetition of the facts; while we shall remind them of our past deeds by reference to our present deeds, when we are undertaking actions identical with, or similar to, former actions.

Our hearers will be well disposed to us, if we follow a course of action which [30] will result in their thinking themselves well treated in the past, present, or future. We shall add weight to our actions, if we deal with transactions which are likely to produce great credit.

Such then is the manner in which an orator must regulate his personal [35] behaviour; while he must practice the art of oratory according to the principles already laid down.

<sup>33</sup>[Sacrifices must be conducted, as we have already indicated, so as to be reverent towards the gods, moderate in costliness, splendid from a spectacular point of view, and likely to bring advantage to the citizens. They will be reverent towards the gods, if we sacrifice according to ancestral custom; they will be moderate in [1446<sup>b</sup>1] costliness, if the accompaniments of the ceremony are not used up as well as the money actually expended; they will be splendid from a spectacular point of view, if they are magnificently appointed; they will be beneficial to the citizens, if horsemen [5] and infantry in full panoply accompany the procession. Our dealings with the gods will be reverently performed if carried out thus.

We shall establish friendly relations with those who are of like character to our own and have the same interests, and with whom we are obliged to co-operate in matters of great importance; for such friendship is most likely to be permanent. We [10] must make those men our allies, who are most righteous and are possessed of considerable power and live near at hand; those who are the contrary must be our enemies. We must undertake war against those who are trying to injure the state or her friends or her allies. The protection of the state must be secured either by [15] personal service or by the help of allies or by mercenaries; the first

method is preferable to the second, and the second to the third.

As regards the supply of resources, we must provide them first and foremost from our own revenues and possessions, secondly by taxes on rateable property, and thirdly by personal service on the part of the poor, and the provision of arms by the [20] craftsmen, and of money by the wealthy.

As for political constitution, the best form of democracy is that under which the laws bestow the posts of dignity on the best citizens, and the people are not deprived of the rights of electing and voting; the worst form is that under which the [25] laws deliver up the wealthy to the insolence of the mob. Oligarchies are of two kinds, being based either on political partisanship or on a property qualification.

Alliances must be formed when the citizens are unable by themselves to protect their own territory and strongholds or hold the enemy in check. An alliance [30] must be dispensed with when it is unnecessary or when the proposed allies are too far distant and unable to arrive at the opportune moment.

A good citizen is one who provides the state with useful friends and few and feeble foes, and who procures for her the greatest revenue without confiscating the [35] property of a single private citizen, and who, while conducting himself righteously, exposes those who attempt any injury to the state.

Men always bestow presents either in the hope of benefiting themselves or in grateful return for previous services. Service is always given either for gain or [1447<sup>a</sup>1] honour or pleasure or fear. All dealings are carried out either by choice or unwillingly; for all facts are done either under compulsion or through persuasion or fraud or on some pretext.

In war one side gains the upper hand either through luck, or superiority of numbers or strength or resources, or advantage of position, or excellence of allies, or [5] skill on the part of a general. It is generally held that men should abandon their allies either because it is expedient to do so or because they have brought the war to a close. [1447<sup>b</sup>1]

To act justly is to follow the common customs of the state, to obey the laws, and to abide by one's personal promises.

Physical advantages are good condition, beauty, strength, and health; mental [5] advantages are wisdom, prudence, courage, self-control, and justice. Wealth and friends are advantages alike to mind and body. The opposites of these are disadvantageous. To a state a multitude of good

citizens is an advantage.]

<sup>1</sup>Fuhrmann brackets the introduction as a later addition.

<sup>2</sup>The text of this sentence is uncertain.

<sup>3</sup>Fuhrmann marks a lacuna here.

<sup>4</sup>Reading ἐᾶν ὦν.

<sup>5</sup>Fuhrmann marks a lacuna here.

<sup>6</sup>Fuhrmann marks a lacuna here.

<sup>7</sup>The text of the obelized passage is uncertain.

<sup>8</sup>Fuhrmann obelizes the ‘since’ clause.

<sup>9</sup>Fuhrmann obelizes this clause.

<sup>10</sup>Fuhrmann marks a lacuna.

<sup>11</sup>Fuhrmann marks a lacuna.

<sup>12</sup>The text of this clause is uncertain.

<sup>13</sup>Frag. 794 Nauck.

<sup>14</sup>Fuhrmann obelizes this sentence.

<sup>15</sup>Fuhrmann obelizes this clause.

<sup>16</sup>The examples make sense in Greek, where τοῦτον τύπτειν τοῦτον is ambiguous.

<sup>17</sup>Fuhrmann marks a lacuna.

<sup>18</sup>The text of this example is uncertain.

<sup>19</sup>Fuhrmann obelizes this clause.

<sup>20</sup>Reading συμβουλεύη λῦειν.

<sup>21</sup>Fuhrmann marks a lacuna.

<sup>22</sup>Obelized by Fuhrmann.

<sup>23</sup>Obelized by Fuhrmann.

<sup>24</sup>Reading καὶ αὐτοὺς κατ’ ἴσον for καὶ αὐτόν ἴσον.

<sup>25</sup>The text is uncertain.

<sup>26</sup>Excised by Fuhrmann.

<sup>27</sup>Fuhrmann marks a lacuna.

<sup>28</sup>The text of this paragraph, which Fuhrmann obelizes, is uncertain.

<sup>29</sup>Deleting the comma after ἄνθρωπον.

<sup>30</sup>Reading μέλλωσιν for ὦσιν.

<sup>31</sup>Reading μοχθηροὺς δοκοῦντας εἶναι νόμους.

<sup>32</sup>Fuhrmann marks a lacuna.

<sup>33</sup>Excised by Fuhrmann.



# POETICS\*\*

## *I. Bywater*

[1447<sup>a</sup>10] 1 · I propose to speak not only of poetry in general but also of its species and their respective capacities; of the structure of plot required for a good poem; of the number and nature of the constituent parts of a poem; and likewise of any other matters in the same line of inquiry. Let us follow the natural order and begin with first principles.

Epic poetry and tragedy, as also comedy, dithyrambic poetry, and most [15] flute-playing and lyre-playing, are all, viewed as a whole, modes of imitation. But they differ from one another in three ways, either in their means, or in their objects, or in the manner of their imitations.

Just as colour and form are used as means by some, who (whether by art or [20] constant practice) imitate and portray many things by their aid, and the voice is used by others; so also in the above-mentioned group of arts, the means with them as a whole are rhythm, language, and harmony—used, however, either singly or in certain combinations. A combination of harmony and rhythm alone is the means in [25] flute-playing and lyre-playing, and any other arts there may be of the same description, e.g. imitative piping. Rhythm alone, without harmony, is the means in the dancer's imitations; for even he, by the rhythms of his attitudes, may represent men's characters, as well as what they do and suffer. There is further an art which imitates by language alone, and one which imitates by metres, either one or a plurality of metres. These forms of imitation are still nameless today. We have no [1447<sup>b</sup>10] common name for a mime of Sophron or Xenarchus and a Socratic Conversation; and we should still be without one even if the imitation in the two instances were in trimeters or elegiacs or some other kind of verse—though it is the way with people to tack on 'poet' to the name of a metre, and talk of elegiac poets and epic poets, [15] thinking that they call them poets not by reason of the imitative nature of their work, but generally by reason of the metre they write in. Even if a theory of medicine or physical philosophy be put forth in a metrical form, it is usual to describe the writer in this way; Homer and Empedocles, however, have really nothing

in common apart from their metre; so that, if the one is to be called a poet, the other should be termed a physicist rather than a poet. We should be in the same [20] position also, if the imitation in these instances were in all the metres, like the *Centaur* (a rhapsody in a medley of all metres) of Chaeremon; and Chaeremon one has to recognize as a poet. So much, then, as to these arts. There are, lastly, certain other arts, which combine all the means enumerated, rhythm, melody, and verse, [25] e.g. dithyrambic and nomic poetry, tragedy and comedy; with this difference, however, that the three kinds of means are in some of them all employed together, and in others brought in separately, one after the other. These elements of difference in the above arts I term the means of their imitation.

2 · The objects the imitator represents are actions, with agents who are [1448<sup>a</sup>1] necessarily either good men or bad—the diversities of human character being nearly always derivative from this primary distinction, since it is by badness and excellence men differ in character. It follows, therefore, that the agents represented must be either above our own level of goodness, or beneath it, or just such as we are; in the same way as, with the painters, the personages of Polygnotus are better than [5] we are, those of Pauson worse, and those of Dionysius just like ourselves. It is clear that each of the above-mentioned arts will admit of these differences, and that it will become a separate art by representing objects with this point of difference. Even in dancing, flute-playing, and lyre-playing such diversities are possible; and [10] they are also possible in the nameless art that uses language, prose or verse without harmony, as its means; Homer's personages, for instance, are better than we are; Cleophon's are on our own level; and those of Hegemon of Thasos, the first writer of parodies, and Nicochares, the author of the *Diliad*, are beneath it. The same is true of the dithyramb and the nome: the personages may be presented in them with the difference exemplified . . .<sup>1</sup> in the Cyclopes of Timotheus and Philoxenus. This [15] difference it is that distinguishes Tragedy and Comedy also; the one would make its personages worse, and the other better, than the men of the present day.

3 · A third difference in these arts is in the manner in which each kind of object is represented. Given both the same means and the same kind of object for [20] imitation, one may either speak at one moment in narrative and at another in an assumed character, as Homer does; or one

may remain the same throughout, without any such change; or the imitators may represent the whole story dramatically, as though they were actually doing the things described.<sup>2</sup>

As we said at the beginning, therefore, the differences in the imitation of these arts come under three heads, their means, their objects, and their manner. [25]

So that as an imitator Sophocles will be on one side akin to Homer, both portraying good men; and on another to Aristophanes, since both present their personages as acting and doing. This in fact, according to some, is the reason for plays being termed dramas, because in a play the personages act the story. Hence too both tragedy and comedy are claimed by the Dorians as their discoveries; [30] Comedy by the Megarians—by those in Greece as having arisen when Megara became a democracy, and by the Sicilian Megarians on the ground that the poet Epicharmus was of their country, and a good deal earlier than Chionides and [35] Magnes; and Tragedy is claimed by certain of the Peloponnesian Dorians. In support of this claim they point to the words ‘comedy’ and ‘drama’. Their word for the outlying hamlets, they say, is *comae*, whereas Athenians call them *demes*—thus assuming that comedians got the name not from their *comoe* or revels, but from their strolling from hamlet to hamlet, lack of appreciation keeping them out of the [1448<sup>b</sup>1] city. Their word also for ‘to act’, they say, is *dran*, whereas Athenians use *prattein*.

So much, then, as to the number and nature of the points of difference in the imitation of these arts.

[5] 4 · It is clear that the general origin of poetry was due to two causes, each of them part of human nature. Imitation is natural to man from childhood, one of his advantages over the lower animals being this, that he is the most imitative creature in the world, and learns at first by imitation. And it is also natural for all to delight in works of imitation. The truth of this second point is shown by experience: though [10] the objects themselves may be painful to see, we delight to view the most realistic representations of them in art, the forms for example of the lowest animals and of dead bodies. The explanation is to be found in a further fact: to be learning something is the greatest of pleasures not only to the philosopher but also to the rest [15] of mankind, however small their capacity for it; the reason of the delight in seeing the picture is that one is at the same time learning—gathering the meaning of things, e.g. that the man there is so-and-so; for if one has not seen the thing before,

one's pleasure will not be in the picture as an imitation of it, but will be due to the [20] execution or colouring or some similar cause. Imitation, then, being natural to us—as also the sense of harmony and rhythm, the metres being obviously species of rhythms—it was through their original aptitude, and by a series of improvements for the most part gradual on their first efforts, that they created poetry out of their improvisations.

Poetry, however, soon broke up into two kinds according to the differences of [25] character in the individual poets; for the graver among them would represent noble actions, and those of noble personages; and the meaner sort the actions of the ignoble. The latter class produced invectives at first, just as others did hymns and panegyrics. We know of no such poem by any of the pre-Homeric poets, though there were probably many such writers among them; instances, however, may be [30] found from Homer downwards, e.g. his *Margites*. and the similar poems of others. In this poetry of invective its natural fitness brought an iambic metre into use; hence our present term 'iambic', because it was the metre of their 'iambus' or invectives against one another. The result was that the old poets became some of them writers of heroic and others of iambic verse. Homer, just as he was in the serious style the [35] poet of poets, standing alone not only through the excellence, but also through the dramatic character of his imitations, so also was he the first to outline for us the general forms of comedy by producing not a dramatic invective, but a dramatic picture of the ridiculous; his *Margites* in fact stands in the same relation to our [1449a1] comedies as the *Iliad* and *Odyssey* to our tragedies. As soon, however, as tragedy and comedy appeared in the field, those naturally drawn to the one line of poetry became writers of comedies instead of iambs, and those naturally drawn to the other, writers of tragedies instead of epics, because these new modes of art were [5] grander and of more esteem than the old.

If it be asked whether tragedy is now all that it need be in its formative elements, to consider that, and decide it theoretically and in relation to the theatres, is a matter for another inquiry.

It certainly began in improvisations—as did also comedy; the one originating [10] with the authors of the dithyramb, the other with those of the phallic songs, which still survive as institutions in many of our cities. And its advance after that was little by little, through their improving on whatever they had before them at each stage. It was in fact only after a long series of changes that the movement of tragedy stopped on its attaining to its natural form. The number of actors was first increased [15] to two by Aeschylus, who curtailed the business of the

Chorus, and made the dialogue take the leading part in the play. A third actor and scenery were due to Sophocles. Tragedy acquired also its magnitude. Discarding short stories and a ludicrous diction, through its passing out of its satyric stage, it assumed, though [20] only at a late point in its progress, a tone of dignity; and its metre changed then from trochaic to iambic. The reason for their original use of the trochaic tetrameter was that their poetry was satyric and more connected with dancing than it now is. As soon, however, as a spoken part came in, the very nature of the thing found the appropriate metre. The iambic, we know, is the most speakable of metres, as is [25] shown by the fact that we very often fall into it in conversation, whereas we rarely talk hexameters, and only when we depart from the speaking tone of voice. Another change was a plurality of episodes. As for the remaining matters, the embellishments and the account of their introduction, these must be taken as said, as it would [30] probably be a long piece of work to go through the details.

5 · As for comedy, it is (as has been observed) an imitation of men worse than the average; worse, however, not as regards any and every sort of fault, but only as regards one particular kind, the ridiculous, which is a species of the ugly. The ridiculous may be defined as a mistake or deformity not productive of pain or [35] harm to others; the mask, for instance, that excites laughter, is something ugly and distorted without causing pain.

Though the successive changes in tragedy and their authors are not unknown, we cannot say the same of comedy; its early stages passed unnoticed, because it was not as yet taken up in a serious way. It was only at a late point in its progress that a chorus of comedians was officially granted by the archon; they used to be mere [1449<sup>b</sup>1] volunteers. It had also already certain definite forms at the time when the record of those termed comic poets begins. Who it was who supplied it with masks, or prologues, or a plurality of actors and the like, has remained unknown. The making [5] of plots, however, originated in Sicily; of Athenian poets Crates was the first to drop the comedy of invective and frame stories and plots of a general nature.

Epic poetry, then, has been seen to resemble tragedy to this extent, that of being an imitation of serious subjects in metre. It differs from it, however, in that it [10] is in one kind of verse and in narrative form; and also by its length—which is due to its action having no fixed limit of

time, whereas tragedy endeavours to keep as far as possible within a single circuit of the sun, or something near that. This, I say, is another point of difference between them, though at first the practice in this respect [15] was just the same in tragedies as in epic poems. They differ also in their constituents, some being common to both and others peculiar to tragedy—hence a judge of good and bad in tragedy is a judge of that in epic poetry also. All the parts of an epic are included in tragedy; but those of tragedy are not all of them to be [20] found in the epic.

6 · Reserving hexameter poetry and comedy for consideration hereafter, let us proceed now to the discussion of tragedy; before doing so, however, we must gather up the definition resulting from what has been said. A tragedy, then, is the [25] imitation of an action that is serious and also, as having magnitude, complete in itself; in language with pleasurable accessories, each kind brought in separately in the parts of the work; in a dramatic, not in a narrative form; with incidents arousing pity and fear, wherewith to accomplish its catharsis of such emotions. Here by ‘language with pleasurable accessories’ I mean that with rhythm and harmony; and [30] by ‘the kinds separately’ I mean that some portions are worked out with verse only, and others in turn with song.

As they act the stories, it follows that in the first place the spectacle must be some part of the whole; and in the second melody and diction, these two being the means of their imitation. Here by diction I mean merely this, the composition of the [35] verses; and by melody, what is too completely understood to require explanation. But further: the subject represented also is an action; and the action involves agents, who must necessarily have their distinctive qualities both of character and thought, [1450<sup>a</sup>1] since it is from these that we ascribe certain qualities to their actions, and in virtue of these that they all succeed or fail. Now the action is represented in the play by the plot. The plot, in our present sense of the term, is simply this, the combination of the [5] incidents, or things done in the story; whereas character is what makes us ascribe certain qualities to the agents; and thought is shown in all they say when proving a particular point or, it may be, enunciating a general truth. There are six parts consequently of every tragedy, that make it the sort of tragedy it is, viz. a plot, [10] characters, diction, thought, spectacle, and melody; two of them arising from the means, one from the manner, and three from the objects of the dramatic imitation; and there is nothing else besides these

six. Of these, its formative elements, then, not a few of the dramatists have made due use, as every play, one may say, admits of spectacle, character, plot, diction, melody, and thought.<sup>3</sup>

[15] The most important of the six is the combination of the incidents of the story. Tragedy is essentially an imitation not of persons but of action and life. [All human happiness or misery takes the form of action; the end for which we live is a certain kind of activity, not a quality. Character gives us qualities, but it is in our actions [20] that we are happy or the reverse.]<sup>4</sup> In a play accordingly they do not act in order to portray the characters; they include the characters for the sake of the action. So that it is the action in it, i.e. its plot, that is the end and purpose of the tragedy; and the end is everywhere the chief thing. Besides this, a tragedy is impossible without action, but there might be one without Character. The tragedies of most of the moderns are characterless—a characteristic common among poets of all kinds, and [25] with its counterpart in painting in Zeuxis as compared with Polygnotus; for whereas the latter is strong in character, the work of Zeuxis is devoid of it. And again: one may string together a series of characteristic speeches of the utmost finish as regards diction and thought, and yet fail to produce the true tragic effect; but one [30] will have much better success with a tragedy which, however inferior in these respects, has a plot, a combination of incidents, in it. And again: the most powerful elements of attraction in Tragedy, the peripeties and discoveries, are parts of the plot. A further proof is in the fact that beginners succeed earlier with the diction [35] and characters than with the construction of a story; and the same may be said of nearly all the early dramatists. We maintain, therefore, that the first essential, the life and soul, so to speak, of tragedy is the plot; and that the characters come second—compare the parallel in painting, where the most beautiful colours laid on [1450<sup>b</sup>1] without order will not give one the same pleasure as a simple black-and-white sketch of a portrait. We maintain that tragedy is primarily an imitation of action, and that it is mainly for the sake of the action that it imitates the personal agents. Third comes the element of thought, i.e. the power of saying whatever can be said, [5] or what is appropriate to the occasion. This is what, in the speeches in tragedy, falls under the arts of politics and rhetoric; for the older poets make their personages discourse like statesmen, and the moderns like orators. One must not confuse it with character. Character in a play is that which reveals the choice of the agents—hence there is no room for character in a speech on a purely indifferent subject. Thought, [10] on the other hand, is shown in all they

say when proving or disproving some particular point, or enunciating some universal proposition. Fourth among the literary elements<sup>5</sup> is the diction of the personages, i.e., as before explained, the expression of their thoughts in words, which is practically the same thing with verse as with prose. As for the two remaining parts, the Melody is the greatest of the [15] pleasurable accessories of Tragedy. The spectacle, though an attraction, is the least artistic of all the parts, and has least to do with the art of poetry. The tragic effect is quite possible without a public performance and actors; and besides, the getting-up of the spectacle is more a matter for the designer than the poet. [20]

7 · Having thus distinguished the parts, let us now consider the proper construction of the plot, as that is at once the first and the most important thing in tragedy. We have laid it down that a tragedy is an imitation of an action that is complete in itself, as a whole of some magnitude; for a whole may be of no [25] magnitude to speak of. Now a whole is that which has beginning, middle, and end. A beginning is that which is not itself necessarily after anything else, and which has naturally something else after it; an end is that which is naturally after something itself, either as its necessary or usual consequent, and with nothing else after it; and [30] a middle, that which is by nature after one thing and has also another after it. A well-constructed plot, therefore, cannot either begin or end at any point one likes; beginning and end in it must be of the forms just described. Again: to be beautiful, a [35] living creature, and every whole made up of parts, must not only present a certain order in its arrangement of parts, but also be of a certain definite magnitude. Beauty is a matter of size and order, and therefore impossible either in a very minute creature, since our perception becomes indistinct as it approaches instantaneity; or in a creature of vast size—one, say, 1,000 miles long—as in that case, [1451<sup>a</sup>1] instead of the object being seen all at once, the unity and wholeness of it is lost to the beholder. Just in the same way, then, as a beautiful whole made up of parts, or a beautiful living creature, must be of some size, but a size to be taken in by the eye, [5] so a story or plot must be of some length, but of a length to be taken in by the memory. As for the limit of its length, so far as that is relative to public performances and spectators, it does not fall within the theory of poetry. If they had to perform a hundred tragedies, they would be timed by water-clocks, as they are said to have been at one period.<sup>6</sup> The limit, however, set by the actual nature of the [10] thing is this: the longer the story, consistently with its being comprehensible as a whole, the finer it is



by reason of its magnitude. As a rough general formula, a length which allows of the hero passing by a series of probable or necessary stages from bad fortune to good, or from good to bad, may suffice as a limit for the [15] magnitude of the story.

8 · The unity of a plot does not consist, as some suppose, in its having one man as its subject. An infinity of things befall that one man, some of which it is impossible to reduce to unity; and in like manner there are many actions of one man which cannot be made to form one action. One sees, therefore, the mistake of all the [20] poets who have written a *Heracleid*, a *Theseid*, or similar poems; they suppose that, because Heracles was one man, the story also of Heracles must be one story. Homer, however, evidently understood this point quite well, whether by art or instinct, just in the same way as he excels the rest in every other respect. In writing [25] an *Odyssey*, he did not make the poem cover all that ever befell his hero—it befell him, for instance, to get wounded on Parnassus and also to feign madness at the time of the call to arms, but the two incidents had no necessary or probable connexion with one another—instead of doing that, he took as the subject of the *Odyssey*, as also of the *Iliad*, an action with a unity of the kind we are describing. [30] The truth is that, just as in the other imitative arts one imitation is always of one thing, so in poetry the story, as an imitation of action, must represent one action, a complete whole, with its several incidents so closely connected that the transposition or withdrawal of any one of them will disjoin and dislocate the whole. For that [35] which makes no perceptible difference by its presence or absence is no real part of the whole.

9 · From what we have said it will be seen that the poet's function is to describe, not the thing that has happened, but a kind of thing that might happen, i.e. what is possible as being probable or necessary. The distinction between historian and poet is not in the one writing prose and the other verse—you might put the work [1451<sup>b</sup>1] of Herodotus into verse, and it would still be a species of history; it consists really in this, that the one describes the thing that has been, and the other a kind of thing that might be. Hence poetry is something more philosophic and of graver import than [5] history, since its statements are of the nature rather of universals, whereas those of history are singulars. By a universal statement I mean one as to what such or such a kind of man will probably

or necessarily say or do—which is the aim of poetry, though it affixes proper names to the characters; by a singular statement, one as to [10] what, say, Alcibiades did or had done to him. In comedy this has become clear by this time; it is only when their plot is already made up of probable incidents that they give it a basis of proper names, choosing for the purpose any names that may occur to them, instead of writing like the old iambic poets about particular persons. In Tragedy, however, they still adhere to the historic names; and for this reason: [15] what convinces is the possible; now whereas we are not yet sure as to the possibility of that which has not happened, that which has happened is manifestly possible, otherwise it would not have happened. Nevertheless even in tragedy there are some plays with but one or two known names in them, the rest being inventions; and there [20] are some without a single known name, e.g. Agathon's *Antheus*, in which both incidents and names are of the poet's invention; and it is no less delightful on that account. So that one must not aim at a rigid adherence to the traditional stories on which tragedies are based. It would be absurd, in fact, to do so, as even the known [25] stories are only known to a few, though they are a delight none the less to all.

It is evident from the above that the poet must be more the poet of his plots than of his verses, inasmuch as he is a poet by virtue of the imitative element in his work, and it is actions that he imitates. And if he should come to take a subject from actual history, he is none the less a poet for that; since some historic occurrences [30] may very well be in the probable order of things; and it is in that aspect of them that he is their poet.

Of simple plots and actions the episodic are the worst. I call a plot episodic when there is neither probability nor necessity in the sequence of its episodes. [35] Actions of this sort bad poets construct through their own fault, and good ones on account of the players. His work being for public performance, a good poet often stretches out a plot beyond its capabilities, and is thus obliged to twist the sequence [1452<sup>a</sup>1] of incident.

Tragedy, however, is an imitation not only of a complete action, but also of incidents arousing pity and fear. Such incidents have the very greatest effect on the mind when they occur unexpectedly and at the same time in consequence of one another; there is more of the marvellous in them than if they happened of [5] themselves or by mere chance. Even matters of chance seem most marvellous if there is an appearance of design as it were in them; as for instance the statue of Mitys at Argos

killed the author of Mity's death by falling down on him when he was looking at it; for incidents like that we think to be not without a meaning. A plot, therefore, of this sort is necessarily finer than others. [10]

10 · Plots are either simple or complex, since the actions they represent are naturally of this twofold description. The action, proceeding in the way defined, as [15] one continuous whole, I call simple, when the change in the hero's fortunes takes place without reversal or discovery; and complex, when it involves one or the other, or both. These should each of them arise out of the structure of the plot itself, so as [20] to be the consequence, necessary or probable, of the antecedents. There is a great difference between a thing happening *propter hoc* and *post hoc*.

11 · A reversal of fortune is the change of the kind described from one state of things within the play to its opposite, and that too as we say, in the probable or necessary sequence of events; as it is for instance in *Oedipus*: here the opposite state [25] of things is produced by the Messenger, who, coming to gladden Oedipus and to remove his fears as to his mother, reveals the secret of his birth. And in *Lynceus*: just as he is being led off for execution, with Danaus at his side to put him to death, the incidents preceding this bring it about that he is saved and Danaus put to death. [30] A discovery is, as the very word implies, a change from ignorance to knowledge, and thus to either love or hate, in the personages marked for good or evil fortune. The finest form of discovery is one attended by reversal, like that which goes with the discovery in *Oedipus*. There are no doubt other forms of it; what we have said may [35] happen in a way<sup>7</sup> in reference to inanimate things, even things of a very casual kind; and it is also possible to discover whether some one has done or not done something. But the form most directly connected with the plot and the action of the piece is the first-mentioned. This, with a reversal, will arouse either pity or fear—actions of [1452<sup>b</sup>1] that nature being what tragedy is assumed to represent; and it will also serve to bring about the happy or unhappy ending. The discovery, then, being of persons, it may be that of one party only to the other, the latter being already known; or both [5] the parties may have to discover each other. Iphigenia, for instance, was discovered to Orestes by sending the letter; and another discovery was required to reveal him to Iphigenia.

[10] Two parts of the plot, then, reversal and discovery, are on matters of this sort. A third part is suffering; which we may define as an

action of a destructive or painful nature, such as murders on the stage, tortures, woundings, and the like. The other two have been already explained.

12 · The parts of tragedy to be treated as formative elements in the whole [15] were mentioned in a previous chapter. From the point of view, however, of its quantity, i.e. the separate sections into which it is divided, a tragedy has the following parts: prologue, episode, exode, and a choral portion, distinguished into parode and stasimon; these two are common to all tragedies, whereas songs from the stage and *Commoe* are only found in some. The prologue is all that precedes the [20] parode of the chorus; an episode all that comes in between two whole choral songs; the exode all that follows after the last choral song. In the choral portion the parode is the whole first statement of the chorus; a stasimon, a song of the chorus without anapaests or trochees; a *Commos*, a lamentation sung by chorus and actor in concert. The parts of tragedy to be used as formative elements in the whole we have [25] already mentioned; the above are its parts from the point of view of its quantity, or the separate sections into which it is divided.

13 · The next points after what we have said above will be these: what is the poet to aim at, and what is he to avoid, in constructing his plots? and what are the conditions on which the tragic effect depends? [30]

We assume that, for the finest form of tragedy, the plot must be not simple but complex; and further, that it must imitate actions arousing fear and pity, since that is the distinctive function of this kind of imitation. It follows, therefore, that there are three forms of plot to be avoided. A good man must not be seen passing from good fortune to bad, or a bad man from bad fortune to good. The first situation is [35] not fear-inspiring or piteous, but simply odious to us. The second is the most untragic that can be; it has no one of the requisites of tragedy; it does not appeal either to the human feeling in us, or to our pity, or to our fears. Nor, on the other [1453<sup>a</sup>1] hand, should an extremely bad man be seen falling from good fortune into bad. Such a story may arouse the human feeling in us, but it will not move us to either pity or fear; pity is occasioned by undeserved misfortune, and fear by that of one like ourselves; so that there will be nothing either piteous or fear-inspiring in the [5] situation. There remains, then, the intermediate kind of

personage, a man not preeminently virtuous and just, whose misfortune, however, is brought upon him not by vice and depravity but by some fault, of the number of those in the enjoyment [10] of great reputation and prosperity; e.g. Oedipus, Thyestes, and the men of note of similar families. The perfect plot, accordingly, must have a single, and not (as some tell us) a double issue; the change in the subject's fortunes must be not from bad fortune to good, but on the contrary from good to bad; and the cause of it must lie [15] not in any depravity, but in some great fault on his part; the man himself being either such as we have described, or better, not worse, than that. Fact also confirms our theory. Though the poets began by accepting any tragic story that came to hand, in these days the finest tragedies are always on the story of some few houses, on that of Alcmeon, Oedipus, Orestes, Meleager, Thyestes, Telephus, or any others [20] that may have been involved, as either agents or sufferers, in some deed of horror. The theoretically best tragedy, then, has a plot of this description. The critics, therefore, are wrong who blame Euripides for taking this line in his tragedies, and giving many of them an unhappy ending. It is, as we have said, the right line to take. [25] The best proof is this: on the stage, and in the public performances, such plays, properly worked out, are seen to be the most truly tragic; and Euripides, even if his execution be faulty in every other point, is seen to be nevertheless the most tragic certainly of the dramatists. After this comes the construction of plot which some [30] rank first, one with a double story (like the *Odyssey*) and an opposite issue for the good and the bad personages. It is ranked as first only through the weakness of the audiences; the poets merely follow their public, writing as its wishes dictate. But the [35] pleasure here is not that of tragedy. It belongs rather to comedy, where the bitterest enemies in the piece (e.g. Orestes and Aegisthus) walk off good friends at the end, with no slaying of any one by any one.

[1453<sup>b</sup>1] **14** · The tragic fear and pity may be aroused by the spectacle; but they may also be aroused by the very structure and incidents of the play—which is the better way and shows the better poet. The plot in fact should be so framed that, even without seeing the things take place, he who simply hears the account of them shall [5] be filled with horror and pity at the incidents; which is just the effect that the mere recital of the story in *Oedipus* would have on one. To produce this same effect by means of the spectacle is less artistic, and requires extraneous aid. Those, however, who make use of the spectacle to put before us that which is merely monstrous and [10] not productive of fear,

are wholly out of touch with tragedy; not every kind of pleasure should be required of a tragedy, but only its own proper pleasure.

The tragic pleasure is that of pity and fear, and the poet has to produce it by a work of imitation; it is clear, therefore, that the causes should be included in the incidents of his story. Let us see, then, what kinds of incident strike one as horrible, [15] or rather as piteous. In a deed of this description the parties must necessarily be either friends, or enemies, or indifferent to one another. Now when enemy does it on enemy, there is nothing to move us to pity either in his doing or in his meditating the deed, except so far as the actual pain of the sufferer is concerned; and the same is true when the parties are indifferent to one another. Whenever the tragic deed, however, is done among friends—when murder or the like is done or meditated by [20] brother on brother, by son on father, by mother on son, or son on mother—these are the situations the poet should seek after. The traditional stories, accordingly, must be kept as they are, e.g. the murder of Clytaemnestra by Orestes and of Eriphyle by [25] Alcmeon. At the same time even with these there is something left to the poet himself; it is for him to devise the right way of treating them. Let us explain more clearly what we mean by ‘the right way’. The deed of horror may be done by the doer knowingly and consciously, as in the old poets, and in Medea’s murder of her [30] children in Euripides. Or he may do it, but in ignorance of his relationship, and discover that afterwards, as does the Oedipus in Sophocles. Here the deed is outside the play; but it may be within it, like the act of the Alcmeon in Astydamos, or that of the Telegonus in *Ulysses Wounded*. A third possibility is for one meditating some [35] deadly injury to another, in ignorance of his relationship, to make the discovery in time to draw back. These exhaust the possibilities, since the deed must necessarily be either done or not done, and either knowingly or unknowingly.

The worst situation is when the personage is with full knowledge on the point of doing the deed, and leaves it undone. It is odious and also (through the absence of suffering) untragic; hence it is that no one is made to act thus except in some few [1454<sup>a</sup>1] instances, e.g. Haemon and Creon in *Antigone*. Next after this comes the actual perpetration of the deed meditated. A better situation than that, however, is for the deed to be done in ignorance, and the relationship discovered afterwards, since there is nothing odious in it, and the discovery will serve to astound us. But the best of all [5] is the last; what we have in *Cresphontes*, for example, where Merope, on the point of slaying her son, recognizes him

in time; in *Iphigenia*, where sister and brother are in a like position; and in *Helle*, where the son recognizes his mother, when on the point of giving her up to her enemy.

This will explain why our tragedies are restricted (as we said just now) to such a small number of families. It was accident rather than art that led the poets in [10] quest of subjects to embody this kind of incident in their plots. They are still obliged, accordingly, to have recourse to the families in which such honours have occurred.

On the construction of the plot, and the kind of plot required for tragedy, enough has now been said. [15]

15 · In the characters there are four points to aim at. First and foremost, that they shall be good. There will be an element of character in the play, if (as has been observed) what a personage says or does reveals a certain choice; and a good element of character, if the purpose so revealed is good. Such goodness is possible in every type of personage, even in a woman or a slave, though the one is perhaps an [20] inferior, and the other a wholly worthless being. The second point is to make them appropriate. The character before us may be, say, manly; but it is not appropriate in a female character to be manly, or clever. The third is to make them like the reality, which is not the same as their being good and appropriate, in our sense of the term. [25] The fourth is to make them consistent and the same throughout; even if inconsistency be part of the man before one for imitation as presenting that form of character, he should still be consistently inconsistent. We have an instance of baseness of character, not required for the story, in the Menelaus in *Orestes*; of the incongruous and unbecoming in the lamentation of Ulysses in *Scylla*, and in the [30] speech of Melanippe; and of inconsistency in *Iphigenia at Aulis*, where Iphigenia the suppliant is utterly unlike the later Iphigenia. The right thing, however, is in the characters just as in the incidents of the play to seek after the necessary or the probable; so that whenever such-and-such a personage says or does such-and-such a [35] thing, it shall be the necessary or probable outcome of his character; and whenever this incident follows on that, it shall be either the necessary or the probable consequence of it. From this one sees that the dénouement also should arise out of the plot itself, and not depend on a stage-artifice, as in *Medea* or in the story of the [1454<sup>b</sup>1] departure of the Greeks in the *Iliad*. The artifice must be reserved for matters outside the play—for past events beyond human knowledge, or events yet to come, which require to be

foretold or announced; since it is the privilege of the gods to [5] know everything. There should be nothing improbable among the actual incidents. If it be unavoidable, however, it should be outside the tragedy, like the improbability in the *Oedipus* of Sophocles. As tragedy is an imitation of personages better than the ordinary man, we should follow the example of good portrait-painters, who reproduce the distinctive features of a man, and at the same time, without losing the [10] likeness, make him handsomer than he is. The poet in like manner, in portraying men quick or slow to anger, or with similar infirmities of character, must know how to represent them as such, and at the same time as good men .

..<sup>8</sup>

All these rules one must keep in mind throughout, and, further, those also for [15] such points of stage-effect as directly depend on the art of the poet, since in these too one may often make mistakes. Enough, however, has been said on the subject in one of our published writings.

16 · Discovery in general has been explained already. As for the species of [20] discovery, the first to be noted is the least artistic form of it, of which the poets make most use through mere lack of invention, discovery by signs. Of these signs some are congenital, like the ‘lance-head which the Earth-born have on them’ or ‘stars’, such as Carcinus brings in his *Thyestes*; others acquired after birth—these latter being either marks on the body, e.g. scars, or external tokens, like necklaces, or the boat in [25] the discovery in *Tyro*. Even these, however, admit of two uses, a better and a worse; the scar of Ulysses is an instance; the discovery of him through it is made in one way by the nurse and in another by the swineherds. A discovery using signs as a means of assurance is less artistic, as indeed are all such as imply reflection; [30] whereas one bringing them in all of a sudden, as in the *Bath-story*, is of a better order. Next after these are discoveries made directly by the poet; which are inartistic for that very reason; e.g. Orestes’ discovery of himself in *Iphigenia*: whereas his sister reveals who she is by the letter, Orestes is made to say himself what the poet rather than the story demands. This, therefore, is not far removed [35] from the first-mentioned fault, since he might have presented certain tokens as well. Another instance is the voice of the shuttle in the *Tereus* of Sophocles. A third species is discovery through memory, from a man’s consciousness being awakened [1455<sup>a</sup>1] by something seen. Thus in *The Cypriote* of Dicaeogenes, the sight of the picture makes the man burst into tears; and in the *Tale of Alcinous*,



hearing the harper Ulysses is reminded of the past and weeps; the discovery of them being the result. A fourth kind of discovery through reasoning; e.g. in *The Choephores*; 'One like me is [5] here; there is no one like me but Orestes; he, therefore, must be here'. Or that which Polyidus the Sophist suggested for *Iphigenia*; since it was natural for Orestes to reflect: 'My sister was sacrificed and I am to be sacrificed like her'. Or that in the *Tydeus* of Theodectes: 'I came to find a son, and am to die myself. Or that in *The Phinidae*: [10] on seeing the place the women inferred their fate, that they were to die there, since they had also been exposed there. There is, too, a composite discovery arising from bad reasoning on the part of the audience. An instance of it is in *Ulysses the False Messenger*: that he stretched the bow and no one else did was invented by the poet and part of the argument, and so too that he said he would [15] recognize the bow which he had not seen; but to suppose from that that he would know it again was bad reasoning. The best of all discoveries, however, is that arising from the incidents themselves, when the great surprise comes about through a probable incident, like that in the *Oedipus* of Sophocles; and also in *Iphigenia*; for it was probable that she should wish to have a letter taken home. These last are the [20] only discoveries independent of the artifice of signs and necklaces. Next after them come discoveries through reasoning.

17 · At the time when he is constructing his plots, and engaged on the diction in which they are worked out, the poet should remember to put the actual scenes as far as possible before his eyes. In this way, seeing everything with the vividness of an eye-witness as it were, he will devise what is appropriate, and be least [25] likely to overlook incongruities. This is shown by what was censured in Carcinus, the return of Amphiaraus from the sanctuary; it would have passed unnoticed, if it had not been actually seen; but on the stage his play failed, the incongruity of the incident offending the spectators. As far, as may be, too, the poet should even act his story with the very gestures of his personages. Given the same natural qualifications, he who feels the emotions to be described will be the most convincing; distress [30] and anger, for instance, are portrayed most truthfully by one who is feeling them at the moment. Hence it is that poetry demands a man with a special gift for it, or else one with a touch of madness in him; the former can easily assume the required mood, and the latter may be actually beside himself with emotion. His story, again, whether already made or of his own making, he should first simplify and reduce to a universal form, before proceeding

to lengthen it out by the insertion of episodes. The [1455<sup>b</sup>1] following will show how the universal element in *Iphigenia*, for instance, may be viewed: a certain maiden having been offered in sacrifice, and spirited away from her sacrificers into another land, where the custom was to sacrifice all strangers to [5] the Goddess, she was made there the priestess of this rite. Long after that the brother of the priestess happened to come; the fact, however, of the oracle having bidden him go there, and his object in going, are outside the plot of the play. On his coming he was arrested, and about to be sacrificed, when he revealed who he was—either as Euripides puts it, or (as suggested by Polyidus) by the not [10] improbable exclamation, ‘So I too am doomed to be sacrificed, as my sister was’; and the disclosure led to his salvation. This done, the next thing, after the proper names have been fixed as a basis for the story, is to turn it into episodes. One must ensure, however, that the episodes are appropriate, like the fit of madness in *Orestes*, which led to his arrest, and the purifying, which brought about his [15] salvation. In plays, then, the episodes are short; in epic poetry they serve to lengthen out the poem. The argument of the *Odyssey* is not a long one. A certain man has been abroad many years; Poseidon is ever on the watch for him, and he is all alone. Matters at home too have come to this, that his substance is being wasted and his son’s death plotted by suitors to his wife. Then he arrives there himself after his [20] grievous sufferings; reveals himself, and falls on his enemies; and the end is his salvation and their death. This being all that is proper to the *Odyssey*, everything else in it is episode.

18 · Every tragedy is in part complication and in part dénouement; the incidents before the opening scene, and often certain also of those within the play, [25] forming the complication; and the rest the dénouement. By complication I mean all from the beginning of the story to the point just before the change in the subject’s fortunes; by dénouement, all from the beginning of the change to the end. In the *Lynceus* of Theodectes, for instance, the complication includes, together with the [30] presupposed incidents, the seizure of the child and that in turn of the parents . . .<sup>9</sup> and the dénouement all from the indictment for the murder to the end. There are four distinct species of Tragedy—that being the number of the constituents also that have been mentioned: first, the complex tragedy, which is all reversal and discovery; second, the tragedy of suffering, e.g. the *Ajaxes* and *Ixions*; third, the [1456<sup>a</sup>1] tragedy of character, e.g. *The Phthiotides* and *Peleus*. The fourth constituent is that of . . .<sup>10</sup> exemplified in *The Phorcides*, in *Prometheus*,

and in all plays with the scene laid in the nether world. Now it is right, when one speaks of a tragedy as the same or not the same as another, to do so on the ground before all else of their plot, i.e. as having the same or not the same complication and dénouement. Yet there are many dramatists who, after a good complication, fail in the dénouement. But it is necessary for both points of construction to be always duly mastered. The poet's aim, then, should be to combine every element of interest, if possible, or else the more important and the major part of them. This is now especially necessary owing [5] to the unfair criticism to which the poet is subjected in these days. Just because there have been poets before him strong in the several species of tragedy, the critics now expect the one man to surpass that which was the strong point of each one of his [10] predecessors. One should also remember what has been said more than once, and not write a tragedy on an epic body of incident (i.e. one with a plurality of stories in it), by attempting to dramatize, for instance, the entire story of the *Iliad*. In the epic owing to its scale every part is treated at proper length; with a drama, however, on [15] the same story the result is very disappointing. This is shown by the fact that all who have dramatized the fall of Ilium in its entirety, and not part by part, like Euripides, or the whole of the Niobe story, instead of a portion, like Aeschylus, either fail utterly or have little success on the stage; for that and that alone was enough to ruin even a play by Agathon. Yet in their reversals of fortune, as also in their simple [20] plots, the poets I mean show wonderful skill in aiming at the kind of effect they desire—a tragic situation that arouses the human feeling in one, like the clever villain (e.g. Sisyphus) deceived, or the brave wrongdoer worsted. This is probable, however, only in Agathon's sense, when he speaks of the probability of even [25] improbabilities coming to pass. The Chorus too should be regarded as one of the actors; it should be an integral part of the whole, and take a share in the action—that which it has in Sophocles, rather than in Euripides. With the later poets, however, the songs in a play of theirs have no more to do with the plot of that than of any other tragedy. Hence it is that they are now singing inserted pieces, a [30] practice first introduced by Agathon. And yet what real difference is there between singing such inserted pieces, and attempting to fit in a speech, or even a whole act, from one play into another?

19 · The plot and characters having been discussed, it remains to consider the diction and thought. As for the thought, we may assume what is said of it in our [35] Art of Rhetoric, as it belongs more properly

to that department of inquiry. The thought of the personages is shown in everything to be effected by their language—in [1456<sup>b</sup>1] every effort to prove or disprove, to arouse emotion (pity, fear, anger, and the like), or to maximize or minimize things. It is clear, also, that their mental procedure must be on the same lines in their actions likewise, whenever they wish them to arouse pity or horror, or to have a look of importance or probability. The only difference is that with the act the impression has to be made without [5] explanation; whereas with the spoken word it has to be produced by the speaker, and result from his language. What, indeed, would be the good of the speaker, if things appeared in the required light even apart from anything he said?

As regards the diction, one subject for inquiry under this head is the turns given to the language when spoken; e.g. the difference between command and prayer, simple statement and threat, question and answer, and so forth. The theory of such matters, however, belongs to acting and the professors of that art. Whether [10] the poet knows these things or not, his art as a poet is never seriously criticized on that account. What fault can one see in Homer's 'Sing of the wrath, Goddess'?— which Protagoras has criticized as being a command where a prayer was meant, [15] since to bid one do or not do, he tells us, is a command. Let us pass over this, then, as appertaining to another art, and not to that of poetry.

**20** · The diction viewed as a whole is made up of the following parts: the [20] letter, the syllable, the conjunction, the article, the noun, the verb, the case, and the speech. The letter is an indivisible sound of a particular kind, one that may become a factor in a compound sound. Indivisible sounds are uttered by the brutes also, but no one of these is a letter in our sense of the term. These elementary sounds are either vowels, semivowels, or mutes. A vowel is a letter having an audible sound [25] without the addition of another letter. A semivowel, one having an audible sound by the addition of another letter; e.g. S and R. A mute, one having no sound at all by itself, but becoming audible by an addition, that of one of the letters which have a sound of some sort of their own; e.g. G and D. The letters differ in various ways: as [30] produced by different conformations or in different regions of the mouth; as aspirated or not aspirated; as long, short, or of variable quantity; and further as having an acute, grave, or intermediate accent. The details of these matters we must leave to the students of metre. A syllable is a non-significant composite sound, made [35] up of a mute and a letter having

a sound; for GR, without an A, is just as much a syllable as GRA, with an A.<sup>11</sup> The various forms of the syllable also belong to the theory of metre. A conjunction is a non-significant sound which, when one significant sound is formable out of several, neither hinders nor aids the union, and [1457<sup>a</sup>1] which naturally stands both at the end and in the middle but must not be inserted at the beginning; e.g. μέν, or δέ. Or a non-significant sound which naturally makes one significant sound out of several significant sounds. An article is a non-significant [5] sound marking the beginning, end, or dividing-point of a sentence, its natural place being either at the extremities or in the middle. E.g. ἀμφί, περί etc. Or a non-significant sound which neither prevents nor makes a single significant sound out of several, and which is naturally placed both at the end and in the middle.<sup>12</sup> A [10] noun or name is a composite significant sound not involving the idea of time, with parts which have no significance by themselves in it. It is to be remembered that in a compound we do not think of the parts as having a significance also by themselves; in the name 'Theodorus', for instance, the δῶρος means nothing. A verb is a [15] composite significant sound involving the idea of time, with parts which (just as in the noun) have no significance by themselves in it. Whereas the word 'man' or 'white' does not signify a time 'he walks' and 'he has walked' involve in addition to the idea of walking that of time present or time past. A case of a noun or verb is [20] when the word means 'of or 'to' a thing, and so forth, or for one or many (e.g. 'man' and 'men'); or it may consist merely in the mode of utterance, e.g. in question, command, etc. 'Did he walk?' and 'Walk!' are cases of the verb 'to walk' of this last kind. A sentence is a composite significant sound, some of the parts of which have a certain significance by themselves. It may be observed that a sentence is not always [25] made up of noun and verb; it may be without a verb, like the definition of man; but it will always have some part with a certain significance by itself. In the sentence 'Cleon walks', 'Cleon' is an instance of such a part. A sentence is said to be one in two ways, either as signifying one thing, or as a union of several speeches made into one by conjunction. Thus the *Iliad* is one speech by conjunction of several; and the [30] definition of man is one through its signifying one thing.

**21** · Nouns are of two kinds, either simple, i.e. made up of non-significant parts, like the word earth, or double; in the latter case the word may be made up either of a significant and a non-significant part (a distinction which disappears in the compound), or of two significant

parts. It is possible also to have triple, quadruple, or higher compounds, like many of the names of people from Massalia: e.g. 'Hermocaïcoxanthus' and the like.

[1457<sup>b</sup>1] Whatever its structure, a noun must always be either the ordinary word for the thing, or a strange word, or a metaphor, or an ornamental word, or a coined word, or a word lengthened out, or curtailed, or altered in form. By the ordinary word I mean that in general use in a country; and by a strange word, one in use elsewhere. So that [5] the same word may obviously be at once strange and ordinary, though not in reference to the same people; σίγυρον, for instance, is an ordinary word in Cyprus, and a strange word with us. Metaphor consists in giving the thing a name that belongs to something else; the transference being either from genus to species, or from species to genus, or from species to species, or on grounds of analogy. That [10] from genus to species is exemplified in 'Here stands my ship'; for lying at anchor is a sort of standing. That from species to genus in 'Truly ten thousand good deeds has Ulysses wrought', where 'ten thousand', which is a particular large number, is put in place of the generic 'a large number'. That from species to species in 'Drawing the life with the bronze,' and in 'Severing with the enduring bronze'; where the poet [15] uses 'draw' in the sense of 'sever' and 'sever' in that of 'draw', both words meaning to 'take away' something. That from analogy is possible whenever there are four terms so related that the second is to the first, as the fourth to the third; for one may then put the fourth in place of the second, and the second in place of the fourth. Now and then, too, they qualify the metaphor by adding on to it that to which the word it supplants is relative. Thus a cup is in relation to Dionysus what a shield is to [20] Ares. The cup accordingly will be described as the 'shield of Dionysus' and the shield as the 'cup of Ares'. Or to take another instance: As old age is to life, so is evening to day. One will accordingly describe evening as the 'old age of the day'—or by the Empedoclean equivalent; and old age as the 'evening' or 'sunset of life'. It may be that some of the terms thus related have no special name of their own, but [25] for all that they will be described in just the same way. Thus to cast forth seed-corn is called 'sowing'; but to cast forth its flame, as said of the sun, has no special name. This nameless act, however, stands in just the same relation to its object, sunlight, as sowing to the seed-corn. Hence the expression in the poet, 'sowing around a god-created flame'. There is also another form of qualified metaphor. Having given [30] the thing the alien name, one may by a negative addition deny of it one of the attributes naturally associated with its new name. An instance

of this would be to call the shield not the ‘cup of Ares’, as in the former case, but a ‘cup that holds no wine’ . . . <sup>13</sup> A coined word is a name which, being quite unknown among a people, is given by the poet himself; e.g. (for there are some words that seem to be of this origin) ἔρυσυγες for horns, and ἀρητήρ for priest. A word is said to be lengthened out, [1458<sup>a</sup>1] when it has a short vowel made long, or an extra syllable inserted; e.g. πόλῃος for πόλεως, Πηλιδάδεω for Πηλείδου. It is said to be curtailed, when it has lost a part; e.g. κρῖ, δῶ, and ὄψ in μία γίνεται ἀμφοτέρων ὄψ. It is an altered word, when part is left as [5] it was and part is of the poet’s making; e.g. δεξιτερόν for δεξιόν, in δεξιτερόν κατὰ μαζόν.

The nouns themselves are either masculines, feminines, or intermediates. All ending in N, P, Σ, or in the two compounds of this last, Ψ and Ξ, are masculines. All [10] ending in the invariably long vowels, H and Ω, and in A among the vowels that may be long, are feminines. So that there is an equal number of masculine and feminine terminations, as Ψ and Ξ are the same as Σ. There is no noun, however, ending in a mute or in a short vowel. Only three (μέλι, κόμμι, πέπερι) end in I, and five in Y. . . . <sup>14</sup> [15] The intermediates end in the variable vowels or in N, P, Σ.

**22** · The excellence of diction is for it to be at once clear and not mean. The clearest indeed is that made up of the ordinary words for things, but it is mean, as is shown by the poetry of Cleophon and Sthenelus. On the other hand the diction [20] becomes distinguished and non-prosaic by the use of unfamiliar terms, i.e. strange words, metaphors, lengthened forms, and everything that deviates from the ordinary modes of speech. But a whole statement in such terms will be either a riddle or a barbarism, a riddle, if made up of metaphors, a barbarism, if made up of [25] strange words. The very nature indeed of a riddle is this, to describe a fact in an impossible combination of words (which cannot be done with a combination of other names, but can be done with a combination of metaphors); e.g. ‘I saw a man glue brass on another with fire’, and the like. The corresponding use of strange words [30] results in a barbarism. A certain admixture, accordingly, of unfamiliar terms is necessary. These, the strange word, the metaphor, the ornamental equivalent, etc., will save the language from seeming mean and prosaic, while the ordinary words in it will secure the requisite clearness. What helps most, however, to render the [1458<sup>b</sup>1] diction at once clear and non-prosaic is the use of the lengthened, curtailed, and altered forms of words. Their deviation from

the ordinary words will, by making the language unlike that in general use, give it a non-prosaic appearance; and their having much in common with the words in general use will give it the quality of [5] clearness. It is not right, then, to condemn these modes of speech, and ridicule the poet for using them, as some have done; e.g. the elder Euclid, who said it was easy to make poetry if one were to be allowed to lengthen words as much as one likes—a procedure he caricatured by reading Ἐπιχάρην εἶδον Μαραθῶνάδε βαδίζοντα, and [10] οὐκ ἴαν γεράμενος τὸν ἐκείνου ἐλλέβορον as verses. A too apparent use of these licences has certainly a ludicrous effect, but they are not alone in that; the rule of moderation applies to all the constituents of the poetic vocabulary; even with metaphors, strange words, and the rest, the effect will be the same, if one uses them improperly and with a view of provoking laughter. The proper use of them is a very [15] different thing. To realize the difference one should take an epic verse and see how it reads when the normal words are introduced. The same should be done too with the strange word, the metaphor, and the rest; for one has only to put the ordinary words in their place to see the truth of what we are saying. The same iambic, for [20] instance, is found in Aeschylus and Euripides, and as it stands in the former it is a poor line; whereas Euripides, by the change of a single word, the substitution of a strange for what is by usage the ordinary word, has made it seem a fine one. Aeschylus having said in his *Philoctetes*:

φαγέδαιναν ἥ μου σάρκας ἐσθίει ποδός,

Euripides has merely altered the ἐσθίει here into θοινᾷται. Or suppose

[25] νῦν δέ μ' ἐὼν ὀλίγος τε καὶ οὔτιδανός καὶ ἀεικῆς

to be altered, by the substitution of the ordinary words, into

νῦν δέ μ' ἐὼν μικρός τε καὶ ἀσθενικός καὶ ἀειδῆς

Or the line

δίφρον ἀεικέλιον καταθείς ὀλίγην τε τράπεζαν

into

[30] δίφρον μοχθηρόν καταθείς μικράν τε τράπεζαν.

Or ἡιόνες βοόωσιν into ἡιόνες κρίζουσιν. Add to this that Aripbrates



used to ridicule the tragedians for introducing expressions unknown in the language of common life, [1459<sup>a</sup>1] δωμάτων ἄπο (for ἀπὸ δωμάτων), σέθεν, ἐγὼ δέ νιν, Ἀχιλλέως πέρι (for περὶ Ἀχιλλέως), and the like. The mere fact of their not being in ordinary speech gives the diction a non-prosaic character; but Ariphrades was unaware of that. It is a great thing, indeed, to make a proper use of these poetical forms, as also of [5] compounds and strange words. But the greatest thing by far is to be a master of metaphor. It is the one thing that cannot be learnt from others; and it is also a sign of genius, since a good metaphor implies an intuitive perception of the similarity in dissimilars.

Of the kinds of words we have enumerated it may be observed that compounds are most in place in the dithyramb, strange words in heroic, and metaphors in [10] iambic poetry. Heroic poetry, indeed, may avail itself of them all. But in iambic verse, which models itself as far as possible on the spoken language, only those kinds of words are in place which are allowable also in a prose speech, i.e. the ordinary word, the metaphor, and the ornamental equivalent.

Let this, then, suffice as an account of tragedy, the art imitating by means of [15] action on the stage.

**23** · As for the poetry which narrates, or imitates by means of versified language, the construction of its plots should clearly be like that in a tragedy; they should be based on a single action, one that is a complete whole in itself, with a beginning, middle, and end, so as to enable the work to produce its own proper [20] pleasure with all the organic unity of a living creature. Nor should one suppose that there is anything like them in our usual histories. A history has to deal not with one action, but with one period and all that happened in that to one or more persons, however disconnected the several events may have been. Just as two events may take place at the same time, e.g. the sea-fight off Salamis and the battle with the [25] Carthaginians in Sicily, without converging to the same end, so too of two consecutive events one may sometimes come after the other with no one end as their common issue. Nevertheless most of our poets, one may say, ignore the distinction.

Herein, then, to repeat what we have said before, we have a further proof of [30] Homer's marvellous superiority to the rest. He did not attempt to deal even with the Trojan war in its entirety, though it was a whole with a definite beginning and end—through a feeling apparently that it was too long a story to be taken in in one view, or if not that, too

complicated from the variety of incident in it. As it is, he has singled out one section of the whole; many of the other incidents, however, he brings [35] in as episodes, using the Catalogue of the Ships, for instance, and other episodes to relieve the uniformity of his narrative. As for the other poets, they treat of one man, or one period; or else of an action which, although one, has a multiplicity of parts in [1459<sup>b</sup>1] it. This last is what the authors of the *Cypria* and *Little Iliad* have done. And the result is that, whereas the *Iliad* or *Odyssey* supplies materials for only one, or at most two tragedies, the *Cypria* does that for several and so does the *Little Iliad* [for [5] more than eight: for an *Adjudgment of Arms*, a *Philoctetes*, a *Neoptolemus*, a *Eurypylus*, a *Ulysses as Beggar*, a *Laconian Women*, a *Fall of Ilium*, and a *Departure of the Fleet*; as also a *Sinon*, and a *Woman of Troy*].<sup>15</sup>

24 · Besides this, epic poetry must divide into the same species as tragedy; it must be either simple or complex, a story of character or one of suffering. Its parts, too, with the exception of song and spectacle, must be the same, as it requires [10] reversals, discoveries, and scenes of suffering just like tragedy. Lastly, the thought and diction in it must be good in their way. All these elements appear in Homer first; and he has made due use of them. His two poems are each examples of [15] construction, the *Iliad* simple and a story of suffering, the *Odyssey* complex (there is discovery throughout it) and a story of character. And they are more than this, since in diction and thought too they surpass all other poems.

There is, however, a difference in the epic as compared with tragedy, in its length, and in its metre. As to its length, the limit already suggested will suffice: it must be possible for the beginning and end of the work to be taken in in one view—a [20] condition which will be fulfilled if the poem be shorter than the old epics, and about as long as the series of tragedies offered for one hearing. For the extension of its length epic poetry has a special advantage, of which it makes large use. In a play [25] one cannot represent an action with a number of parts going on simultaneously; one is limited to the part on the stage and connected with the actors. Whereas in epic poetry the narrative form makes it possible for one to describe a number of simultaneous incidents; and these, if germane to the subject, increase the body of the poem. This then is a gain to the epic, tending to give it grandeur, and also variety [30] of interest and room for episodes of diverse kinds. Uniformity of incident by the satiety it soon creates is apt to ruin tragedies on the stage. As for its metre, the

heroic has been assigned it from experience; were any one to attempt a narrative poem in some one, or in several, of the other metres, the incongruity of the thing would be apparent. The heroic in fact is the gravest and weightiest of metres—which [35] is what makes it more tolerant than the rest of strange words and metaphors, that also being a point in which the narrative form of poetry goes beyond all others. The iambic and trochaic, on the other hand, are metres of movement, the one [1460<sup>a</sup>1] representing that of life and action, the other that of the dance. Still more unnatural would it appear, if one were to write an epic in a medley of metres, as Chaeremon did. Hence it is that no one has ever written a long story in any but heroic verse; the very nature of the thing, as we have said, teaches us to select the metre appropriate to such a story.

[5] Homer, admirable as he is in every other respect, is especially so in this, that he alone among epic poets is not unaware of the part to be played by the poet himself in the poem. The poet should say very little in his own character, as he is no imitator when doing that. Whereas the other poets are perpetually coming forward in person, and say but little, and that only here and there, as imitators, Homer after a [10] brief preface brings in forthwith a man, a woman, or some other character—no one of them characterless, but each with distinctive characteristics.

The marvellous is certainly required in tragedy. The epic, however, affords more opening for the improbable, the chief factor in the marvellous, because in it [15] the agents are not visibly before one. The scene of the pursuit of Hector would be ridiculous on the stage—the Greeks halting instead of pursuing him, and Achilles shaking his head to stop them; but in the poem the absurdity is overlooked. The marvellous, however, is a cause of pleasure, as is shown by the fact that we all tell a story with additions, in the belief that we are giving pleasure to our hearers.

Homer more than any other has taught the others the art of framing lies in the right way. I mean the use of paralogism. Whenever, if one thing is or happens, [20] another is or happens, men's notion is that, if the latter is, so is the former—but that is a false conclusion. Accordingly, if the first thing is untrue, but there is something else that on the assumption of its truth follows as its consequent, the right thing then is to add on the latter. Just because we know the truth of the consequent, we are in our own minds led on to the erroneous inference of the truth of the antecedent. [25] There is an instance of this in the *Bath-story* in the *Odyssey*.

A likely impossibility is always preferable to an unconvincing possibility. The story should never be made up of improbable incidents; there should be nothing of that sort in it. If, however, such incidents are unavoidable, they should be outside the piece, like Oedipus' ignorance in *Oedipus* of the circumstances of Laius' death; [30] not within it, like the report of the Pythian games in *Electra*, or the man's having come to Mysia from Tegea without uttering a word on the way, in *The Mysians*. So that it is ridiculous to say that one's plot would have been spoilt without them, since it is fundamentally wrong to make up such plots. If the poet has taken such a plot, however, and one sees that he might have put it in a more probable form, he is guilty of absurdity as well as a fault of art.<sup>16</sup> Even in the *Odyssey* the improbabilities in the setting-ashore of Ulysses would be clearly intolerable in the hands of an inferior poet. As it is, the poet conceals them, his other excellences veiling their absurdity. [1460<sup>b</sup>1] Elaborate diction, however, is required only in places where there is no action, and no character or thought to be revealed. Where there is character or thought, on the other hand, an over-ornate diction tends to obscure them. [5]

25 · As regards problems and their solutions, one may see the number and nature of the assumptions on which they proceed by viewing the matter in the following way. The poet being an imitator just like the painter or other maker of likenesses, he must necessarily in all instances represent things in one or other of three aspects, either as they were or are, or as they are said or thought to be or to [10] have been, or as they ought to be. All this he does in language, with an admixture, it may be, of strange words and metaphors, as also of the various modified forms of words, since the use of these is conceded in poetry. It is to be remembered, too, that there is not the same kind of correctness in poetry as in politics, or indeed any other art. There is, however, within the limits of poetry itself a possibility of two kinds of [15] error, the one directly, the other only accidentally connected with the art. If the poet meant to describe the thing . . .<sup>17</sup> lack of power of expression, his art itself is at fault. But if it was through his having meant to describe it in some incorrect way (e.g. to make the horse in movement have both right legs thrown forward) that the technical error (one in a matter of, say, medicine or some other special science), [20] have got into his description, his error in that case is not in the essentials of the poetic art. These, therefore, must be the premisses of the solutions in answer to the criticisms involved in the problems.

As to the criticisms relating to the poet's art itself. Any impossibilities there may be in his descriptions of things are faults. But from another point of view they are justifiable, if they serve the end of poetry itself—if (to assume what we have [25] said of that end) they make the effect of either that very portion of the work or some other portion more astounding. The Pursuit of Hector is an instance in point. If, however, the poetic end might have been as well or better or no worse attained without sacrifice of technical correctness in such matters, the impossibility is not to be justified, since the description should be, if it can, entirely free from error. One [30] may ask, too, whether the error is in a matter directly or only accidentally connected with the poetic art; since it is a lesser error in an artist not to know, for instance, that the hind has no horns, than to produce an unrecognizable picture of one.

If the poet's description be criticized as not true to fact, one may urge perhaps that the object ought to be as described—an answer like that of Sophocles, who said that he drew men as they ought to be, and Euripides as they were. If the description, [35] however, be neither true nor of the thing as it ought to be, the answer must be then, that it is in accordance with opinion. The tales about Gods, for instance, may be as [1461<sup>a</sup>1] wrong as Xenophanes thinks, neither true nor the better thing to say; but they are certainly in accordance with opinion. Of other statements in poetry one may perhaps say, not that they are better than the truth, but that the fact was so at the time; e.g. the description of the arms: 'their spears stood upright, butt-end upon the ground'; for that was the usual way of fixing them then, as it is still with the [5] Illyrians. As for the question whether something said or done in a poem is right or not, in dealing with that one should consider not only the intrinsic quality of the actual word or deed, but also the person who says or does it, the person to whom he says or does it, the time, the means, and the motive of the agent—whether he does it to attain a greater good, or to avoid a greater evil.

Other criticisms one must meet by considering the language of the poet: by the [10] assumption of a strange word in a passage like οὐρῆας μὲν πρῶτον, where by οὐρῆας Homer may perhaps mean not mules but sentinels. And in saying of Dolon, ὅς ρ' ἦ τοι εἶδος μὲν ἔην κακός, his meaning may perhaps be, not that Dolon's body was deformed, but that his face was ugly, as εὐειδής is the Cretan word for handsome-faced [15]. So, too, ζωρότερον δὲ κέρατε may mean not 'mix the wine stronger', as though for topers, but 'mix it quicker'. Other expressions in Homer may be explained as metaphorical; e.g. in πάντες μὲν ῥα θεοὶ τε καὶ ἄνδρες

εὔδον παννύχιοι, as compared with what he tells us at the same time, ἦ τοι ὄτ' ἐς πεδῖον τὸ Τρωικὸν ἀθρήσειεν, αὐλῶν συρίγγων τε ὄμαδόν, the word πάντες, 'all', is metaphorically put for 'many', since [20] 'all' is a species of 'many'. So also his οἷη δ' ἄμμορος is metaphorical, the best known standing 'alone'. A change, as Hippias of Thasos suggested, in the mode of reading a word will solve the difficulty in διδομεν δέ οἱ εὖχος ἀρέσθαι, and in τὸ μὲν οὗ καταπύθεται ὄμβρω. Other difficulties may be solved by another punctuation; e.g. in Empedocles, αἶψα δέ θνήτ' ἐφύοντο, τὰ πρὶν μάθον ἀθάνατ' εἶναι ζωρὰ τε πρὶν κέκρητο. [25] Or by the assumption of an equivocal term, as in παρώχηκεν δέ πλέω νύξ where πλέω is equivocal. Or by an appeal to the custom of language. Wine-and-water we call 'wine'; and it is on the same principle that Homer speaks of a κνημὶς νεοτεύκτου κασσιτέροιο, a 'greave of new-wrought tin'. A worker in iron we call a 'brazier'; and [30] it is on the same principle that Ganymede is described as the 'wine-server' of Zeus, though the Gods do not drink wine. This latter, however, may be an instance of metaphor. But whenever also a word seems to imply some contradiction, it is necessary to reflect how many ways there may be of understanding it in the passage in question; e.g. in Homer's τηρὶ ἔσχετο χάλκεον ἔγχοις one should consider the possible senses of 'was stopped there'—whether by taking it in this sense or in that one will best avoid the fault of which Glaucon speaks: 'They start with some [1461<sup>b</sup>1] improbable presumption; and having so decreed it themselves, proceed to draw inferences, and censure the poet as though he had actually said whatever they happen to believe, if his statement conflicts with their own notion of things'. This is how Homer's silence about Icarius has been treated. Starting with the notion of his having been a Lacedaemonian, the critics think it strange for Telemachus not to [5] have met him when he went to Lacedaemon. Whereas the fact may have been as the Cephallenians say, that the wife of Ulysses was of a Cephallenian family, and that her father's name was Icadus, not Icarius. So that it is probably a mistake of the critics that has given rise to the problem.<sup>18</sup>

Speaking generally, one has to justify the impossible by reference to the [10] requirements of poetry, or to the better, or to opinion. For the purposes of poetry a convincing impossibility is preferable to an unconvincing possibility; and if men such as Zeuxis depicted . . .<sup>19</sup> the answer is that it is better they should be like that, as the artist ought to improve on his model. The improbable one has to justify either by showing it to be in accordance with opinion, or by urging that at times it is not improbable; for there is a probability of things happening also

against probability. [15] The contradictions found in the poet's language one should first test as one does an opponent's confutation in a dialectical argument, so as to see whether he means the same thing, in the same relation, and in the same sense, before admitting that he has contradicted either something he has said himself or what a man of sound sense assumes as true. But there is no possible apology for improbability or depravity, when they are not necessary and no use is made of them, like the Euripides' Aegeus [20] and the baseness of Menelaus in *Orestes*.

The objections, then, of critics start with faults of five kinds: the allegation is always that something is either impossible, improbable, corrupting, contradictory, or against technical correctness. The answers to these objections must be sought under one or other of the above-mentioned heads, which are twelve in number. [25]

26 · The question may be raised whether the epic or the tragic is the higher form of imitation. It may be argued that, if the less vulgar is the higher, and the less vulgar is always that which addresses the better public, an art addressing any and every one is of a very vulgar order. It is a belief that their public cannot see the meaning, unless they add something themselves, that causes the perpetual movements of the performers—bad flute-players, for instance, rolling about, if quoit-throwing [30] is to be represented, and pulling at the conductor, if Scylla is the subject of the piece. Tragedy, then, is said to be an art of this order—to be in fact just what the later actors were in the eyes of their predecessors; for Mynniscus used to call Callippides 'the ape', because he thought he so overacted his parts; and a similar [1462<sup>a</sup>1] view was taken of Pindarus also. All tragedy, however, is said to stand to the Epic as the newer to the older school of actors. The one, accordingly, is said to address a cultivated audience, which does not need the accompaniment of gesture; the other, an uncultivated one. If, therefore, tragedy is a vulgar art, it must clearly be lower than the epic.

[5] In the first place, one may urge that the censure does not touch the art of the dramatic poet, but only that of the actor; for it is quite possible to overdo the gesturing even in an epic recital, as did Sosistratus, and in a singing contest, as did Mnasiheus of Opus. Again, one should not condemn all movement, unless one means to condemn even the dance, but only that of ignoble people—which is the [10] point of the criticism passed on Callippides and in the present day on others, that their women are not like gentlewomen. Again, tragedy may produce its

effect even without movement or action in just the same way as epic poetry; for from the mere reading of a play its quality may be seen. So that, if it be superior in all other respects, this element of inferiority is no necessary part of it.

In the second place, one must remember that tragedy has everything that the [15] epic has (even the epic metre being admissible), together with a not inconsiderable addition in the shape of the music which very clearly gives pleasure. Next, the reality of presentation is felt in the play as read, as well as in the play as acted. Again, tragic imitation requires less space for the attainment of its end; which is a [1462<sup>b</sup>1] great advantage, since the more concentrated effect is more pleasurable than one with a large admixture of time to dilute it—consider the *Oedipus* of Sophocles, for instance, and the effect of expanding it into the number of lines of the *Iliad*. There is less unity in the imitation of the epic poets, as is proved by the fact that any one [5] work of theirs supplies matter for several tragedies; the result being that, if they take what is really a single story, it seems curt when briefly told, and thin when on the scale of length usual with their verse. In saying that there is less unity in an epic, I mean an epic made up of a plurality of actions, in the same way as the *Iliad* and [10] *Odyssey* have many such parts, each one of them in itself of some magnitude; yet the structure of the two Homeric poems is as perfect as can be, and the action in them is as nearly as possible one action. If, then, tragedy is superior in these respects, and also, besides these, in its poetic effect (since the two forms of poetry should give us, not any or every pleasure, but the very special kind we have [15] mentioned), it is clear that, since it attains the poetic effect better than the epic, it will be the higher form of art.

So much for tragedy and epic poetry—for these two arts in general and their species; the number and nature of their constituent parts; the causes of success and failure in them; the objections of the critics, and the solutions in answer to them.



<sup>1</sup>The text is corrupt here.

<sup>2</sup>The text of the last clause is uncertain.

<sup>3</sup>The text of this sentence is uncertain.

<sup>4</sup>Excised by Kassel.

<sup>5</sup>Text uncertain.

<sup>6</sup>Text uncertain.

<sup>7</sup>Text uncertain.

<sup>8</sup>The text is corrupt here.

<sup>9</sup>Kassel marks a lacuna.

<sup>10</sup>The text is corrupt; most editors read ὄψις, 'spectacle'.

<sup>11</sup>The text of this sentence is uncertain.

<sup>12</sup>The text from 1456<sup>b</sup>38–1457<sup>a</sup>10 is highly uncertain.

<sup>13</sup>Kassel marks a lacuna.

<sup>14</sup>Kassel marks a lacuna.

<sup>15</sup>Excised by Kassel.

<sup>16</sup>The text of this sentence is uncertain.

<sup>17</sup>Kassel marks a lacuna.

<sup>18</sup>The text of this sentence is uncertain.

<sup>19</sup>Kassel marks a lacuna.

# CONSTITUTION OF ATHENS\*\*

*F. G. Kenyon*

1 . . . [They<sup>1</sup> were tried] by a court empanelled from among the noble families, and sworn upon the sacrifices. The part of accuser was taken by Myron. They were found guilty of the sacrilege, and their bodies were cast out of their graves and their race banished for evermore. In view of this expiation, Epimenides the Cretan performed a purification of the city.

2 · After this event there was contention for a long time between the upper classes and the populace. Not only was the constitution at this time oligarchical in every respect, but the poorer classes, men, women, and children, were the serfs of the rich. They were known as Pelatae and also as Hectemori, because they cultivated the lands of the rich at the rent thus indicated. The whole country was in the hands of a few persons, and if the tenants failed to pay their rent they were liable to be haled into slavery, and their children with them. All loans were secured upon the debtor's person up to the time of Solon, who was the first to appear as the champion of the people. But the hardest and bitterest part of the constitution in the eyes of the masses was their state of serfdom. Not but what they were also discontented with every other feature of their lot; for, to speak generally, they had no share in anything.

3 · Now the ancient constitution, as it existed before the time of Draco, was organized as follows. The magistrates were elected according to qualifications of birth and wealth. At first they governed for life, but subsequently for terms of ten years. The first magistrates, both in date and in importance, were the King, the Polemarch, and the Archon. The earliest of these offices was that of the King, which existed from ancestral antiquity. To this was added, secondly, the office of Polemarch, on account of some of the kings proving feeble in war; for it was on this

account that Ion was invited to accept the post on an occasion of pressing need. The last of the three offices was that of the Archon, which most authorities state to have come into existence in the time of Medon. Others assign it to the time of Acastus, and adduce as proof the fact that the nine Archons swear to execute their oaths 'as in the days of Acastus', which seems to suggest that it was in his time that the descendants of Codrus retired from the kingship in return for the prerogatives conferred upon the Archon. Whichever way it be, the difference in date is small; but that it was the last of these magistracies to be created is also shown by the fact that the Archon has no part in the ancestral sacrifices, as the King and the Polemarch have, but exclusively in those of later origin. So it is only at a comparatively late date that the office of Archon has become of great importance, through the dignity conferred by these later additions. The Thesmothetae were appointed many years afterwards, when these offices had already become annual, with the object that they might publicly record all legal decisions, and act as guardians of them with a view to determining the issues between litigants. Accordingly their office, alone of those which have been mentioned, was never of more than annual duration.

Such, then, is the relative chronological precedence of these offices. At that time the nine Archons did not all live together. The King occupied the building now known as the Bucolium, near the Prytaneum, as may be seen from the fact that even to the present day the marriage of the King's wife to Dionysus and its consummation take place there. The Archon lived in the Prytaneum, the Polemarch in the Epilyceum. The latter building was formerly called the Polemarcheum, but after Epilycus, during his term of office as Polemarch, had rebuilt it and fitted it up, it was called the Epilyceum. The Thesmothetae occupied the Thesmotheteum. In the time of Solon, however, they all came together into the Thesmotheteum. They had power to decide cases finally on their own authority, not, as now, merely to hold a preliminary hearing. Such then was the arrangement of the magistracies. The Council of Areopagus had as its duty the protection of the laws; but in point of fact it administered the greater and most important part of the government of the state, and inflicted punishments and fines summarily upon all who misbehaved themselves. For the Archons were elected under qualifications of birth and wealth, and the Areopagus was composed of those who had served as Archons; for which reason the membership of the Areopagus is the only office which has continued to be a life-magistracy to the present day.

4 · Such was, in outline, the first constitution; but not very long after the events above recorded, in the archonship of Aristaechnus, Draco enacted his ordinances. Now his constitution had the following form. The franchise was given to all who could furnish themselves with a military equipment. The nine Archons and the Treasurers were elected by this body from persons possessing an unencumbered property of not less than ten minas, the less important officials from those who could furnish themselves with a military equipment, and the generals and commanders of the cavalry from those who could show an unencumbered property of not less than a hundred minas, and had children born in lawful wedlock over ten years of age. These officers were required to hold to bail the Prytanes, the generals, and the cavalry commanders of the preceding year until their accounts had been audited, taking four securities of the same class as that to which the generals and the cavalry commanders belonged. There was also to be a Council, consisting of four hundred and one members, chosen by lot from among those who possessed the franchise. Both for this and for the other magistracies the lot was cast among those who were over thirty years of age; and no one might hold office twice until every one else had had his turn, after which they were to cast the lot afresh. If any member of the Council failed to attend when there was a sitting of the Council or of the Assembly, he paid a fine, to the amount of three drachmas if he was a Pentacosimedimnus, two if he was a Knight, and one if he was a Zeugites. The Council of Areopagus was guardian of the laws, and kept watch over the magistrates to see that they executed their offices in accordance with the laws. Any person who felt himself wronged might lay an information before the Council of Areopagus, on declaring what law was broken by the wrong done to him. But, as has been said before, loans were secured upon the persons of the debtors, and the land was in the hands of a few.

5 · Since such, then, was the organization of the constitution, and the many were in slavery to the few, the people rose against the upper class. The strife was keen, and for a long time the two parties were ranged in hostile camps against one another, until, by common consent, they appointed Solon to be mediator and Archon, and committed the whole constitution to his hands—he had written the poem, which begins with the words:

I behold, and within my heart deep sadness has claimed its place,  
As I mark the oldest home of the ancient Ionian race

Slain by the sword.

In this poem he fights and disputes on behalf of each party in turn against the other, and finally he advises them to come to terms and put an end to the quarrel existing between them. By birth and reputation Solon was one of the foremost men of the day, but in wealth and position he was of the middle class, as is generally agreed on other grounds, and is, indeed, established by his own evidence in these poems, where he exhorts the wealthy not to be grasping.

But ye who have store of good, who are sated and overflow,

Restrain your swelling soul, and still it and keep it low:

Let the heart that is great within you be trained a lowlier way;

Ye shall not have all at your will, and we will not for ever obey.

Indeed, he constantly fastens the blame for the conflict on the rich; and accordingly at the beginning of the poem he says that he fears 'the love of wealth and an overweening mind', evidently meaning that it was through these that the quarrel arose.

6 · As soon as he was at the head of affairs, Solon liberated the people once and for all, by prohibiting all loans on the security of the debtor's person; and in addition he made laws and cancelled all debts, public and private. This measure is commonly called the *Seisachtheia*<sup>2</sup> since thereby the people had their loads removed from them. In connexion with it some persons try to traduce the character of Solon. It so happened that, when he was about to enact the *Seisachtheia*, he communicated his intention to some members of the upper class, whereupon, as the partisans of the popular party say, his friends stole a march on him; while those who wish to attack his character maintain that he too had a share in the fraud himself. For these persons borrowed money and bought up a large amount of land, and so when, a short time afterwards, all debts were cancelled, they became wealthy; and this, they say, was the origin of the families which were afterwards looked on as having been wealthy from primeval times. However, the story of the popular party is more plausible. A man who was so moderate and public-spirited in all his other actions, that when it was within his power to put his fellow-citizens beneath his feet and establish himself as tyrant, he preferred instead to incur the hostility of both parties by placing his honour and the general welfare above his personal aggrandisement, is not likely to have consented to defile his hands by such a petty and palpable fraud. That he had this absolute power is indicated by the desperate

condition of the country; moreover, he mentions it himself repeatedly in his poems, and it is universally admitted. We are therefore bound to consider this accusation to be false.

7 · Next Solon drew up a constitution and enacted new laws; and the ordinances of Draco ceased to be used, with the exception of those relating to murder. The laws were inscribed on the wooden stands, and set up in the King's Porch, and all swore to obey them; and the nine Archons made oath upon the stone, declaring that they would dedicate a golden statue if they should transgress any of them. This is the origin of the oath to that effect which they take to the present day. Solon ratified his laws for a hundred years; and the following was the fashion in which he organized the constitution. He divided the population according to property into four classes, just as it had been divided before, namely, Pentacosiomedimni, Knights, Zeugitae, and Thetes. The various magistracies, namely, the nine Archons, the Treasurers, the Commissioners for Public Contracts [Poletae], the Eleven, and the Exchequer Clerks [Colacretae], he assigned to the Pentacosiomedimni, the Knights, and the Zeugitae, giving offices to each class in proportion to the value of their property. To those who ranked among the Thetes he gave nothing but a place in the Assembly and in the juries. A man had to rank as a Pentacosiomedimnus if he made, from his own land, five hundred measures, whether liquid or solid. Those ranked as Knights who made three hundred measures, or, as some say, those who were able to maintain a horse. In support of the latter definition they adduce the name of the class, which may be supposed to be derived from this fact, and also some votive offerings of early times; for in the Acropolis there is a votive offering, a statue of Diphilus, bearing this inscription:

The son of Diphilus, Anthemion hight,  
Raised from the Thetes and become a Knight,  
Did to the gods this sculptured charger bring,  
For his promotion a thank-offering.

And a horse stands in evidence beside the man, implying that this was what was meant by belonging to the rank of Knight. At the same time it seems more reasonable to suppose that this class, like the Pentacosiomedimni, was defined by the possession of an income of a certain number of measures. Those ranked as Zeugitae who made two hundred measures, liquid or solid; and the rest ranked as Thetes, and were not eligible for any office. Hence it is that even at the present day,

when a candidate for any office is asked to what class he belongs, no one would think of saying that he belonged to the Thetes.

8 · The elections to the various offices Solon enacted should be by lot, out of candidates selected by each of the tribes. Each tribe selected ten candidates for the nine archonships, and among these the lot was cast. Hence it is still the custom for each tribe to choose ten candidates by lot, and then the lot is again cast among these. A sign that Solon regulated the elections to office according to the property classes may be found in the law still in force with regard to the Treasurers, which enacts that they shall be chosen from the Pentacosimedimni. Such was Solon's legislation with respect to the nine Archons; whereas in early times the Council of Areopagus summoned suitable persons according to its own judgement and appointed them for the year to the several offices. There were four tribes, as before, and four tribe-kings. Each tribe was divided into three Trittyes, with twelve Naucraries in each; and the Naucraries had officers of their own, called Naucrari, whose duty it was to superintend the current receipts and expenditure. Hence, among the laws of Solon now obsolete, it is repeatedly written that the Naucrari are to receive and to spend out of the Naucratic fund. Solon also appointed a Council of four hundred, a hundred from each tribe; but he assigned to the Council of the Areopagus the duty of superintending the laws, acting as before as the guardian of the constitution in general. It kept watch over the affairs of the state in most of the more important matters, and corrected offenders, with full powers to inflict either fines or punishment. The money received in fines it brought up into the Acropolis, without assigning the reason for the mulct. It also tried those who conspired for the overthrow of the state, Solon having enacted a process of impeachment to deal with such offenders. Further, since he saw the state often engaged in internal disputes, while many of the citizens from sheer indifference accepted whatever might turn up, he made a law with express reference to such persons, enacting that any one who, in a time of civil factions, did not take up arms with either party, should lose his rights as a citizen and cease to have any part in the state.

9 · Such, then, was his legislation concerning the magistracies. There are three points in the constitution of Solon which appear to be its most democratic features: first and most important, the prohibition of loans on the security of the debtor's person; secondly, the right of every person

who so willed to claim redress on behalf of any one to whom wrong was being done; thirdly, the institution of the appeal to the jury-courts; and it is to this last, they say, that the masses have owed their strength most of all, since, when the people are master of the voting-power, it is master of the constitution. Moreover, since the laws were not drawn up in simple and explicit terms (but like the one concerning inheritances and wards of state), disputes inevitably occurred, and the courts had to decide in every matter, whether public or private. Some persons in fact believe that Solon deliberately made the laws indefinite, in order that the final decision might be in the hands of the people. This, however, is not probable, and the reason no doubt was that it is impossible to attain ideal perfection when framing a law in general terms; for we must judge of his intentions, not from the actual results in the present day, but from the rest of his legislation.

10 · These seem to be the democratic features of his laws; but in addition, before the period of his legislation, he carried through his abolition of debts, and after it his increase in the standards of weights and measures, and of the currency. During his administration the measures were made larger than those of Pheidon, and the mina, which previously had a standard of seventy drachmas, was raised to the full hundred. The standard coin in earlier times was the two-drachma piece. He also made weights corresponding with the coinage, sixty-three minas going to the talent; and the odd three minas were distributed among the staters and the other values.

11 · When he had completed his organization of the constitution in the manner that has been described, he found himself beset by people coming to him and harassing him concerning his laws, criticizing here and questioning there, till, as he wished neither to alter what he had decided on nor yet to be an object of ill will by remaining in Athens, he set off on a journey to Egypt, with the combined objects of trade and travel, giving out that he should not return for ten years. He considered that it was not right for him to expound the laws personally, but that every one should obey them just as they were written. Moreover, many members of the upper class had been estranged from him on account of his abolition of debts, and both parties were alienated through their disappointment at the condition of things which he had created. The mass of the people had expected him to make a complete redistribution of all



property, and the upper class hoped he would restore everything to its former position, or, at any rate, make but a small change. Solon, however, had resisted both classes. He might have made himself a despot by attaching himself to whichever party he chose, but he preferred to incur the enmity of both, by being the saviour of his country and the ideal lawgiver.

**12** · The truth of this view of Solon's policy is established alike by common consent and by the mention he has himself made of the matter in his poems. Thus:

I gave to the mass of the people such rank as befitted their need,  
I took not away their honour, and I granted naught to their greed;  
While those who were rich in power, who in wealth were glorious and great,  
I bethought me that naught should befall them unworthy their splendour and state;  
So I stood with my shield outstretched, and both were safe in its sight,  
And I would not that either should triumph, when the triumph was not with right.

Again he declares how the mass of the people ought to be treated:

But thus will the people best the voice of their leaders obey,  
When neither too slack is the rein, nor violence holdeth the sway;  
For indulgence breedeth a child, the presumption that spurns control,  
When riches too great are poured upon men of unbalanced soul.

And again elsewhere he speaks about the persons who wished to redistribute the land:

So they came in search of plunder, and their cravings knew no bound,  
Every one among them deeming endless wealth would here be found,  
And that I with glozing smoothness hid a cruel mind within.  
Fondly then and vainly dreamt they; now they raise an angry din,  
And they glare askance in anger, and the light within their eyes  
Burns with hostile flames upon me. Yet therein no justice lies.  
All I promised, fully wrought I with the gods at hand to cheer,  
Naught beyond in folly ventured. Never to my soul was dear  
With a tyrant's force to govern, nor to see the good and base  
Side by side in equal portion share the rich home of our race.

Once more he speaks of the abolition of debts and of those who before were in servitude, but were released owing to the Seisachtheia:

Of all the aims for which I summoned forth  
The people, was there one I compassed not?  
Thou, when slow time brings justice in its train,  
O mighty mother of the Olympian gods,  
Dark Earth, thou best canst witness, from whose breast  
I swept the pillars broadcast planted there,  
And made thee free, who hadst been slave of yore.  
And many a man whom fraud or law had sold  
Far from his god-built land, an outcast slave,  
I brought again to Athens; yea, and some,  
Exiles from home through debt's oppressive load,  
Speaking no more the dear Athenian tongue,  
But wandering far and wide, I brought again;  
And those that here in vilest slavery  
Crouched 'neath a master's frown, I set them free.  
Thus might and right were yoked in harmony,  
Since by the force of law I won my ends  
And kept my promise. Equal laws I gave  
To evil and to good, with even hand  
Drawing straight justice for the lot of each.  
But had another held the goad as I,  
One in whose heart was guile and greediness,  
He had not kept the people back from strife.  
For had I granted, now what pleased the one,  
Then what their foes devised in counterpoise,  
Of many a man this state had been bereft.  
Therefore I showed my might on every side,  
Turning at bay like wolf among the hounds.

And again he reviles both parties for their grumblings in the times that followed:

Nay, if one must lay blame where blame is due,  
Were't not for me, the people ne'er had set  
Their eyes upon these blessings e'en in dreams—  
While greater men, the men of wealthier life,  
Should praise me and should court me as their friend.

For had any other man, he says, received this exalted post,

He had not kept the people back, nor ceased  
Till he had robbed the richness of the milk.

But I stood forth a landmark in the midst.  
And barred the foes from battle.

13 · Such, then, were Solon's reasons for his departure from the country. After his retirement the city was still torn by divisions. For four years, indeed, they lived in peace; but in the fifth year after Solon's government they were unable to elect an Archon on account of their dissensions, and again four years later they elected no Archon for the same reason. Subsequently, after a similar period had elapsed, Damasias was elected Archon; and he governed for two years and two months, until he was forcibly expelled from his office. After this it was agreed, as a compromise, to elect ten Archons, five from the Eupatridae, three from the Agroeci, and two from the Demiurgi; and they ruled for the year following Damasias. It is clear from this that the Archon was at the time the magistrate who possessed the greatest power, since it is always in connexion with this office that conflicts are seen to arise. But altogether they were in a continual state of internal disorder. Some found the cause and justification of their discontent in the abolition of debts, because thereby they had been reduced to poverty; others were dissatisfied with the political constitution, because it had undergone a revolutionary change; while with others the motive was found in personal rivalries among themselves. The parties at this time were three in number. First there was the party of the Shore, led by Megacles the son of Alcmeon, which was considered to aim at a moderate form of government; then there were the men of the Plain, who desired an oligarchy and were led by Lycurgus; and thirdly there were the men of the Highlands, at the head of whom was Pisistratus, who was looked on as an extreme democrat. This party was reinforced by those who had been deprived of the debts due to them, from motives of poverty, and by those who were not of pure descent, from motives of personal apprehension. A proof of this is seen in the fact that after the tyranny was overthrown a revision was made of the citizen-roll, on the ground that many persons were partaking in the franchise without having a right to it. The names given to the respective parties were derived from the districts in which they held their lands.

14 · Pisistratus, who had the reputation of being an extreme democrat, and had also distinguished himself greatly in the war with Megara, wounded himself, and by representing that his injuries had been

inflicted on him by his political rivals, he persuaded the people, through a motion proposed by Aristion, to grant him a bodyguard. After he had got these 'club-bearers', as they were called, he made an attack with them on the people and seized the Acropolis. This happened in the archonship of Comeas, thirty-one years after the legislation of Solon. It is related that, when Pisistratus asked for his bodyguard, Solon opposed the request, and declared that in so doing he proved himself wiser than half the people and braver than the rest—wiser than those who did not see that Pisistratus designed to make himself tyrant, and braver than those who saw it and kept silence. But when all his words availed nothing he carried forth his armour and set it up in front of his house, saying that he had helped his country so far as lay in his power (he was already a very old man), and that he called on all others to do the same. Solon's exhortations, however, proved fruitless, and Pisistratus assumed the sovereignty. His administration was more like a constitutional government than the rule of a tyrant; but before his power was firmly established, the adherents of Megacles and Lycurgus made a coalition and drove him out. This took place in the archonship of Hegesias, five years after the first establishment of his rule. Eleven years later Megacles, being in difficulties in a party struggle, again opened negotiations with Pisistratus, proposing that the latter should marry his daughter; and on these terms he brought him back to Athens, by a very primitive and simple-minded device. He first spread abroad a rumour that Athena was bringing back Pisistratus, and then, having found a woman of great stature and beauty, named Phyë (according to Herodotus, of the deme of Paeania, but as others say a Thracian flower-seller of the deme of Collytus), he dressed her in a garb resembling that of the goddess and brought her into the city with Pisistratus. The latter drove in on a chariot with the woman beside him, and the inhabitants of the city, struck with awe, received him with adoration.

15 · In this manner did his first return take place. But later, about six years after his return, he was again expelled. For he did not hold power for long: he refused to treat the daughter of Megacles as his wife, and being afraid in consequence of a combination of the two opposing parties, he retired from the country. First he led a colony to a place called Rhaicelus, in the region of the Thermaic gulf; and thence he passed to the country in the neighbourhood of Mt. Pangaeus. Here he acquired wealth and hired mercenaries; and not till ten years had elapsed did he return to Eretria and make an attempt to recover the government by force. In this

he had the assistance of many allies, notably the Thebans and Lygdāmis of Naxos, and also the Knights who held the supreme power in the constitution of Eretria. After his victory in the battle at Pallene he captured Athens, and when he had disarmed the people he at last had his tyranny securely established, and was able to take Naxos and set up Lygdamis as ruler there. He effected the disarmament of the people in the following manner. He ordered a parade in full armour in the Theseum, and began to make a speech to the people. He spoke for a short time, until the people called out that they could not hear him, whereupon he bade them come up to the entrance of the Acropolis, in order that his voice might be better heard. Then, while he continued to speak to them at great length, men whom he had appointed for the purpose collected the arms and locked them up in the chambers of the Theseum hard by, and came and made a signal to him that it was done. Pisistratus accordingly, when he had finished the rest of what he had to say, told the people also what had happened to their arms; adding that they were not to be surprised or alarmed, but go home and attend to their private affairs, while he would himself for the future manage all the business of the state.

16 · Such was the origin and such the vicissitudes of the tyranny of Pisistratus. His administration was temperate, as has been said before, and more like constitutional government than a tyranny. Not only was he in every respect humane and mild and ready to forgive those who offended, but, in addition, he advanced money to the poorer people to help them in their labours, so that they might make their living by agriculture. In this he had two objects, first that they might not spend their time in the city but might be scattered over all the country, and secondly that, being moderately well off and occupied with their own business, they might have neither the wish nor the time to attend to public affairs. At the same time his revenues were increased by the thorough cultivation of the country, since he imposed a tax of one tenth on all the produce. For the same reasons he instituted the local justices, and often made expeditions in person into the country to inspect it and to settle disputes between individuals, that they might not come into the city and neglect their farms. It was in one of the progresses that, as the story goes, Pisistratus had his adventure with the man of Hymettus, who was cultivating the spot afterwards known as ‘Tax-free Farm’. He saw a man digging and working at a very stony piece of ground, and being surprised he sent his attendant to ask what he got out of this plot of land.

‘Aches and pains’, said the man; ‘and that’s what Pisistratus ought to have his tenth of’. The man spoke without knowing who his questioner was; but Pisistratus was so pleased with his frank speech and his industry that he granted him exemption from all taxes. And so in matters in general he burdened the people as little as possible with his government, but always cultivated peace and kept them in all quietness. Hence the tyranny of Pisistratus was often spoken of proverbially as ‘the age of gold’; for when his sons succeeded him the government became much harsher. But most important of all in this respect was his popular and kindly disposition. In all things he was accustomed to observe the laws, without giving himself any exceptional privileges. Once he was summoned on a charge of homicide before the Areopagus, and he appeared in person to make his defence; but the prosecutor was afraid to present himself and abandoned the case. For these reasons he held power long, and whenever he was expelled he regained his position easily. The majority alike of the upper class and of the people were in his favour; the former he won by his social intercourse with them, the latter by the assistance which he gave to their private purses, and his nature fitted him to win the hearts of both. Moreover, the laws in reference to tyrants at that time in force at Athens were very mild, especially the one which applies more particularly to the establishment of a tyranny. The law ran as follows: ‘These are the ancestral statutes of the Athenians; if any persons shall make an attempt to establish a tyranny, or if any person shall join in setting up a tyranny, he shall lose his civic rights, both himself and his whole house’.

17 · Thus did Pisistratus grow old in the possession of power, and he died of illness in the archonship of Philoneus, thirty-three years from the time at which he first established himself as tyrant, during nineteen of which he was in possession of power; the rest he spent in exile. It is evident from this that the story is mere gossip which states that Pisistratus was the youthful favourite of Solon and commanded in the war against Megara for the recovery of Salamis. It will not harmonize with their respective ages, as any one may see who will reckon up the years of the life of each of them, and the dates at which they died. After the death of Pisistratus his sons took up the government, and conducted it on the same system. He had two sons by his legitimate wife, Hippias and Hipparchus, and two by his Argive consort, Iophon and Hegesistratus, who was surnamed Thessalus. For Pisistratus took a wife from Argos, Timonassa, the daughter of a man of Argos, named Gorgilus; she had previously been the wife of Archius of Ambracia; one of the descendants

of Cypselus. This was the origin of his friendship with the Argives, on account of which a thousand of them were brought over by Hegesistratus and fought on his side in the battle at Pallene. Some authorities say that this marriage took place after his first expulsion from Athens, others while he was in possession of the government.

18 · Hippias and Hipparchus assumed the control of affairs on grounds alike of standing and of age; but Hippias, as being the elder and also naturally of a statesmanlike and shrewd disposition, was really the head of the government. Hipparchus was youthful in disposition, amorous, and fond of literature (it was he who invited to Athens Anacreon, Simonides, and the other poets), while Thessalus was much junior in age, and was violent and headstrong in his behaviour. It was from his character that all the evils arose which befell the house. He became enamoured of Harmodius, and, since he failed to win his affection, he lost all restraint upon his passion, and in addition to other exhibitions of rage he finally prevented the sister of Harmodius from taking the part of a basketbearer in the Panathenaic procession, slanderously alleging that Harmodius was a person of loose life. Thereupon, in a frenzy of wrath, Harmodius and Aristogeiton did their celebrated deed, in conjunction with a number of confederates. But while they were lying in wait for Hippias in the Acropolis at the time of the Panathenaea (Hippias, at this moment, was awaiting the arrival of the procession, while Hipparchus was organizing its dispatch) they saw one of the persons privy to the plot talking familiarly with him. Thinking that he was betraying them, and desiring to do something before they were arrested, they rushed down and made their attempt without waiting for the rest of their confederates. They succeeded in killing Hipparchus near the Leocoreum while he was engaged in arranging the procession, but ruined the design as a whole; of the two leaders, Harmodius was killed on the spot by the guards, while Aristogeiton was arrested, and perished later after suffering long tortures. While under the torture he accused many persons who belonged by birth to the most distinguished families and were also personal friends of the tyrants. At first the government could find no clue to the conspiracy; for the current story, that Hippias made all who were taking part in the procession leave their arms, and then detected those who were carrying secret daggers, cannot be true, since at that time they did not bear arms in the processions, this being a custom instituted at a later period by the democracy. According to the story of the popular party, Aristogeiton accused the friends of the tyrants

with the deliberate intention that the latter might commit an impious act, and at the same time weaken themselves, by putting to death innocent men who were their own friends; others say that he told no falsehood, but was betraying the actual accomplices. At last, when for all his efforts he could not obtain release by death, he promised to give further information against a number of other persons; and, having induced Hippias to give him his hand to confirm his word, as soon as he had hold of it he reviled him for giving his hand to the murderer of his brother, till Hippias, in a frenzy of rage, lost control of himself and snatched out his dagger and dispatched him.

19 · After this event the tyranny became much harsher. In consequence of his vengeance for his brother, and of the execution and banishment of a large number of persons, Hippias became a distrusted and an embittered man. About three years after the death of Hipparchus, finding his position in the city insecure, he set about fortifying Munichia, with the intention of establishing himself there. While he was still engaged on this work, however, he was expelled by Cleomenes, king of Lacedaemon, in consequence of the Spartans being continually incited by oracles to overthrow the tyranny. These oracles were obtained in the following way. The Athenian exiles, headed by the Alcmeonidae, could not by their own power effect their return, but failed continually in their attempts. Among their other failures, they fortified a post in Attica, Lipsydrium, above Mt. Parnes, and were there joined by some partisans from the city; but they were besieged by the tyrants and reduced to surrender. After this disaster the following became a popular drinking song:

Ah! Lipsydrium, faithless friend!  
Lo, what heroes to death didst send,  
Nobly born and great in deed!  
Well did they prove themselves at need  
Of noble sires a noble seed.

Having failed, then, in every other method, they took the contract for rebuilding the temple at Delphi, thereby obtaining ample funds, which they employed to secure the help of the Lacedaemonians. All this time the Pythia kept continually enjoining on the Lacedaemonians who came to consult the oracle, that they must free Athens; till finally she succeeded in impelling the Spartans to that step, although the house of Pisistratus was



connected with them by ties of hospitality. The resolution of the Lacedaemonians was, however, at least equally due to the friendship which had been formed between the house of Pisistratus and Argos. Accordingly they first sent Anchimolus by sea at the head of an army; but he was defeated and killed, through the arrival of Cineas of Thessaly in support with a force of a thousand horsemen. Then, being roused to anger by this disaster, they sent their king, Cleomenes, by land at the head of a larger force; and he, after defeating the Thessalian cavalry when they attempted to intercept his march into Attica, shut up Hippias within what was known as the Pelargic wall and blockaded him there with the assistance of the Athenians. While he was sitting down before the place, it so happened that the sons of the Pisistratidae were captured in an attempt to slip out; upon which the tyrants capitulated on condition of the safety of their children, and surrendered the Acropolis to the Athenians, five days being first allowed them to remove their effects. This took place in the archonship of Harpactides, after they had held the tyranny for about seventeen years since their father's death, or in all, including the period of their father's rule, for forty-nine years.

20 · After the overthrow of the tyranny, the rival leaders in the state were Isagoras son of Tisander, a partisan of the tyrants, and Cleisthenes, who belonged to the family of the Alcmeonidae. Cleisthenes, being beaten in the political clubs, called in the people by offering the franchise to the masses. Thereupon Isagoras, finding himself left inferior in power, invited Cleomenes, who was united to him by ties of hospitality, to return to Athens, and persuaded him to 'drive out the pollution', a plea derived from the fact that the Alcmeonidae were supposed to be under the curse of pollution. On this Cleisthenes retired from the country, and Cleomenes, entering Attica with a small force, expelled, as polluted, seven hundred Athenian families. Having effected this, he next attempted to dissolve the Council, and to set up Isagoras and three hundred of his partisans as the supreme power in the state. The Council, however, resisted, the populace flocked together, and Cleomenes and Isagoras, with their adherents, took refuge on the Acropolis. Here the people sat down and besieged them for two days; and on the third they agreed to let Cleomenes and all his followers depart, while they summoned Cleisthenes and the other exiles back to Athens. When the people had thus obtained the command of affairs, Cleisthenes was their chief and popular leader. For the Alcmeonidae were perhaps the chief cause of the expulsion of the tyrants, and for the greater part of their rule were at perpetual war with them.

But even earlier than the attempts of the Alcmeonidae, Cedon made an attack on the tyrants; whence there came another popular drinking song, addressed to him:

Pour a health yet again, boy, to Cedon; forget not this duty to do,  
If a health is an honour befitting the name of a good man and true.

**21** · The people, therefore, had good reason to place confidence in Cleisthenes. Accordingly, now that he was the popular leader, three years after the expulsion of the tyrants, in the archonship of Isagoras, his first step was to distribute the whole population into ten tribes in place of the existing four, with the object of intermixing the members of the different tribes, and so securing that more persons might have a share in the franchise. From this arose the saying ‘Do not look at the tribes’, addressed to those who wished to scrutinize the lists of the old families. Next he made the Council to consist of five hundred members instead of four hundred, each tribe now contributing fifty, whereas formerly each had sent a hundred. The reason why he did not organize the people into twelve tribes was that he might not have to use the existing division into trittyes; for the four tribes had twelve trittyes, so that he would not have achieved his object of redistributing the population in fresh combinations. Further, he divided the country into thirty groups of demes, ten from the districts about the city, ten from the coast, and ten from the interior. These he called trittyes; and he assigned three of them by lot to each tribe, in such a way that each should have one portion in each of these three localities. All who lived in any given deme he declared fellow-demesmen, to the end that the new citizens might not be exposed by the habitual use of family names, but that men might be officially described by the names of their demes; and accordingly it is by the names of their demes that the Athenians speak of one another. He also instituted Demarchs, who had the same duties as the previously existing Naucrari—the demes being made to take the place of the naucraries. He gave names to the demes, some from the localities to which they belonged, some from the persons who founded them, since some of the areas no longer corresponded to localities possessing names. On the other hand he allowed every one to retain his family and clan and religious rites according to ancestral custom. The names given to the tribes were the ten which the Pythia appointed out of the hundred selected national heroes.

**22** · By these reforms the constitution became much more

democratic than that of Solon. The laws of Solon had been obliterated by disuse during the period of the tyranny, while Cleisthenes substituted new ones with the object of securing the goodwill of the masses. Among these was the law concerning ostracism. Four years after the establishment of this system, in the archonship of Hermocreon, they first imposed upon the Council of Five Hundred the oath which they take to the present day. Next they began to elect the generals by tribes, one from each tribe, while the Polemarch was the commander of the whole army. Then, eleven years later, in the archonship of Phaenippus they won the battle of Marathon; and two years after this victory, when the people had now gained self-confidence, they for the first time made use of the law of ostracism. This had originally been passed as a precaution against men in high office, because Pisistratus took advantage of his position as a popular leader and general to make himself tyrant; and the first person ostracized was one of his relatives, Hipparchus son of Charmus, of the deme of Collytus, the very person on whose account especially Cleisthenes had enacted the law, as he wished to get rid of him. (The Athenians, with the usual leniency of the democracy, allowed all the partisans of the tyrants, who had not joined in their evil deeds in the time of the troubles, to remain in the city; and the chief and leader of these was Hipparchus.) Then in the very next year, in the archonship of Telesinus, they for the first time since the tyranny elected, tribe by tribe, the nine Archons by lot out of the five hundred candidates selected by the demes, all the earlier ones having been elected by vote; and in the same year Megacles son of Hippocrates, of the deme of Alopece, was ostracized. Thus for three years they continued to ostracize the friends of the tyrants, on whose account the law had been passed; but in the following year they began to remove others as well who seemed to be more powerful than was expedient. The first person unconnected with the tyrants who was ostracized was Xanthippus son of Ariphron. Two years later, in the archonship of Nicodemus, the mines of Maroneia were discovered, and the state made a profit of a hundred talents from the working of them. Some persons advised the people to make a distribution of the money among themselves, but this was prevented by Themistocles. He refused to say on what he proposed to spend the money, but he bade them lend it to the hundred richest men in Athens, one talent to each, and then, if the manner in which it was employed pleased the people, the expenditure should be charged to the state, but otherwise the state should receive the sum back from those to whom it was lent. On these terms he received the money and with it he had a hundred triremes built, each of the hundred

individuals building one; and it was with these ships that they fought the battle of Salamis against the barbarians. About this time Aristides the son of Lysimachus was ostracized. Three years later, however, in the archonship of Hypsichides, all the ostracized persons were recalled, on account of the advance of the army of Xerxes; and it was laid down for the future that persons under sentence of ostracism must not live between Geraestus and Scyllaeum, on pain of losing their civic rights irrevocably.

23 · So far, then, had the city progressed by this time, growing gradually with the growth of the democracy; but after the Persian wars the Council of Areopagus once more developed strength and assumed the control of the state. It did not acquire this supremacy by virtue of any formal decree, but because it had been the cause of the battle of Salamis being fought. When the generals were utterly at a loss how to meet the crisis and made proclamation that every one should see to his own safety, the Areopagus provided eight drachmas to each member of the ships' crews, and so prevailed on them to go on board. On these grounds people bowed to its prestige; and during this period Athens was well administered. At this time they devoted themselves to the prosecution of war and were in high repute among the Greeks, so that the command by sea was conferred upon them in spite of the opposition of the Lacedaemonians. The leaders of the people during this period were Aristides, son of Lysimachus, and Themistocles, son of Neocles, of whom the latter appeared to devote himself to the conduct of war, while the former had the reputation of being a clever statesman and the most upright man of his time. Accordingly the one was usually employed as general, the other as political adviser. The rebuilding of the fortifications they conducted in combination, although they were political opponents; but it was Aristides who, seizing the opportunity afforded by the discredit brought upon the Lacedaemonians by Pausanias, guided the public policy in the matter of the defection of the Ionian states from the alliance with Sparta. It follows that it was he who made the first assessment of tribute from the various allied states, two years after the battle of Salamis, in the archonship of Timosthenes; and it was he who took the oath of offensive and defensive alliance with the Ionians, on which occasion they cast the masses of iron into the sea.

24 · After this, seeing the state growing in confidence and much wealth accumulated, he advised the people to lay hold of the leadership

of the league, and to quit the country districts and settle in the city. He pointed out to them that all would be able to gain a living there, some by service in the army, others in the garrisons, others by taking a part in public affairs; and in this way they would secure the leadership. This advice was taken; and when the people had assumed the supreme control they proceeded to treat their allies in a more imperious fashion, with the exception of the Chians, Lesbians, and Samians. These they maintained to protect their empire, leaving their constitutions untouched, and allowing them to retain whatever dominion they then possessed. They also secured an ample maintenance for the mass of the population in the way which Aristides had pointed out to them. Out of the proceeds of the tributes and the taxes and the contributions of the allies more than twenty thousand persons were maintained. There were 6,000 jurymen, 1,600 bowmen, 1,200 Knights, 500 members of the Council, 500 guards of the dockyards, besides fifty guards in the Acropolis. There were some 700 magistrates at home, and some 700 abroad. Further, when they subsequently went to war, there were in addition 2,500 heavy-armed troops, twenty guard-ships, and other ships which collected the tributes, with crews amounting to 2,000 men, selected by lot; and besides these there were the persons maintained by the Prytaneum, and orphans, and gaolers, since all these were supported by the state.

25 · Such was the way in which the people earned their livelihood. The supremacy of the Areopagus lasted for about seventeen years after the Persian wars, although gradually declining. But as the strength of the masses increased, Ephialtes, son of Sophonides, a man with a reputation for incorruptibility and public virtue, who had become the leader of the people, made an attack upon that Council. First of all he ruined many of its members by bringing actions against them with reference to their administration. Then, in the archonship of Conon, he stripped the Council of all the acquired prerogatives from which it derived its guardianship of the constitution, and assigned some of them to the Council of Five Hundred, and others to the Assembly and the law-courts. In this revolution he was assisted by Themistocles, who was himself a member of the Areopagus, but was expecting to be tried before it on a charge of treasonable dealings with Persia. This made him anxious that it should be overthrown, and accordingly he warned Ephialtes that the Council intended to arrest him, while at the same time he informed the Areopagites that he would reveal to them certain persons who were conspiring to subvert the constitution. He then conducted the

representatives delegated by the Council to the residence of Ephialtes, promising to show them the conspirators who assembled there, and proceeded to converse with them in an earnest manner. Ephialtes, seeing this, was seized with alarm and took refuge in suppliant guise at the altar. Every one was astounded at the occurrence, and presently, when the Council of Five Hundred met, Ephialtes and Themistocles together proceeded to denounce the Areopagus to them. This they repeated in similar fashion in the Assembly, until they succeeded in depriving it of its power. Not long afterwards, however, Ephialtes was assassinated by Aristodicus of Tanagra. In this way was the Council of Areopagus deprived of its guardianship of the state.

26 · After this the administration of the state became more and more lax, in consequence of the eager rivalry of candidates for popular favour. During this period the moderate party, as it happened, had no real chief, their leader being Cimon son of Miltiades, who was a comparatively young man, and had been late in entering public life; and at the same time the general populace suffered great losses by war. The soldiers for active service were selected at that time from the roll of citizens, and as the generals were men of no military experience, who owed their position solely to their family standing, it continually happened that some two or three thousand of the troops perished on an expedition; and in this way the best men alike of the lower and the upper classes were exhausted. Consequently in most matters of administration less heed was paid to the laws than had formerly been the case. No alteration, however, was made in the method of election of the nine Archons, except that five years after the death of Ephialtes it was decided that the candidates to be submitted to the lot for that office might be selected from the Zeugitae as well. The first Archon from that class was Mnesitheides. Up to this time all the Archons had been taken from the Pentacosiomedimni and Knights, while the Zeugitae were confined to the ordinary magistracies, save where an evasion of the law was overlooked. Four years later, in the archonship of Lysicrates, the thirty 'local justices', as they were called, were re-established; and two years afterwards, in the archonship of Antidotus, in consequence of the great increase in the number of citizens, it was resolved, on the motion of Pericles, that no one should be admitted to the franchise who was not of citizen birth by both parents.

27 · After this Pericles came forward as popular leader, having first

distinguished himself while still a young man by prosecuting Cimon on the audit of his official accounts as general. Under his auspices the constitution became still more democratic. He took away some of the privileges of the Areopagus, and, above all, he turned the policy of the state in the direction of sea power, which caused the masses to acquire confidence in themselves and consequently to take the constitution more and more into their own hands. Moreover, forty-eight years after the battle of Salamis, in the archonship of Pythodorus, the Peloponnesian war broke out, during which the populace was shut up in the city and became accustomed to gain its livelihood by military service, and so, partly voluntarily and partly involuntarily, determined to assume the administration of the state itself. Pericles was also the first to institute pay for service in the law-courts, as a bid for popular favour to counterbalance the wealth of Cimon. The latter, having private possessions on a regal scale, not only performed the regular public services magnificently, but also maintained a large number of his fellow-demesmen. Any member of the deme of Laciadae could go every day to Cimon's house and there receive a reasonable provision; while his estate was guarded by no fences, so that any one who liked might help himself to the fruit from it. Pericles' private property was quite unequal to this magnificence and accordingly he took the advice of Damonides of Oea (who was commonly supposed to be the person who prompted Pericles in most of his measures, and was therefore subsequently ostracized), which was that, as he was beaten in the matter of private possessions, he should make gifts to the people from their own property; and accordingly he instituted pay for the members of the juries. Some critics accuse him of thereby causing a deterioration in the character of the juries, since it was always the common people who put themselves forward for selection as jurors, rather than the men of better position. Moreover, bribery came into existence after this, the first person to introduce it being Anytus, after his command at Pylos. He was prosecuted by certain individuals on account of his loss of Pylos, but escaped by bribing the jury.

28 · So long as Pericles was leader of the people, things went tolerably well with the state; but when he was dead there was a great change for the worse. Then for the first time did the people choose a leader who was of no reputation among men of good standing, whereas up to this time such men had always been found as leaders of the democracy. The first leader of the people, in the very beginning of things, was Solon, and the second was Pisistratus, both of them men of birth and

position. After the overthrow of the tyrants there was Cleisthenes, a member of the house of the Alcmeonidae; and he had no rival opposed to him after the expulsion of the party of Isagoras. After this Xanthippus was the leader of the people, and Militades of the upper class. Then came Themistocles and Aristides, and after them Ephialtes as leader of the people, and Cimon son of Miltiades of the wealthier class. Pericles followed as leader of the people, and Thucydides, who was connected by marriage with Cimon, of the opposition. After the death of Pericles, Nicias, who subsequently fell in Sicily, appeared as leader of the aristocracy, and Cleon son of Cleaenetus of the people. The latter seems, more than any one else, to have been the cause of the corruption of the democracy by his wild undertakings; and he was the first to use unseemly shouting and coarse abuse on the Bema, and to harangue the people with his cloak girt up short about him, whereas all his predecessors had spoken decently and in order. These were succeeded by Theramenes son of Hagnon as leader of the one party, and the lyre-maker Cleophon of the people. It was Cleophon who first granted the two-obol donation and for some time it continued to be given; but then Callicrates of Paeania ousted him by promising to add a third obol to the sum. Both of these persons were subsequently condemned to death; for the people, even if they are deceived for a time, in the end generally come to detest those who have beguiled them into any unworthy action. After Cleophon the popular leadership was occupied successively by the men who chose to talk the biggest and pander the most to the tastes of the majority, with their eyes fixed only on the interests of the moment. The best statesmen at Athens, after those of early times, seem to have been Nicias, Thucydides, and Theramenes. As to Nicias and Thucydides, nearly every one agrees that they were not merely men of birth and character, but also statesmen, and that they ruled the state with paternal care. On the merits of Theramenes opinion is divided, because it so happened that in his time public affairs were in a very stormy state. But those who give their opinion deliberately find him, not, as his critics falsely assert, overthrowing every kind of constitution, but supporting every kind so long as it did not transgress the laws; thus showing that he was able, as every good citizen should be, to live under any form of constitution, while he refused to countenance illegality and was its constant enemy.

29 · So long as the fortune of the war continued even, the Athenians preserved the democracy; but after the disaster in Sicily, when the Lacedaemonians had gained the upper hand through their alliance with



the king of Persia, they were compelled to abolish the democracy and establish in its place the constitution of the Four Hundred. The speech recommending this course before the vote was made by Melobius, and the motion was proposed by Pythodorus of Anaphlystus; but the real argument which persuaded the majority was the belief that the king of Persia was more likely to form an alliance with them if the constitution were on an oligarchical basis. The motion of Pythodorus was to the following effect. The popular Assembly was to elect twenty persons from among those over forty years of age, who, in conjunction with the existing ten members of the Committee of Public Safety, after taking an oath that they would frame such measures as they thought best for the state, should then prepare proposals for the public safety. In addition, any other person might make proposals, so that of all the schemes before them the people might choose the best. Cleitophon concurred with the motion of Pythodorus, but moved that the committee should also investigate the ancient laws enacted by Cleisthenes when he created the democracy, in order that they might have these too before them and so be in a position to decide wisely; his suggestion being that the constitution of Cleisthenes was not really democratic, but closely akin to that of Solon. When the committee was elected, their first proposal was that the Prytanes should be completed to put to the vote any motion that was offered on behalf of the public safety. Next they abolished all indictments for illegal proposals, all impeachments and public prosecutions, in order that every Athenian should be free to give his counsel on the situation, if he chose; and they decreed that if any person imposed a fine on any other for his acts in this respect, or prosecuted him or summoned him before the courts, he should, on an information being laid against him, be brought before the generals, who should deliver him to the Eleven to be put to death. After these preliminary measures, they drew up the constitution in the following manner. The revenues of the state were not to be spent on any purpose except the war. All magistrates should serve without remuneration for the period of the war, except the nine Archons and the Prytanes for the time being, who should each receive three obols a day. The whole of the rest of the administration was to be committed, for the period of the war, to those Athenians who were most capable of serving the state personally or pecuniarily, to the number of not less than five thousand. This body was to have full powers, to the extent even of making treaties with whomsoever they willed; and ten representatives, over forty years of age, were to be elected from each tribe to draw up the list of the Five Thousand, after taking an oath on a full and perfect

sacrifice.

30 · These were the recommendations of the committee; and when they had been ratified the Five Thousand elected from their own number a hundred commissioners to draw up the constitution. They, on their appointment, drew up and produced the following recommendations. There should be a Council, holding office for a year, consisting of men over thirty years of age, serving without pay. To this body should belong the Generals, the nine Archons, the Amphictyonic Registrar [Hieromnemon], the Taxiarchs, the Hipparchs, the Phylarchs, the commanders of garrisons, the Treasurers of Athena and the other gods, ten in number, the Hellenic Treasurers [Hellenotamiae], the Treasurers of the other non-sacred moneys, to the number of twenty, the ten Commissioners of Sacrifices [Hieropoei], and the ten Superintendents of the mysteries. All these were to be appointed by the Council from a larger number of selected candidates, chosen from its members for the time being. The other offices were all to be filled by lot, and not from the members of the Council. The Hellenic Treasurers who actually administered the funds should not sit with the Council. As regards the future, four Councils were to be created, of men of the age already mentioned, and one of these was to be chosen by lot to take office at once, while the others were to receive it in turn, in the order decided by the lot. For this purpose the hundred commissioners were to distribute themselves and all the rest as equally as possible into four parts, and cast lots for precedence, and the selected body should hold office for a year. They were to administer that office as seemed to them best, both with reference to the safe custody and due expenditure of the finances, and generally with regard to all other matters to the best of their ability. If they desired to take a larger number of persons into counsel, each member might call in one assistant of his own choice, subject to the same qualification of age. The Council was to sit once every five days, unless there was any special need for more frequent sittings. The casting of the lot for the Council was to be held by the nine Archons; votes on divisions were to be counted by five tellers chosen by lot from the members of the Council, and of these one was to be selected by lot every day to act as president. These five persons were to cast lots for precedence between the parties wishing to appear before the Council, giving the first place to sacred matters, the second to heralds, the third to embassies, and the fourth to all other subjects; but matters concerning the war might be dealt with, on the motion of the generals, whenever there was need,

without balloting. Any member of the Council who did not enter the Council-house at the time named should be fined a drachma for each day, unless he was away on leave of absence from the Council.

**31** · Such was the constitution which they drew up for the time to come, but for the immediate present they devised the following scheme. There should be a Council of Four Hundred, as in the ancient constitution, forty from each tribe, chosen out of candidates of more than thirty years of age, selected by the members of the tribes. This Council should appoint the magistrates and draw up the form of oath which they were to take; and in all that concerned the laws, in the examination of official accounts, and in other matters generally, they might act according to their discretion. They must, however, observe the laws that might be enacted with reference to the constitution of the state, and had no power to alter them nor to pass others. The generals should be provisionally elected from the whole body of the Five Thousand, but so soon as the Council came into existence it was to hold an examination of military equipments, and thereon elect ten persons, together with a secretary, and the persons thus elected should hold office during the coming year with full powers, and should have the right, whenever they desired it, of joining in the deliberations of the Council. They were also to elect a single Hipparch and ten Phylarchs; but for the future the Council was to elect these officers according to the regulations above laid down. No office, except those of member of the Council and of general, might be held more than once, either by the first occupants or by their successors. With reference to the future distribution of the Four Hundred into the four successive sections, the hundred commissioners must divide them whenever the time came for the citizens to join in the Council along with the rest.

**32** · The hundred commissioners appointed by the Five Thousand drew up the constitution as just stated; and after it had been ratified by the people, under the presidency of Aristomachus, the existing Council, that of the year of Callias, was dissolved before it had completed its term of office. It was dissolved on the fourteenth day of the month Thargelion, and the Four Hundred entered into office on the twenty-first; whereas the regular Council, elected by lot, ought to have entered into office on the fourteenth of Scirophorion. Thus was the oligarchy established, in the archonship of Callias, just about a hundred years after the expulsion of

the tyrants. The chief promoters of the revolution were Pisander, Antiphon, and Theramenes, all of them men of good birth and with high reputations for ability and judgement. When, however, this constitution had been established, the Five Thousand were only nominally selected, and the Four Hundred, together with the ten officers on whom full powers had been conferred, occupied the Council-house and really administered the government. They began by sending ambassadors to the Lacedaemonians proposing a cessation of the war on the basis of the existing position; but as the Lacedaemonians refused to listen to them unless they would also abandon the command of the sea, they broke off the negotiations.

**33** · For about four months the constitution of the Four Hundred lasted, and Mnasilochns held office as Archon of their nomination for two months of the year of Theopompus, who was Archon for the remaining ten. On the loss of the naval battle of Eretria, however, and the revolt of the whole of Euboea except Oreum, the indignation of the people was greater than at any of the earlier disasters, since they drew far more supplies at this time from Euboea than from Attica itself. Accordingly they deposed the Four Hundred and committed the management of affairs to the Five Thousand, consisting of persons possessing a military equipment. At the same time they voted that pay should not be given for any public office. The persons chiefly responsible for the revolution were Aristocrates and Theramenes, who disapproved of the action of the Four Hundred in retaining the direction of affairs entirely in their own hands, and referring nothing to the Five Thousand. During this period the constitution of the state seems to have been admirable, since it was a time of war and the franchise was in the hands of those who possessed military equipment.

**34** · The people, however, in a very short time deprived the Five Thousand of their monopoly of the government. Then, six years after the overthrow of the Four Hundred, in the archonship of Callias of Angele, the battle of Arginusae took place, of which the results were, first, that the ten generals who had gained the victory were all condemned by a single decision, owing to the people being led astray by persons who aroused their indignation; though, as a matter of fact, some of the generals had actually taken no part in the battle, and others were themselves picked up by other vessels. Secondly, when the

Lacedaemonians proposed to evacuate Decelea and make peace on the basis of the existing position, although some of the Athenians supported this proposal, the majority refused to listen to them. In this they were led astray by Cleophon, who appeared in the Assembly drunk and wearing his breastplate, and prevented peace being made, declaring that he would never accept peace unless the Lacedaemonians abandoned their claims on all the cities allied with them. They mismanaged their opportunity then, and in a very short time they learnt their mistake. The next year, in the archonship of Alexias, they suffered the disaster of Aegospotami, the consequence of which was that Lysander became master of the city, and set up the Thirty in the following manner. One of the terms of peace stipulated that the state should be governed according to 'the ancient constitution'. Accordingly the popular party tried to preserve the democracy, while that part of the upper class which belonged to the political clubs, together with the exiles who had returned since the peace, aimed at an oligarchy, and those who were not members of any club, though in other respects they considered themselves as good as any other citizens, were anxious to restore the ancient constitution. The latter class included Archinus, Anytus, Cleitophon, Phormisius, and many others, but their most prominent leader was Theramenes. Lysander, however, threw his influence on the side of the oligarchical party, and the popular Assembly was compelled by sheer intimidation to pass a vote establishing the oligarchy. The motion to this effect was proposed by Dracontides of Aphidna.

35 · In this way were the Thirty established in power, in the archonship of Pythodorus. As soon, however, as they were masters of the city, they ignored all the resolutions which had been passed relating to the organization of the constitution, but after appointing a Council of Five Hundred and the other magistrates out of a thousand selected candidates, and associating with themselves ten Archons in Piraeus, eleven superintendents of the prison, and three hundred 'lash-bearers' as attendants, they kept the city under their own control. At first, indeed, they behaved with moderation towards the citizens and pretended to administer the state according to the ancient constitution. They took down from the hill of Areopagus the laws of Ephialtes and Arcestratus relating to the Areopagite Council; they also repealed such of the statutes of Solon as were obscure, and abolished the supreme power of the law-courts. In this they claimed to be restoring the constitution and freeing it from obscurities; as, for instance, by making the testator free once and for

all to leave his property as he pleased, and abolishing the existing limitations in cases of insanity, old age, and undue female influence, in order that no opening might be left for professional accusers. In other matters also their conduct was similar. At first, then, they acted on these lines, and they destroyed the professional accusers and those mischievous and evil-minded persons who, to the great detriment of the democracy, had attached themselves to it in order to curry favour with it. With all of this the city was much pleased, and thought that the Thirty were doing it with the best of motives. But so soon as they had got a firmer hold on the city, they spared no class of citizens, but put to death any persons who were eminent for wealth or birth or character. Herein they aimed at removing all whom they had reason to fear, while they also wished to lay hands on their possessions; and in a short time they put to death not less than fifteen hundred persons.

36 · Theramenes, however, seeing the city thus falling into ruin, was displeased with their proceedings, and counselled them to cease such unprincipled conduct and let the better classes have a share in the government. At first they resisted his advice, but when his proposals came to be known abroad, and the masses began to associate themselves with him, they were seized with alarm lest he should make himself the leader of the people and destroy their despotic power. Accordingly they drew up a list of three thousand citizens, to whom they announced that they would give a share in the constitution. Theramenes, however, criticized this scheme also, first on the ground that, while proposing to give all respectable citizens a share in the constitution, they were actually giving it only to three thousand persons, as though all merit were confined within that number; and secondly because they were doing two inconsistent things, since they made the government rest on the basis of force, and yet made the governors inferior in strength to the governed. However, they took no notice of his criticisms, and for a long time put off the publication of the list of the Three Thousand and kept to themselves the names of those who had been placed upon it; and every time they did decide to publish it they proceeded to strike out some of those who had been included in it, and insert others who had been omitted.

37 · Now when winter had set in, Thrasybulus and the exiles occupied Phyle, and the force which the Thirty led out to attack them met with a reverse. Thereupon the Thirty decided to disarm the bulk of the

population and to get rid of Theramenes; which they did in the following way. They introduced two laws into the Council, which they commanded it to pass; the first of them gave the Thirty absolute power to put to death any citizen who was not included in the list of the Three Thousand, while the second disqualified all persons from participation in the franchise who should have assisted in the demolition of the fort of Eëtionēia, or have acted in any way against the Four Hundred who had organized the previous oligarchy. Theramenes had done both, and accordingly, when these laws were ratified, he became excluded from the franchise and the Thirty had full power to put him to death. Theramenes having been thus removed, they disarmed all the people except the Three Thousand, and in every respect showed a great advance in cruelty and crime. They also sent ambassadors to Lacedaemon to blacken the character of Theramenes and to ask for help; and the Lacedaemonians, in answer to their appeal, sent Callibius as military governor with about seven hundred troops, who came and occupied the Acropolis.

**38** · These events were followed by the occupation of Munichia by the exiles from Phyle, and their victory over the Thirty and their partisans. After the fight the party of the city retreated, and next day they held a meeting in the marketplace and deposed the Thirty, and elected ten citizens with full powers to bring the war to a termination. When, however, the Ten had taken over the government they did nothing toward the object for which they were elected, but sent envoys to Lacedaemon to ask for help and to borrow money. Further, finding that the citizens who possessed the franchise were displeased at their proceedings, they were afraid lest they should be deposed, and consequently, in order to strike terror into them (in which design they succeeded), they arrested Demaretus, one of the most eminent citizens, and put him to death. This gave them a firm hold on the government, and they also had the support of Callibius and his Peloponnesians, together with several of the Knights; for some of the members of this class were the most zealous among the citizens to prevent the return of the exiles from Phyle. When, however, the party in Piraeus and Munichia began to gain the upper hand in the war, through the defection of the whole populace to them, the party in the city deposed the original Ten, and elected another Ten, consisting of men of the highest repute. Under their administration, and with their active and zealous co-operation, the treaty of reconciliation was made and the populace returned to the city. The most prominent members of this board were Rhinon of Paeania and

Phayllus of Acherdus, who, even before the arrival of Pausanias, opened negotiations with the party in Piraeus, and after his arrival seconded his efforts to bring about the return of the exiles. For it was Pausanias, the king of the Lacedaemonians, who brought the peace and reconciliation to a fulfilment, in conjunction with the ten commissioners of arbitration who arrived later from Lacedaemon, at his own earnest request. Rhinon and his colleagues received a vote of thanks for the goodwill shown by them to the people, and though they received their charge under an oligarchy and handed in their accounts under a democracy, no one, either of the party that had stayed in the city or of the exiles that had returned from the Piraeus, brought any complaint against them. On the contrary, Rhinon was immediately elected general on account of his conduct in this office.

**39** · This reconciliation was effected in the archonship of Eucleides, on the following terms. All persons who, having remained in the city during the troubles, were now anxious to leave it, were to be free to settle at Eleusis, retaining their civil rights and possessing full and independent powers of self-government, and with the free enjoyment of their own personal property. The temple at Eleusis should be common ground for both parties, and should be under the superintendence of the Ceryces and the Eumolpidae, according to ancient custom. The settlers at Eleusis should not be allowed to enter Athens, nor the people of Athens to enter Eleusis, except at the season of the mysteries. The secessionists should pay their share to the fund for the common defence out of their revenues, just like all the other Athenians. If any of the seceding party wished to take a house in Eleusis, the people would help them to obtain the consent of the owner; but if they could not come to terms, they should appoint three valuers on either side, and the owner should receive whatever price they should appoint. Of the inhabitants of Eleusis, those whom the secessionists wished to remain should be allowed to do so. The list of those who desired to secede should be made up within ten days after the taking of the oaths in the case of persons already in the country, and their actual departure should take place within twenty days; persons at present out of the country should have the same terms allowed to them after their return. No one who settled at Eleusis should be capable of holding any office in Athens until he should again register himself on the roll as a resident in the city. Trials for homicide, in which one party had either killed or wounded another, should be conducted according to ancestral practice. There should be a general amnesty concerning past events



towards all persons except the Thirty, the Ten, the Eleven, and the magistrates in Piraeus; and these too should be included if they should submit their accounts in the usual way. Such accounts should be given by the magistrates in Piraeus before a court of citizens in Piraeus, and by the magistrates in the city before a court of those rated.<sup>3</sup> On these terms those who wished to do so might secede. Each party was to repay separately the money which it had borrowed for the war.

40 · When the reconciliation had taken place on these terms, those who had fought on the side of the Thirty felt considerable apprehensions, and a large number intended to secede. But as they put off entering their names till the last moment, as people will do, Archinus, observing their numbers, and being anxious to retain them as citizens, cut off the remaining days during which the list should have remained open; and in this way many persons were compelled to remain, though they did so very unwillingly until they recovered confidence. This is one point in which Archinus appears to have acted in a most statesmanlike manner, and another was his subsequent prosecution of Thrasybulus on the charge of illegality, for a motion by which he proposed to confer the franchise on all who had taken part in the return from Piraeus, although some of them were notoriously slaves. And yet a third such action was when one of the returned exiles began to violate the amnesty, whereupon Archinus haled him to the Council and persuaded them to execute him without trial, telling them that now they would have to show whether they wished to preserve the democracy and abide by the oaths they had taken; for if they let this man escape they would encourage others to imitate him, while if they executed him they would make an example for all to learn by. And this was exactly what happened; for after this man had been put to death no one ever again broke the amnesty. On the contrary, the Athenians seem, both in public and in private, to have behaved in the most unprecedentedly admirable and public-spirited way with reference to the preceding troubles. Not only did they blot out all memory of former offences, but they even repaid to the Lacedaemonians out of the public purse the money which the Thirty had borrowed for the war, although the treaty required each party, the party of the city and the party of Piraeus, to pay its own debts separately. This they did because they thought it was a necessary first step in the direction of restoring harmony; but in other states, so far from the democratic parties making advances from their own possessions, they are rather in the habit of making a general redistribution of the land. A reconciliation was made with the

secessionists at Eleusis two years after the secession, in the archonship of Xenaenetus.

41 · This, however, took place at a later date; at the time of which we are speaking the people, having secured the control of the state, established the constitution which exists at the present day. Pythodorus was Archon at the time, but the democracy seems to have assumed the supreme power with perfect justice, since it had effected its own return by its own exertions.<sup>4</sup> This was the eleventh change which had taken place in the constitution of Athens. The first modification of the *primaeval* condition of things was when Ion and his companions brought the people together into a community, for then the people were first divided into the four tribes, and the tribe-kings were created. Next, and first after this, having now some semblance of a constitution, was that which took place in the reign of Theseus, consisting in a slight deviation from absolute monarchy. After this came the constitution formed under Draco, when the first code of laws was drawn up. The third was that which followed the civil war, in the time of Solon; from this the democracy took its rise. The fourth was the tyranny of Pisistratus; the fifth the constitution of Cleisthenes, after the overthrow of the tyrants, of a more democratic character than that of Solon. The sixth was that which followed on the Persian wars, when the Council of Areopagus had the direction of the state. The seventh, succeeding this, was the constitution which Aristides sketched out, and which Ephialtes brought to completion by overthrowing the Areopagite Council; under this the nation, misled by the demagogues, made the most serious mistakes in the interest of its maritime empire. The eighth was the establishment of the Four Hundred, followed by the ninth, the restored democracy. The tenth was the tyranny of the Thirty and the Ten. The eleventh was that which followed the return from Phyle and Piraeus; and this has continued from that day to this, with continual accretions of power to the masses. The democracy has made itself master of everything and administers everything by its votes in the Assembly and by the law-courts, in which it holds the supreme power. Even the jurisdiction of the Council has passed into the hands of the people at large; and this appears to be a judicious change, since small bodies are more open to corruption, whether by actual money or influence, than large ones. At first they refused to allow payment for attendance at the Assembly; but the result was that people did not attend. Consequently, after the Prytanes had tried many devices in order to induce the populace to come and ratify the votes, Agyrrhius, in the first

instance, made a provision of one obol a day, which Heracleides of Clazomenae, nicknamed 'the king', increased to two obols, and Agyrrhius again to three.

42 · The present state of the constitution is as follows. The franchise is open to all who are of citizen birth by both parents. They are enrolled among the demesmen at the age of eighteen. On the occasion of their enrolment the demesmen give their votes on oath, first whether the candidates appear to be of the age prescribed by the law (if not, they are dismissed back into the ranks of the boys), and secondly whether the candidate is free born and of such parentage as the laws require. Then if they decide that he is not a free man, he appeals to the law-courts, and the demesmen appoint five of their own number to act as accusers; if the court decides that he has no right to be enrolled, he is sold by the state as a slave, but if he wins his case he has a right to be enrolled among the demesmen without further question. After this the Council examines those who have been enrolled, and if it comes to the conclusion that any of them is less than eighteen years of age, it fines the demesmen who enrolled him. When the youths [Ephebi] have passed this examination, their fathers meet by their tribes, and appoint on oath three of their fellow tribesmen, over forty years of age, who, in their opinion, are the best and most suitable persons to have charge of the youths; and of these the Assembly elects one from each tribe as guardian, together with a director, chosen from the general body of Athenians, to control them all. Under the charge of these persons the youths first of all make the circuit of the temples; then they proceed to Piraeus, and some of them garrison Munichia and some the south shore. The Assembly also elects two trainers, with subordinate instructors, who teach them to fight in heavy armour, to use the bow and javelin, and to discharge a catapult. The guardians receive from the state a drachma apiece for their keep, and the youths four obols apiece. Each guardian receives the allowance for all the members of his tribe and buys the necessary provisions for the common stock (they mess together by tribes), and generally superintends everything. In this way they spend the first year. The next year, after giving a public display of their military evolutions, on the occasion when the Assembly meets in the theatre, they receive a shield and spear from the state; after which they patrol the country and spend their time in the forts. For these two years they are on garrison duty, and wear the military cloak, and during this time they are exempt from all taxes. They also can neither bring an action at law, nor have one brought against them, in

order that they may have no excuse for requiring leave of absence; though exception is made in cases of actions concerning inheritances and wards of state, or of any sacrificial ceremony connected with the family. When the two years have elapsed they thereupon take their position among the other citizens. Such is the manner of the enrolment of the citizens and the training of the youths.

**43** · All the magistrates that are concerned with the ordinary routine of administration are elected by lot, except the Military Treasurer, the Commissioners of the Theoric fund, and the Superintendent of Springs. These are elected by vote, and hold office from one Panathenaic festival to the next. All military officers are also elected by vote.

The Council of Five Hundred is elected by lot, fifty from each tribe. Each tribe holds the office of Prytanes in turn, the order being determined by lot; the first four serve for thirty-six days each, the last six for thirty-five, since the reckoning is by lunar years. The Prytanes for the time being, in the first place, mess together in the Tholus and receive a sum of money from the state for their maintenance; and, secondly, they convene the meetings of the Council and the Assembly. The Council they convene every day, unless it is a holiday, the Assembly four times in each prytany. It is also their duty to draw up the programme of the business of the Council and to decide what subjects are to be dealt with on each particular day, and where the sitting is to be held. They also draw up the programme for the meetings of the Assembly. One of these in each prytany is called the 'sovereign' Assembly; in this the people have to ratify the continuance of the magistrates in office, if they are performing their duties properly, and to consider the supply of corn and the defence of the country. On this day, too, impeachments are introduced by those who wish to do so, the lists of property confiscated by the state are read, and also applications for inheritances and wards of state, so that nothing may pass unclaimed without the cognizance of any person concerned. In the sixth prytany, in addition to the business already stated, the question is put to the vote whether it is desirable to hold a vote of ostracism or not; and complaints against professional accusers, whether Athenian or aliens domiciled in Athens, are received, to the number of not more than three of either class, together with cases in which an individual has made some promise to the people and has not performed it. Another Assembly in each prytany is assigned to the hearing of petitions, and at this meeting any one is free, on depositing the petitioner's olive-branch, to speak to

the people concerning any matter, public or private. The two remaining meetings are devoted to all other subjects, and the laws require them to deal with three questions connected with religion, three connected with heralds and embassies, and three on secular subjects. Sometimes questions are brought forward without a preliminary vote.

Heralds and envoys appear first before the Prytanes, and the bearers of dispatches also deliver them to the same officials.

**44** · There is a single President of the Prytanes, elected by lot, who presides for a night and a day; he may not hold the office for more than that time, nor may the same individual hold it twice. He keeps the keys of the sanctuaries in which the treasures and public records of the state are preserved, and also the public seal; and he is bound to remain in the Tholus, together with one-third of the Prytanes, named by himself. Whenever the Prytanes convene a meeting of the Council or Assembly, he appoints by lot nine Proedri, one from each tribe except that which holds the office of Prytanes for the time being; and out of these nine he similarly appoints one as President, and hands over the programme for the meeting to them. They take it and see to the preservation of order, put forward the various subjects which are to be considered, decide the results of the votings, and direct the proceedings generally. They also have power to dismiss the meeting. No one may act as President more than once in the year, but he may be a Proedrus once in each prytany.

Elections to the offices of General and Hipparch and all other military commands are held in the Assembly, in such manner as the people decide; they are held after the sixth prytany by the first board of Prytanes in whose term of office the omens are favourable. There has, however, to be a preliminary consideration by the Council in this case also.

**45** · In former times the Council had full powers to inflict fines and imprisonment and death. When it had consigned Lysimachus to the executioner, and he was sitting in the immediate expectation of death, Eumelides of Alopece rescued him from its hands, maintaining that no citizen ought to be put to death except on the decision of a court of law. Accordingly a trial was held in a law-court, and Lysimachus was acquitted, receiving henceforth the nickname of 'the man from the drum-head'; and the people deprived the Council thenceforward of the power to inflict death or imprisonment or fine, passing a law that if the Council condemn any person for an offence or inflict a fine, the Thesmothetae

shall bring the sentence or fine before the law-court, and the decision of the jurors shall be the final judgement in the matter.

The Council passes judgement on nearly all magistrates, especially those who have the control of money; its judgement, however, is not final, but is subject to an appeal to the law-courts. Private individuals, also, may lay an information against any magistrate they please for not obeying the laws, but here too there is an appeal to the law-courts if the Council declare the charge proved. The Council also examines those who are to be its members for the ensuing year, and likewise the nine Archons. Formerly the Council had full power to reject candidates for office as unsuitable, but now they have an appeal to the law-courts. In all these matters, therefore, the Council has no final jurisdiction. It takes, however, preliminary cognizance of all matters brought before the Assembly, and the Assembly cannot vote on any question unless it has first been considered by the Council and placed on the programme by the Prytanes; since a person who carries a motion in the Assembly is liable to an action for illegal proposal on these grounds.

**46** · The Council also superintends the triremes that are already in existence, with their tackle and sheds, and builds new triremes or quadriremes, whichever the Assembly votes, with tackle and sheds to match. The Assembly appoints master-builders for the ships by vote; and if they do not hand them over completed to the next Council, they cannot receive the donation—that being normally given during the term of the following Council. For the building of the triremes it appoints ten commissioners, chosen from its own members. The Council also inspects all public buildings, and if it is of opinion that the state is being defrauded, it reports the culprit to the Assembly, and on condemnation hands him over to the law-courts.

**47** · The Council also co-operates with the other magistrates in most of their duties. First there are the treasurers of Athena, ten in number, elected by lot, one from each tribe. According to the law of Solon—which is still in force—they must be Pentacosimedimni, but in point of fact the person on whom the lot falls holds the office even though he be quite a poor man. These officers take over charge of the statue of Athena, the figures of Victory, and all the other ornaments of the temple, together with the money, in the presence of the Council. Then there are the Commissioners for Public Contracts [Poletae], ten in number, one chosen

by lot from each tribe, who farm out all the public contracts. They lease the mines and taxes in conjunction with the Military Treasurer and the Commissioners of the Theoric fund, in the presence of the Council, and grant, to the persons indicated by the vote of the Council, the mines which are let out by the state, including both the workable ones, which are let for three years, and those which are let under special agreements for ten years. They also sell, in the presence of the Council, the property of those who have gone into exile from the court of the Areopagus, and of others whose goods have been confiscated, and the nine Archons ratify the contracts. They also hand over to the Council lists of the taxes which are farmed out for the year, entering on whitened tablets the name of the lessee and the amount paid. They make separate lists, first of those who have to pay their instalments in each prytany, on ten several tablets, next of those who pay thrice in the year, with a separate tablet for each instalment, and finally of those who pay in the ninth prytany. They also draw up a list of farms and dwellings which have been confiscated and sold by order of the courts; for these too come within their province. In the case of dwellings the value must be paid up in five years, and in that of farms, in ten. The instalments are paid in the ninth prytany. Further, the King-archon brings before the Council the leases of the sacred enclosures written on whitened tablets. These too are leased for ten years, and the instalments are paid in the ninth prytany; consequently it is in this prytany that the greatest amount of money is collected. The tablets containing the lists of the instalments are carried into the Council, and the public clerk takes charge of them. Whenever a payment of instalments is to be made he takes from the pigeon-holes the precise list of the sums which are to be paid and struck off on that day, and delivers it to the Receivers-General. The rest are kept apart, in order that no sum may be struck off before it is paid.

48 · There are ten Receivers-General [Apodectae], elected by lot, one from each tribe. These officers receive the tablets, and strike off the instalments as they are paid, in the presence of the Council in the Council-chamber, and give the tablets back to the public clerk. If any one fails to pay his instalment, a note is made of it on the tablet; and he is bound to pay double the amount of the deficiency, or, in default, to be imprisoned. The Council has full power by the laws to exact these payments and to inflict this imprisonment. They receive all the instalments, therefore, on one day, and portion the money out among the magistrates; and on the next day they bring up the report of the

apportionment, written on a wooden notice-board, and read it out in the Council-chamber, after which they ask publicly in the Council whether any one knows of any malpractice in reference to the apportionment, on the part of either a magistrate or a private individual, and if any one is charged with malpractice they take a vote on it.

The Council also elects ten Auditors [Logistae] by lot from its own members, to audit the accounts of the magistrates for each prytany. They also elect one Examiner of Accounts [Euthunus] by lot from each tribe, with two assessors [Paredri] for each examiner, whose duty it is to sit at the ordinary market hours, each opposite the statue of the eponymous hero of his tribe; and if any one wishes to prefer a charge, on either public or private grounds, against any magistrate who has passed his audit before the law-courts, within three days of his having so passed, he enters on a whitened tablet his own name and that of the magistrate prosecuted, together with the malpractice that is alleged against him. He also appends his claim for a penalty of such amount as seems to him fitting, and gives in the record to the Examiner. The latter takes it, and if after reading it he considers it proved he hands it over, if a private case, to the local justices who introduce cases for the tribe concerned, while if it is a public case he enters it on the register of the Thesmothetae. Then, if the Thesmothetae accept it, they bring the accounts of this magistrate once more before the law-court, and the decision of the jury stands as the final judgement.

49 · The Council also inspects the horses belonging to the state. If a man who has a good horse is found to keep it in bad condition, he is mulcted in his allowance of corn; while those which cannot keep up or which shy and will not stand steady, it brands with a wheel on the jaw, and the horse so marked is disqualified for service. It also inspects those who appear to be fit for service as scouts, and any one whom it rejects is deprived of his horse. It also examines the infantry who serve among the cavalry, and any one whom it rejects ceases to receive his pay. The roll of the cavalry is drawn up by the Commissioners of Enrolment [Catalogeis], ten in number, elected by the Assembly by open vote. They hand over to the Hipparchs and Phylarchs the list of those whom they have enrolled, and these officers take it and bring it up before the Council, and there open the tablet containing the names of the cavalry. If any of those who have been on the roll previously make affidavit that they are physically incapable of cavalry service, they strike them out; then they call up the



persons enrolled, and if any one makes affidavit that he is either physically or pecuniarily incapable of cavalry service they dismiss him, but if no such affidavit is made the Council vote whether the individual in question is suitable for the purpose or not. If they vote in the affirmative his name is entered on the tablet; if not, he is dismissed with the others.

Formerly the Council used to decide on the plans for public buildings and the contract for making the robe of Athena; but now this is done by a jury in the law-courts appointed by lot, since the Council was considered to have shown favouritism in its decisions. The Council also shares with the Military Treasurer the superintendence of the manufacture of the images of Victory and the prizes at the Panathenaic festival.

The Council also examines infirm paupers; for there is a law which provides that persons possessing less than three minas, who are so crippled as to be unable to do any work, are, after examination by the Council, to receive two obols a day from the state for their support. A treasurer is appointed by lot to attend to them.

The Council also, speaking broadly, co-operates in most of the duties of all the other magistrates; and this ends the list of the functions of that body.

**50** · There are ten Commissioners for Repairs of Temples elected by lot, who receive a sum of thirty minas from the Receivers-General, and therewith carry out the most necessary repairs in the temples.

There are also ten City Commissioners [Astynomi], of whom five hold office in Piraeus and five in the city. Their duty is to see that female flute- and harp- and lute-players are not hired at more than two drachmas, and if more than one person is anxious to hire the same girl, they cast lots and hire her out to the person to whom the lot falls. They also provide that no collector of sewage shall deposit any of his sewage within ten stadia of the walls; they prevent people from blocking up the streets by building, or stretching barriers across them, or making raised drain-pipes with a discharge into the street, or having doors which open outwards; they also remove the corpses of those who die in the streets for which purpose they have a body of state slaves assigned to them.

**51** · Market Commissioners [Agoranomi] are elected by lot, five for Piraeus, five for the city. Their statutory duty is to see that all articles offered for sale in the market are pure and unadulterated.

Commissioners of Weights and Measures [Metronomi] are elected by lot, five for the city, and five for Piraeus. They see that sellers use fair weights and measures.

Formerly there were ten Corn Commissioners [Sitophylaces], elected by lot, five for Piraeus, and five for the city; but now there are twenty for the city and fifteen for Piraeus. Their duties are, first, to see that the unprepared corn in the market is offered for sale at reasonable prices, and secondly, to see that the millers sell barley meal at a price proportionate to that of barley, and that the bakers sell their loaves at a price proportionate to that of wheat, and of such weight as the Commissioners may appoint; for the law requires them to fix the standard weight.

There are ten Superintendents of the Mart, elected by lot, whose duty is to superintend the Mart, and to compel merchants to bring up into the city two-thirds of the corn which is brought by sea to the Corn Mart.

**52** · The Eleven also are appointed by lot to take care of the prisoners in the state gaol. Thieves, kidnappers, and pickpockets are brought to them, and if they plead guilty they are executed, but if they deny the charge the Eleven bring the case before the law-courts; if the prisoners are acquitted, they release them, but if not, they then execute them. They also bring up before the law-courts the list of farms and houses claimed as state-property; and if it is decided that they are so, they deliver them to the Commissioners for Public Contracts. The Eleven also bring up informations laid against magistrates alleged to be disqualified; this function comes within their province, but some such cases are brought up by the Thesmothetae.

There are also five Introducers of Cases [Eisagogeis], elected by lot, one for each pair of tribes, who bring up the one-month cases to the law-courts. The one-month cases are these: refusal to pay up a dowry where a party is bound to do so, refusal to pay interest on money borrowed at 12 per cent., or where a man desirous of setting up business in the market has borrowed from another man capital to start with; also cases of slander, cases arising out of friendly loans or partnerships, and cases concerned with slaves, cattle, and the office of trierarch, or with banks. These are brought up as one-month cases and are introduced by these officers; but the Receivers-General perform the same function in cases for or against the farmers of taxes. Those in which the sum concerned is not more than ten drachmas they can decide summarily, but all above that amount they bring into the law-courts as one-month cases.

53 · The Forty are also elected by lot, four from each tribe, before whom suitors bring all other cases. Formerly they were thirty in number, and they went on circuit through the demes to hear causes; but after the oligarchy of the Thirty they were increased to forty. They have full powers to decide cases in which the amount at issue does not exceed ten drachmas, but anything beyond that value they hand over to the Arbitrators. The Arbitrators take up the case, and, if they cannot bring the parties to an agreement, they give a decision. If their decision satisfies both parties, and they abide by it, the case is at an end; but if either of the parties appeals to the law-courts, the Arbitrators enclose the evidence, the pleadings, and the laws quoted in the case in two urns, those of the plaintiff in the one, and those of the defendant in the other. These they seal up and, having attached to them the decision of the arbitrator, written out on a tablet, place them in the custody of the four justices whose function it is to introduce cases on behalf of the tribe of the defendant. These officers take them and bring up the case before the law-court, to a jury of two hundred and one members in cases up to the value of a thousand drachmas, or to one of four hundred and one in cases above that value. No laws or pleadings or evidence may be used except those which were adduced before the Arbitrator, and have been enclosed in the urns.

The Arbitrators are persons in the sixtieth year of their age; this appears from the schedule of the Archons and the Eponymi. There are two classes of Eponymi, the ten who give their names to the tribes, and the forty-two of the years of service. The youths, on being enrolled among the citizens, were formerly registered upon whitened tablets, and the names were appended by the Archon in whose year they were enrolled, and by the Eponymus who had been in course in the preceding year; at the present day they are written on a bronze pillar, which stands in front of the Council-chamber, near the Eponymi of the tribes. Then the Forty take the last of the Eponymi of the years of service, and assign the arbitrations to the persons belonging to that year, casting lots to determine which arbitrations each shall undertake; and every one is compelled to carry through the arbitrations which the lot assigns to him. The law enacts that any one who does not serve as Arbitrator when he has arrived at the necessary age shall lose his civil rights, unless he happens to be holding some other office during that year, or to be out of the country. These are the only persons who escape the duty. Any one who suffers injustice at the hands of the Arbitrator may appeal to the whole board of Arbitrators, and if they find the magistrate guilty the law

enacts that he shall lose his civil rights. The persons thus condemned have, however, in their turn an appeal. The Eponymi are also used in reference to military expeditions; when the men of military age are despatched on service, a notice is put up stating that the men from such-and-such an Archon and Eponymus to such-and-such another Archon and Eponymus are to go on the expedition.

**54** · The following magistrates also are elected by lot: Five Commissioners of Roads [Hodopoei], who, with an assigned body of public slaves, are required to keep the roads in order; and ten Auditors, with ten assistants, to whom all persons who have held any office must give in their accounts. These are the only officers who audit the accounts of those who are subject to examination, and who bring them up for examination before the law-courts. If they detect any magistrate in embezzlement, the jury condemn him for theft, and he is obliged to repay tenfold the sum he is declared to have misappropriated. If they charge a magistrate with accepting bribes and the jury convict him, they fine him for corruption, and this sum too is repaid tenfold. Or if they convict him of unfair dealing, he is fined on that charge, and the sum assessed is paid without increase, if payment is made before the ninth prytany, but otherwise it is doubled. A tenfold fine is not doubled.

The Clerk of the Prytany, as he is called, is also elected by lot. He has the charge of all public documents, and keeps the resolutions which are passed by the Assembly, and checks the transcripts of all other official papers and attends at the sessions of the Council. Formerly he was elected by vote, and the most distinguished and trustworthy persons were elected to the post, as is known from the fact that the name of this officer is appended on the pillars recording treaties of alliance and grants of consulship and citizenship. Now, however, he is elected by lot. There is, in addition, a Clerk of the Laws, elected by lot, who attends at the sessions of the Council; and he too checks all the transcripts. The Assembly also elects by open vote a clerk to read documents to it and to the Council; but he has no other duty except that of reading aloud.

The Assembly also elects by lot the Commissioners of Public Worship [Hieropoei], known as the Commissioners for Sacrifices, who offer the sacrifices appointed by oracle, and, in conjunction with the seers, take the auspices whenever there is occasion. It also elects by lot ten others, known as Annual Commissioners, who offer certain sacrifices and administer all the quadrennial festivals except the Panathenaea. There are

the following quadrennial festivals: first that of Delos (where there is also a sexennial festival), secondly the Brauronia, thirdly the Heracleia, fourthly the Eleusinia, and fifthly the Panathenaea; and no two of these are celebrated in the same place. To these the Hephaestia has now been added, in the archonship of Cephisophon.

An Archon is also elected by lot for Salamis, and a Demarch for Piraeus. These officers celebrate the Dionysia in these two places, and appoint Choregi. In Salamis, moreover, the name of the Archon is publicly recorded.

55 · All the foregoing magistrates are elected by lot, and their powers are those which have been stated. To pass on to the nine Archons, as they are called, the manner of their first establishment has been described already. At the present day six Thesmothetae are elected by lot, together with their clerk, and in addition to these an Archon, a King, and a Polemarch. One is elected from each tribe. They are examined first of all by the Council of Five Hundred, with the exception of the clerk. The latter is examined only in the law-court, like other magistrates (for all magistrates, whether elected by lot or by open vote, are examined before entering on their offices); but the nine Archons are examined both in the Council and again in the law-court. Formerly no one could hold the office if the Council rejected him, but now there is an appeal to the law-court, which is the final authority in the matter of the examination. When they are examined, they are asked, first, ‘Who is your father, and of what deme? who is your father’s father? who is your mother? who is your mother’s father, and of what deme?’ Then the candidate is asked whether he possesses an ancestral Apollo and a household Zeus, and where their sanctuaries are; next if he possesses a family tomb, and where; then if he treats his parents well, and pays his taxes, and has served on the required military expeditions. When the examiner has put these questions, he proceeds, ‘Call the witnesses to these facts’; and when the candidate has produced his witnesses, he next asks, ‘Does any one wish to make any accusation against this man?’ If an accuser appears, he gives the parties an opportunity of making their accusation and defence, and then puts it to the Council to pass the candidate or not, and to the law-court to give the final vote. If no one wishes to make an accusation, he proceeds at once to the vote. Formerly a single individual gave the vote, but now all the members are obliged to vote on the candidates, so that if any unprincipled candidate has managed to get rid of his accusers, it may still

be possible for him to be disqualified before the law-court. When the examination has been thus completed, they proceed to the stone on which are the pieces of the victims, and on which the Arbitrators take oath before declaring their decisions, and witnesses swear to their testimony. On this stone the Archons stand, and swear to execute their office uprightly and according to the laws, and not to receive presents in respect of the performance of their duties, or, if they do, to dedicate a golden statue. When they have taken this oath they proceed to the Acropolis, and there they repeat it; after this they enter upon their office.

**56** · The Archon, the King, and the Polemarch have each two assessors, nominated by themselves. These officers are examined in the law-court before they begin to act, and give in accounts on each occasion of their acting.

As soon as the Archon enters office, he begins by issuing a proclamation that whatever any one possessed before he entered into office, that he shall possess and hold until the end of his term. Next he assigns Choregi to the tragic poets, choosing three of the richest persons out of the whole body of Athenians. Formerly he used also to assign five Choregi to the comic poets, but now the tribes provide the Choregi for them. Then he receives the Choregi who have been appointed by the tribes for the men's and boy's choruses and the comic poets at the Dionysia, and for the men's and boy's choruses at the Thargelia (at the Dionysia there is a chorus for each tribe, but at the Thargelia one between two tribes, each tribe taking its turn in providing it); he transacts the exchanges of properties for them, and reports any excuses that are tendered, if any one says that he has already performed this service, or that he is exempt because he has performed some other service and the period of his exemption has not yet expired, or that he is not of the required age; for the Choregus of a boys' chorus must be over forty years of age. He also appoints Choregi for the festival at Delos, and a chief of the mission for the thirty-oar boat which conveys the youths thither. He also superintends sacred processions, both that in honour of Asclepius, when the initiated keep house, and that of the great Dionysia—the latter in conjunction with the Superintendents of that festival. These officers, ten in number, were formerly elected by open vote in the Assembly, and used to provide for the expenses of the procession out of their private means; but now one is elected by lot from each tribe, and the state contributes a hundred minas for the expenses. The Archon also

superintends the procession at the Thargelia, and that in honour of Zeus the Saviour. He also manages the contests at the Dionysia and the Thargelia.

These, then, are the festivals which he superintends. The suits and indictments which come before him, and which he, after a preliminary inquiry, brings up before the law-courts, are as follows. Injury to parents (for bringing these actions the prosecutor cannot suffer any penalty); injury to orphans (these actions lie against their guardians); injury to a ward of state (these lie against their guardians or their husbands); injury to an orphan's estate (these too lie against the guardians); mental derangement, where a party charges another with destroying his own property through unsoundness of mind; for appointment of liquidators, where a party refuses to divide property in which others have a share; for constituting a wardship; for determining between rival claims to a wardship; for granting inspection of property to which another party lays claim; for appointing oneself as guardian; and for determining disputes as to inheritances and wards of state. The Archon also has the care of orphans and wards of state, and of women who, on the death of their husbands, declare themselves to be with child; and he has power to inflict a fine on those who offend against the persons under his charge, or to bring the case before the law-courts. He also leases the houses of orphans and wards of state until they reach the age of fourteen, and takes mortgages on them; and if the guardians fail to provide the necessary food for the children under their charge, he exacts it from them. Such are the duties of the Archon.

**57** · The King in the first place superintends the mysteries, in conjunction with the Superintendents of Mysteries. The latter are elected in the Assembly by open vote, two from the general body of Athenians, one from the Eumolpidae, and one from the Ceryces. Next, he superintends the Lenaeon Dionysia, which consists of a procession and a contest. The procession is ordered by the King and the Superintendents in conjunction; but the contest is managed by the King alone. He also manages all the contests of the torch-race; and to speak broadly, he administers all the ancestral sacrifices. Indictments for impiety come before him, or any disputes between parties concerning priestly rites; and he also determines all controversies concerning sacred rites for the ancient families and the priests. All actions for homicide come before him, and it is he that makes the proclamation requiring polluted persons

to keep away from sacred ceremonies. Actions for homicide and wounding are heard, if the homicide or wounding is willful, in the Areopagus; so also in cases of killing by poison, and of arson. These are the only cases heard by that Council. Cases of unintentional homicide, or of intent to kill, or of killing a slave or a resident alien or a foreigner, are heard by the court of Palladium. When the homicide is acknowledged, but legal justification is pleaded, as when a man takes an adulterer in the act, or kills another by mistake in battle or in an athletic contest, the prisoner is tried in the court of Delphinium. If a man who is in banishment for a homicide which admits of reconciliation incurs a further charge of killing or wounding, he is tried in Phreatto, and he makes his defence from a boat moored near the shore. All these cases, except those which are heard in the Areopagus, are tried by the Ephetae on whom the lot falls. The King introduces them, and the hearing is held within sacred precincts and in the open air. Whenever the King hears a case he takes off his crown. The person who is charged with homicide is at all other times excluded from the temples, nor is it even lawful for him to enter the market-place; but on the occasion of his trial he enters the temple and makes his defence. If the actual offender is unknown, the writ runs against 'the doer of the deed'. The King and the tribe-kings also hear the cases in which the guilt rests on inanimate objects and animals.

**58** · The Polemarch performs the sacrifices to Artemis the huntress and to Enyalios, and arranges the contest at the funeral of those who have fallen in war, and makes offerings to the memory of Harmodius and Aristogeiton. Only private actions come before him, namely those in which resident aliens, both ordinary and privileged, and agents of foreign states are concerned. It is his duty to receive these cases and divide them into ten groups, and assign to each tribe the group which comes to it by lot; after which the magistrates who introduce cases for the tribe hand them over to the Arbitrators. The Polemarch, however, brings up in person cases in which an alien is charged with deserting his patron or neglecting to provide himself with one, and also of inheritances and wards of state where aliens are concerned; and in fact, generally, whatever the Archon does for citizens, the Polemarch does for aliens.

**59** · The Thesmothetae in the first place have the power of prescribing on what days the law-courts are to sit, and next of assigning them to the several magistrates; for the latter must follow the



arrangement which the Thesmothetae assign. Moreover they introduce impeachments before the Assembly, and bring up all votes for removal from office, challenges of a magistrate's conduct before the Assembly, indictments for illegal proposals or for proposing a law which is contrary to the interests of the state, complaints against Proedri or their president for their conduct in office, and the accounts presented by the generals. All indictments also come before them in which a deposit has to be made by the prosecutor, namely, indictments for concealment of foreign origin, for corrupt evasion of foreign origin (when a man escapes the disqualification by bribery), for blackmailing accusations, bribery, false entry of another as a state debtor, false testimony to the service of a summons, conspiracy to enter a man as a state debtor, corrupt removal from the list of debtors; and adultery. They also bring up the examinations of all magistrates, and the rejections by the demes and the condemnations by the Council. Moreover they bring up certain private suits in cases of merchandise and mines, or where a slave has slandered a free man. It is they also who cast lots to assign the courts to the various magistrates, whether for private or public cases. They ratify commercial treaties, and bring up the cases which arise out of such treaties; and they also bring up cases of perjury from the Areopagus. The casting of lots for the jurors is conducted by all the nine Archons, with the clerk to the Thesmothetae as the tenth, each performing the duty for his own tribe. Such are the duties of the nine Archons.

60 · There are also ten Commissioners of Games [Athlothetae], elected by lot, one from each tribe. These officers, after passing an examination, serve for four years; and they manage the Panathenaic procession, the contest in music and that in gymnastic, and the horse-race; they also provide the robe of Athena and, in conjunction with the Council, the vases, and they present the oil to the athletes. This oil is collected from the sacred olives. The Archon requisitions it from the owners of the farms on which the sacred olives grow, at the rate of three-quarters of a pint from each plant. Formerly the state used to sell the fruit itself, and if any one dug up or broke down one of the sacred olives, he was tried by the Council of Areopagus, and if he was condemned, the penalty was death. Since, however, the oil has been paid by the owner of the farm, the procedure has lapsed, though the law remains; and the oil is a state charge upon the property instead of being taken from the individual plants. When then, the Archon has collected the oil for his year of office, he hands it over to the Treasurers to preserve in the Acropolis,

and he may not take his seat in the Areopagus until he has paid over to the Treasurers the full amount. The Treasurers keep it in the Acropolis until the Panathenaea, when they measure it out to the Commissioners of Games, and they again to the victorious competitors. The prizes for the victors in the musical contest consist of silver and gold, for the victors in manly vigour, of shields, and for the victors in the gymnastic contest and the horse-race, of oil.

**61** · All officers connected with military service are elected by open vote. In the first place, ten Generals [Strategi], who were formerly elected one from each tribe, but now are chosen from the whole mass of citizens. Their duties are assigned to them by open vote; one is appointed to command the heavy infantry, and leads them if they go out to war; one to the defence of the country, who remains on the defensive, and fights if there is war within the borders of the country; two to Piraeus, one of whom is assigned to Munichia, and one to the south shore, and these have charge of the defence of the Piraeus; and one to superintend the symmories, who nominates the trierarchs and arranges exchanges of properties for them, and brings up actions to decide on rival claims in connexion with them. The rest are dispatched to whatever business may be on hand at the moment. The appointment of these officers is submitted for confirmation in each prytany, when the question is put whether they are considered to be doing their duty. If any officer is rejected on this vote, he is tried in the law-court, and if he is found guilty the people decide what punishment or fine shall be inflicted on him; but if he is acquitted he resumes his office. The Generals have full power, when on active service, to arrest any one for insubordination, or to cashier him publicly, or to inflict a fine; the latter is, however, unusual.

There are also ten Taxiarchs, one from each tribe, elected by open vote; and each commands his own tribesmen and appoints captains of companies [Lochagi]. There are also two Hipparchs, elected by open vote from the whole mass of the citizens, who command the cavalry, each taking five tribes. They have the same powers as the Generals have in respect of the infantry, and their appointments are also subject to confirmation. There are also ten Phylarchs, elected by open vote, one from each tribe, to command the cavalry, as the Taxiarchs do the infantry. There is also a Hipparch for Lemnos, elected by open vote, who has charge of the cavalry in Lemnos. There is also a treasurer of the Paralus, and another of the Ammonias, similarly elected.

62 · Of the magistrates elected by lot, in former times some, including the nine Archons, were elected out of the tribe as a whole, while others, namely those who are now elected in the Theseum, were apportioned among the demes; but since the demes used to sell the elections, these magistrates too are now elected from the whole tribe, except the members of the Council and the guards, who are still left to the demes.

Pay is received for the following services. First the members of the Assembly receive a drachma for the ordinary meetings, and nine obols for the 'sovereign' meeting. Then the jurors at the law-courts receive three obols; and the members of the Council five obols. The Prytanes receive an allowance of an obol for their maintenance. The nine Archons receive four obols apiece for maintenance, and also keep a herald and a flute-player; and the Archon for Salamis receives a drachma a day. The Commissioners for Games dine in the Prytaneum during the month of Hecatombaeon in which the Panathenaic festival takes place, from the fourteenth day onwards. The Amphictyonic deputies to Delos receive a drachma a day from the exchequer of Delos. Also all magistrates sent to Samos, Scyros, Lemnos, or Imbros receive an allowance for their maintenance. The military offices may be held any number of times, but none of the others more than once, except the membership of the Council, which may be held twice.

63 · The juries for the law-courts are chosen by lot by the nine Archons, each for their own tribe, and by the clerk to the Thesmothetae for the tenth. There are ten entrances into the courts, one for each tribe; twenty rooms in which the lots are drawn, two for each tribe; a hundred chests, ten for each tribe; other chests, in which are placed the tickets of the jurors on whom the lot falls; and two vases. Further, staves, equal in number to the jurors required, are placed by the side of each entrance; and counters are put into one vase, equal in number to the staves. These are inscribed with letters of the alphabet beginning with the eleventh (*lambda*), equal in number to the courts which require to be filled. All persons above thirty years of age are qualified to serve as jurors, provided they are not debtors to the state and have not lost their civil rights. If any unqualified person serves as juror, an information is laid against him, and he is brought before the court: if he is convicted, the jurors assess the punishment or fine which they consider him to deserve. If he is condemned to a money fine, he must be imprisoned until he has paid up

both the original debt, on account of which the information was laid against him, and also the fine which the court has imposed upon him. Each juror has his ticket of box-wood, on which is inscribed his name, with the name of his father and his deme, and one of the letters of the alphabet up to *kappa*; for the jurors in their several tribes are divided into ten sections, with approximately an equal number in each letter. When the Thesmothetes has decided by lot which letters are required to attend at the courts, the servant puts up above each court the letter which has been assigned to it by the lot.

64 · The ten chests are placed in front of the entrance used by each tribe, and are inscribed with the letters of the alphabet from *alpha* to *kappa*. The jurors cast in their tickets, each into the chest on which is inscribed the letter which is on his ticket; then the servant shakes them all up, and the Thesmothetes draws one ticket from each chest. The individual so selected is called the Ticket-hanger [Empectes], and his function is to hang up the tickets out of his chest on the bar which bears the same letter as that on the chest. He is chosen by lot, lest, if the Ticket-hanger were always the same person, he might tamper with the results. There are five of these bars in each of the rooms assigned for the lot-drawing. Then the Archon casts in the dice and thereby chooses the jurors from each tribe, room by room. The dice are made of bronze, coloured black or white; and according to the number of jurors required, so many white dice are put in, one for each five tickets, while the remainder are black, in the same proportion. As the Archon draws out the dice, the crier calls out the names of the individuals chosen. The Ticket-hanger is included among those selected. Each juror, as he is chosen and answers to his name, draws a counter from the vase, and holding it out with the letter uppermost shows it first to the presiding archon; and he, when he has seen it, throws the ticket of the juror into the chest on which is inscribed the letter which is on the counter, so that the juror must go into the court assigned to him by lot, and not into one chosen by himself, and that it may be impossible for any one to collect the jurors of his choice into any particular court. For this purpose chests are placed near the Archon, as many in number as there are courts to be filled that day, bearing the letters of the courts on which the lot has fallen.

65 · The juror thereupon, after showing his counter again to the attendant, passes through the barrier into the court. The attendant gives

him a staff of the same colour as the court bearing the letter which is on his counter, so as to ensure his going into the court assigned to him by lot; since, if he were to go into any other, he would be betrayed by the colour of his staff. Each court has a certain colour painted on the lintel of the entrance. Accordingly the juror, bearing his staff, enters the court which has the same colour as his staff, and the same letter as his counter. As he enters, he receives a voucher from the official to whom this duty has been assigned by lot. So with their counters and their staves the selected jurors take their seats in the court, having thus completed the process of admission. The unsuccessful candidates receive back their tickets from the Ticket-hangers. The public servants carry the chests from each tribe, one to each court, containing the names of the members of the tribe who are in that court, and hand them over to the officials, five in number,<sup>5</sup> assigned to the duty of giving back their tickets to the jurors in each court, so that these officials may call them up by name and pay them their fee.

**66** · When all the courts are full, two ballot boxes are placed in the first court, and a number of bronze dice, bearing the colours of the several courts, and other dice inscribed with the names of the presiding magistrates. Then two of the Thesmothetae, selected by lot, severally throw the dice with the colours into one box, and those with the magistrates' names into the other. The magistrate whose name is first drawn is thereupon proclaimed by the crier as assigned for duty in the court which is first drawn, and the second in the second, and similarly with the rest. The object of this procedure is that no one may know which court he will have, but that each may take the court assigned to him by lot.

When the jurors have come in, and have been assigned to their respective courts, the presiding magistrate in each court draws one ticket out of each chest (making ten in all, one out of each tribe), and throws them into another empty chest. He then draws out five of them, and assigns one to the superintendence of the water-clock, and the other four to the telling of the votes. This is to prevent any tampering beforehand with either the superintendent of the clock or the tellers of the votes, and to secure that there is no malpractice in these respects. The five who have not been selected for these duties receive from them a statement of the order in which the jurors shall receive their fees, and of the places where the several tribes shall respectively gather in the court for this purpose

when their duties are completed; the object being that the jurors may be broken up into small groups for the reception of their pay, and not all crowd together and impede one another.

67 · These preliminaries being concluded, the cases are called on. If it is a day for private cases, the private litigants are called. Four cases are taken in each of the categories defined in the law, and the litigants swear to confine their speeches to the point at issue. If it is a day for public causes, the public litigants are called, and only one case is tried. Water-clocks are provided, having small supply-tubes, into which the water is poured by which the length of the pleadings is regulated. Ten gallons are allowed for a case in which an amount of more than five thousand drachmas is involved, and three for the second speech on each side. When the amount is between one and five thousand drachmas, seven gallons are allowed for the first speech and two for the second; when it is less than one thousand, five and two. Six gallons are allowed for arbitrations between rival claimants, in which there is no second speech. The official chosen by lot to superintend the water-clock places his hand on the supply-tube whenever the clerk is about to read a resolution or law or affidavit or treaty. When, however, a case is conducted according to a set measurement of the day, he does not stop the supply, but each party receives an equal allowance of water. The standard of measurement is the length of the days in the month Poseideon<sup>6</sup> . . . . The measured day is employed in cases when imprisonment, death, exile, loss of civil rights, or confiscation of goods is assigned as the penalty.

68 · Most of the courts consist of 500 members . . . ;<sup>7</sup> and when it is necessary to bring public cases before a jury of 1,000 members, two courts combine for the purpose, . . .<sup>8</sup> The ballot balls are made of bronze with stems running through the centre, half of them having the stem pierced and the other half solid. When the speeches are concluded, the officials assigned to the taking of the votes give each juror two ballot balls, one pierced and one solid. This is done in full view of the rival litigants, to secure that no one shall receive two pierced or two solid balls. Then the official designated for the purpose takes away the jurors' staves, in return for which each one as he records his vote receives a brass voucher marked with the numeral 3 (because he gets three obols when he gives it up). This is to ensure that all shall vote; for no one can get a voucher unless he votes. Two urns, one of bronze and the other of

wood, stand in the court, in distinct spots so that no one may surreptitiously insert ballot balls; in these the jurors record their votes. The bronze urn is for effective votes, the wooden for unused votes; and the bronze urn has a lid pierced so as to take only one ballot ball, in order that no one may put in two at a time.

When the jurors are about to vote, the crier demands first whether the litigants enter a protest against any of the evidence; for no protest can be received after the voting has begun. Then he proclaims again, 'The pierced ballot for the plaintiff, the solid for the defendant'; and the juror, taking his two ballot balls from the stand, with his hand closed over the stem so as not to show either the pierced or the solid ballot to the litigants, casts the one which is to count into the bronze urn, and the other into the wooden urn.

69 · When all the jurors have voted, the attendants take the urn containing the effective votes and discharge them on to a reckoning board having as many cavities as there are ballot balls, so that the effective votes, whether pierced or solid, may be plainly displayed and easily counted. Then the officials assigned to the taking of the votes tell them off on the board, the solid in one place and the pierced in another, and the crier announces the numbers of the votes, the pierced ballots being for the prosecutor and the solid for the defendant. Whichever has the majority is victorious; but if the votes are equal the verdict is for the defendant. Then, if damages have to be awarded, they vote again in the same way, first returning their pay-vouchers and receiving back their staves. Half a gallon of water is allowed to each party for the discussion of the damages. Finally, when all has been completed in accordance with the law, the jurors receive their pay in the order assigned by the lot.

**\*\*TEXT:** F. G. Kenyon, OCT, Oxford, 1920

<sup>1</sup>Sc. the Alcmeonidae. The papyrus begins in the middle of a sentence.

<sup>2</sup>‘Removal of burdens’.

<sup>3</sup>The text is uncertain.

<sup>4</sup>Kenyon obelizes this sentence.

<sup>5</sup>Reading ἀριθμῷ πέντε.

<sup>6</sup>The next ten lines in the papyrus are mutilated.

<sup>7</sup>The papyrus is mutilated at this point.

<sup>8</sup>The papyrus is mutilated here.



# FRAGMENTS

*Selected and translated by  
Jonathan Barnes and Gavin Lawrence*

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## PREFACE

In the twelfth volume of the Oxford Translation, Sir David Ross published a selection of fragments from Aristotle's lost works. Ross limited his attention to passages bearing upon Aristotle's dialogues and upon his logical and philosophical writings. He presented those passages at generous length, including large amounts of context and often transcribing several variants of the same report.

Like Ross, we have attempted to give a fairly full collection of the fragments of Aristotle's *juvenilia*, which have occupied much scholarly attention in the past five decades, and also of the texts relating to the more philosophically interesting of his lost works. But we have been less generous than Ross in matters of context, repetitious variants, and dubiously valuable reports.

Unlike Ross, we have paid some attention to the fragments of Aristotle's other lost works—fragments which account for some two thirds of our total information about the lost writings. Here we have, for want of space, been highly selective: our aim has been to give a fair sample of the range of Aristotle's intellectual concerns, as it is exhibited in the fragments, and at the same time to illustrate those parts of his work which are less well represented in the surviving treatises.

We have prefaced the selection with a translation of the Catalogue of Aristotle's works; and we have closed it with versions of his letters and of his poems.

All the translations have been done afresh from the originals; but we have based ourselves on Ross's versions where those are available, and for the fragments of the *Protrepticus* we have leaned heavily on Düring's translation. As for the Greek texts, we have generally taken the latest, or the standard, editions of the various authors concerned. For much of the *Protrepticus* we have again made use of Düring's work; for *On Ideas* we have followed Harlfinger's edition of the text of Alexander.

We present the passages in the order in which they occur in Rose's third edition of the *Fragmenta* (Teubner, Leipzig, 1886). "*F I R*<sup>3</sup>" thus refers to fragment one in this edition. The few passages not occurring there have been interpolated at the most appropriate points. We have retained Rose's division of the fragments into ten categories. Rose's arrangement is not ideal; but we felt that, on balance, any fresh

arrangement would have caused more inconvenience than it produced enlightenment.

Finally, a few words of caution. Most of the passages we print are not, in the strict sense, fragments of Aristotle's lost works: most of the passages do not purport to quote Aristotle's actual words. Rather, they offer paraphrases or summaries of his opinions and arguments; and in many cases they are little more than casual allusions to his views. Some of the passages we quote refer to works which were in all probability not written by Aristotle at all; several of the passages may plausibly be construed as relaxed allusions to the extant treatises rather than as close paraphrases of lost works; and in some cases—and those not the least celebrated—we ourselves are not convinced that any genuinely Aristotelian matter is conserved.

J.B.

G.L.

# CATALOGUE OF ARISTOTLE'S WRITINGS

*(Diogenes Laertius, V 22–27)*

He wrote a vast number of books, which I have thought it appropriate to list because of the man's excellence in all fields of enquiry:—

On Justice, 4 books

On Poets, 3 books

On Philosophy, 3 books

On the Statesman, 2 books

On Rhetoric, or Grylus, 1 book

Nerinthus, 1 book

Sophist, 1 book

Menexenus, 1 book

Eroticus, 1 book

Symposium, 1 book

On Wealth, 1 book

Protrepticus, 1 book

On the Soul, 1 book

On Prayer, 1 book

On Good Birth, 1 book

On Pleasure, 1 book

Alexander, or On behalf of Colonies, 1 book

On Kingship, 1 book

On Education, 1 book

On the Good, 3 books

Excerpts from Plato's Laws, 3 books

Excerpts from Plato's Republic, 2 books

Economics, 1 book

On Friendship, 1 book

On being affected or having been affected, 1 book

On the Sciences, 2 books  
On Eristics, 2 books  
Eristical Solutions, 4 books  
Sophistical Divisions, 4 books  
On Contraries, 1 book  
On Genera and Species, 1 book  
On Properties, 1 book  
Notes on Arguments, 3 books  
Propositions on Excellence, 3 books  
Objections, 1 book  
On things spoken of in many ways or by addition, 1 book  
On Feelings or On Anger, 1 book  
Ethics, 5 books  
On Elements, 3 books  
On Knowledge, 1 book  
On Principles, 1 book  
Divisions, 16 books  
Division, 1 book  
On Question and Answer, 2 books  
On Motion, 2 books  
Propositions, 1 book  
Eristical Propositions, 4 books  
Deductions, 1 book  
Prior Analytics, 9 books  
Great Posterior Analytics, 2 books  
On Problems, 1 book  
Methodics, 8 books  
On what is better, 1 book  
On the Idea, 1 book  
Definitions prior to the Topics, 1 book  
Topics, 7 books

Deductions, 2 books  
Deduction and Definitions, 1 book  
On the desirable and on accidents, 1 book  
Pre-topics, 1 book  
Topics aimed at definitions, 2 books  
Feelings, 1 book  
Division, 1 book  
Mathematics, 1 book  
Definitions, 13 books  
Arguments, 2 books  
On Pleasure, 1 book  
Propositions, 1 book  
On the Voluntary, 1 book  
On the Noble, 1 book  
Argumentative theses, 25 books  
Theses on love, 4 books  
Theses on friendship, 2 books  
Theses on the soul, 1 book  
Politics, 2 books  
Lectures on Politics (like those of Theophrastus), 8 books  
On Just Acts, 2 books  
Collection of Arts, 2 books  
Art of Rhetoric, 2 books  
Art, 1 book  
Art (another work), 2 books  
Methodics, 1 book  
Collection of the Art of Theodectes, 1 book  
Treatise on the Art of Poetry, 2 books  
Rhetorical Enthymemes, 1 book  
On Magnitude, 1 book  
Divisions of Enthymemes, 1 book

On Diction, 2 books

On Advice, 1 book

Collection, 2 books

On Nature, 3 books

Nature, 1 book

On the Philosophy of Archytas, 3 books

On the Philosophy of Speusippus and Xenocrates, 1 book

Excerpts from the Timaeus and from the works of Archytas, 1 book

Against Melissus, 1 book

Against Alcmaeon, 1 book

Against the Pythagoreans, 1 book

Against Gorgias, 1 book

Against Xenophanes, 1 book

Against Zeno, 1 book

On the Pythagoreans, 1 book

On Animals, 9 books

Dissections, 8 books

Selection of Dissections, 1 book

On Composite Animals, 1 book

On Mythological Animals, 1 book

On Sterility, 1 book

On Plants, 2 books

Physiognomonics, 1 book

Medicine, 2 books

On Units, 1 book

Storm Signs, 1 book

Astronomy, 1 book

Optics, 1 book

On Motion, 1 book

On Music, 1 book

Memory, 1 book

Homeric Problems, 6 books

Poetics, 1 book

Physics (alphabetically ordered), 38 books

Additional Problems,<sup>1</sup> 2 books

Standard Problems, 2 books

Mechanics, 1 book

Problems from Democritus, 2 books

On the Magnet, 1 book

Conjunctions of Stars, 1 book

Miscellaneous, 12 books

Explanations<sup>2</sup> (arranged by subject), 14 books

Claims, 1 book

Olympic Victors, 1 book

Pythian Victors in Music,<sup>3</sup> 1 book

On Pytho, 1 book

Lists of Pythian Victors, 1 book

Victories at the Dionysia, 1 book

On Tragedies, 1 book

Didascaliae, 1 book

Proverbs, 1 book

Rules for Messing, 1 book

Laws, 4 books

Categories, 1 book

On Interpretation, 1 book

Constitutions of 158 States (arranged by type: democratic, oligarchical, tyrannical, aristocratic)

Letters to Philip

Letters about the Selymbrians<sup>4</sup>

Letters to Alexander (4), to Antipater (9), to Mentor (1), to Ariston (1), to Olympias (1), to Hephaestion (1), to Themistagoras (1), to Philoxenus (1), to Democritus (1)

Poems, beginning: "Holy one, most honoured of the gods, far-shooting



...”

Elegies, beginning: “Daughter of a mother of fair children ...”

*Appendix:*

(A) Titles found in the *Vita Menagiana* but not in Diogenes:

Peplos

Hesiodic Problems,<sup>5</sup> 1 book

Metaphysics, 10 books

Cycle on Poets, 3 books

Sophistical Refutations or On Eristics

Prior Analytics, 2 books

Messing Problems, 3 books

On Blessedness, or Why did Homer invent the cattle of the sun?

Problems from Archilochus, Euripides, Choerilus, 3 books

Poetical Problems, 1 book

Poetical Explanations

Lectures on Physics, 16 books

On Generation and Destruction, 2 books

Meteorologica, 4 books

On the Soul, 3 books

History of Animals, 10 books

Movement of Animals, 3 books

Parts of Animals, 3 books

Generation of Animals, 3 books

On the Rising of the Nile

On Substance in Mathematics

On Reputation

On Voice

On the Common Life of Husband and Wife

Laws for Man and Wife

On Time

On Vision, 2 books

Nicomachean Ethics

Art of Eulogy

On Marvellous Things heard

Eulogies or Hymns

On Differentia

On the Nature of Man

On the Generation of the World

Customs of the Romans

Collection of Foreign Customs

(B) Titles in the *Life* of Ptolemy but neither in Diogenes nor in the *Vita Menagiana*:

On Indivisible Lines, 3 books

On Spirit, 3 books

On Hibernation, 1 book

Magna Moralia, 2 books

On the Heavens and the Universe, 4 books

On Sense and Sensibilia, 1 book

On Memory and Sleep, 1 book

On Length and Shortness of Life, 1 book

Problems of Matter, 1 book

Platonic Divisions, 6 books

Divisions of Hypotheses, 6 books

Precepts, 4 books

On Regimen, 1 book

Farming, 15 books

On the Moist, 1 book

On the Dry, 1 book

On Relatives, 1 book

# I • DIALOGUES

F 1–111 R<sup>3</sup>

(*Cicero*, ad Atticum IV xvi 2):

. . . since I am having a preface in each book, as Aristotle does in the books he calls exoteric . . .

(*Cicero*, ad Atticum XIII xix 4):

In what I have written recently, I have followed the Aristotelian custom, according to which the conversation of the others is so arranged that the writer himself has the chief part.

(*Plutarch*, adversus Colotem III5BC):

As for the Ideas, over which he upbraids Plato, Aristotle attacks them everywhere and introduces all the puzzles about them—in his ethical works, in his metaphysics, in his physics, in his exoteric dialogues: to some he seemed more ambitious than philosophical . . . <sup>1</sup> these doctrines, as though proposing to subvert Plato's philosophy; so far was he from following Plato.

(*Numenius*, apud *Eusebius*, Praeparatio Evangelica XIV vi 9–10):

Cephisodorus, when he saw his master Isocrates being attacked by Aristotle, was ignorant of and unversed in Aristotle himself; but, seeing the repute which Plato's views enjoyed, he thought that Aristotle was following Plato. So he waged war on Aristotle, but was really attacking Plato. His criticism began with the Ideas and finished with the other doctrines—things which he himself did not know; he was only guessing at the meaning of the opinions held about them. This Cephisodorus was not attacking the person he was at war with, but was attacking the person he did not wish to make war upon.

(*Asclepius*, Commentarius in Metaphysica 112. 16–19):

About these first principles, he [sc. Aristotle] says, we have already spoken in the *Physics*; and he promises to speak about these in Book  $\alpha$  [sc. of the *Metaphysics*], and to raise and solve the puzzles about them in the work *On Philosophy*.

*F 1 R<sup>3</sup> (Plutarch, adversus Colotem 1118C):*

Of the inscriptions at Delphi that which was thought to be the most divine was “Know Thyself”; it was this, as Aristotle has said in his Platonic works, that started Socrates off puzzling and inquiring.

*F 2 R<sup>3</sup> (Diogenes Laertius, II 23):*

Aristotle says that he [sc. Socrates] went to Delphi.

*F 3 R<sup>3</sup> (Porphyry apud Stobaeus, Anthologium III xxi 26):*

What and whose was the sacred injunction at Delphi, which bids him who is to seek anything from the god to know himself? . . . or was it even before the time of Chilon already inscribed in the temple that was founded after the one of feathers and bronze, as Aristotle has said in his work *On Philosophy*?

*F 4 R<sup>3</sup> (Clement, Stromateis I xiv 61.2):*

Aristotle and his followers think that it [sc. “Give a pledge and you’re ruined”] comes from Chilon.

*F 5 R<sup>3</sup> (Etymologicon Magnum s.v. σοφιστής):*

Aristotle calls the Seven Sages sophists.

*F 6 R<sup>3</sup> (Diogenes Laertius, I 8):*

Aristotle in the first book of *On Philosophy* says that they [sc. the Magi] are more ancient than the Egyptians, and that according to them there are two first principles, a good spirit and an evil spirit, one called Zeus and Oromasdes, the other Hades and Arimanius.

*F 7 R<sup>3</sup> (Philoponus, Commentarius in de Anima 186. 24–26):*

Aristotle says “so-called . . .” because the poems are thought not to be the work of Orpheus, as he himself says in the books *On Philosophy*: the opinions are those of Orpheus, but they say that Onomacritus set them to verse.

*F 7 R<sup>3</sup> (Cicero, de natura deorum I xxxviii 107):*

Aristotle says the poet Orpheus never existed; the Pythagoreans ascribe this Orphic poem to a certain Cercon.

*(Sextus Empiricus, adversus mathematicos X 46):*

Its existence [i.e. the existence of motion] is denied by Parmenides and Melissus, whom Aristotle has called immobilists<sup>1</sup> and unnaturalists—

immobilists because they maintain the immobility of things, unnaturalists because nature is a source of motion and in saying that nothing moves they abolished nature.

*F 8 R<sup>3</sup> (Proclus, apud Philoponus, de aeternitate mundi II 2):*

. . . and in his dialogues, where he [sc. Aristotle] announces most clearly that he cannot agree with this doctrine [sc. the Theory of Ideas], even if he should be thought to be opposing it from ambition.

*F 9 R<sup>3</sup> (Syrianus, Commentarius in Metaphysica 159.35–160.3):*

This is shown by what he [sc. Aristotle] says in the second book of the work *On Philosophy*: “Thus if the Ideas are a different sort of number, not mathematical number, we can have no understanding of it; for of the majority of us, at all events, who understands any other number?”

*(Alexander, Commentarius in Metaphysica 117.23–118.1)*

Aristotle sets out their view, which he has also stated in the work *On Philosophy*. Wishing to refer the things that exist (he always calls the things that exist substances) to the first principles which they assumed (for them the first principles of existing things were the great and the small, which they called the indefinite dyad)—wishing to refer everything to this, they said that the first principles of length were the short and the long (on the grounds that length takes its origin from a long and short, i.e. a great and small, or that every line falls under one or other of these), and that the first principles of the plane were the narrow and wide, which are themselves also great and small.

*(Simplicius, Commentarius in de Anima 28.7–9):*

Aristotle now [sc. in the *de Anima*] applies the name *On Philosophy* to his work *On the Good* (taken down from Plato’s seminar), in which he relates both the Pythagorean and the Platonic opinions about what exists.

*([Alexander], Commentarius in Metaphysica 777.16–21):*

The principle of the One, he [sc. Aristotle] says, they did not all introduce in the same way. Some said that the numbers themselves introduced the Forms into magnitudes, e.g. the number 2 doing so for line, the number 3 for plane, the number 4 for solid (Aristotle relates this about Plato in the work *On Philosophy*, and that is why he here [sc. in the *Metaphysics*] expounds their theory only briefly and concisely); while others explained the form of the magnitudes by participation in the One.

*F 10 R<sup>3</sup> (Sextus Empiricus, adversus mathematicos IX 20–23):*

Aristotle used to say that men's concept of god sprang from two sources—the experiences of the soul and the phenomena of the heavens. From the experiences of the soul, because of its inspiration and prophetic power in dreams. For, he says, when the soul gets by itself in sleep, it then assumes its nature and foresees and foretells the future. The soul is also in such a condition when it is severed from the body at death. At all events, he accepts even Homer as having observed this; for he has represented Patroclus, in the moment of his death, as foretelling the death of Hector, and Hector as foretelling the end of Achilles. It was from such events, he says, that men came to suspect the existence of something divine, of something in itself akin to the soul and of all things most knowledgeable. And from the heavenly bodies too: seeing by day the revolution of the sun and by night the well-ordered movement of the other stars, they came to think that there was a god who is the cause of such movement and order.

*F 12 R<sup>3</sup> (Cicero, de natura deorum II xxxvii 95):*

Thus Aristotle brilliantly remarks: 'Suppose there were men who had always lived underground, in good and well-lighted dwellings, adorned with statues and pictures, and furnished with everything in which those who are thought happy abound. Suppose, however, that they had never gone above ground, but had learned by report and hearsay that there was a divine spirit and power. Suppose that then, at some time, the jaws of the earth opened, and they were able to escape and make their way from those hidden dwellings into these regions which we inhabit. When they suddenly saw earth and seas and skies, when they learned the grandeur of clouds and the power of winds, when they saw the sun and realized not only its grandeur and beauty but also its power, by which it fills the sky with light and makes the day; when, again, night darkened the lands and they saw the whole sky picked out and adorned with stars, and the varying light of the moon as it waxes and wanes, and the risings and settings of all these bodies, and their courses settled and immutable to all eternity; when they saw those things, most certainly would they have judged both that there are gods and that these great works are the works of gods'. Thus far Aristotle.

*F 14 R<sup>3</sup> (Seneca, quaestiones naturales VII xxx 1):*

Aristotle excellently says that we should nowhere be more modest than in discussions about the gods. If we compose ourselves before we

enter temples, . . . how much more should we do so when we discuss the constellations, the stars, and the nature of the gods, lest from temerity or impudence we should make ignorant assertions or knowingly tell lies.

*F 15 R<sup>3</sup> (Synesius, Dio 48A):*

. . . as Aristotle claims that those who are being initiated are not to learn anything but to experience something and be put into a certain condition . . .

*F 16 R<sup>3</sup> (Alexander, apud Simplicius, Commentarius in de Caelo 289.1–15):*

He [sc. Aristotle] speaks of this in his *On Philosophy*. In general, where there is a better there is also a best. Since, then, among existing things one is better than another, there is also something that is best, which will be the divine. Now that which changes is changed either by something else or by itself, and if by something else, either by something better or by something worse, and if by itself, either to something worse or through desire for something nobler. But the divine has nothing better than itself by which it will be changed (for that other thing would then have been more divine), nor is it right for the better to be affected by the worse; besides, if it were changed by something worse, it would have admitted something bad into itself—and nothing in it is bad. Nor yet does it change itself through desire for something nobler, since it lacks none of its own nobilities; nor yet does it change itself for the worse, since not even a man willingly makes himself worse, nor does it possess anything bad such as it would have acquired from a change to the worse. This proof too Aristotle took over from the second book of Plato's *Republic*.

*F 17 R<sup>3</sup> (Scholia in Proverbia Salomonis, cod. Paris gr. 174, fol. 46a):*

Aristotle: 'There is either one first principle or many. If there is one, we have what we are looking for; if there are many, they are either ordered or disordered. Now if they are disordered, their products are more so, and the world is not a world but a chaos; and that which is contrary to nature exists while that which is in accordance with nature does not exist. If on the other hand they are ordered, they were ordered either by themselves or by some outside cause. But if they were ordered by themselves, they have something common that joins them, and that is the first principle'.

*F 18 R<sup>3</sup> (Philo, de aeternitate mundi III 10–11):*

Aristotle was surely speaking piously and devoutly when he objected that the world is ungenerated and imperishable, and convicted of grave

ungodliness those who maintained the opposite and thought that the great visible god, which contains in truth sun and moon and the remaining pantheon of planets and fixed stars is no different from an artefact; he used to say in mockery (we are told) that in the past he had been afraid for his house lest it be destroyed by violent winds or by fierce storms or by time or by lack of proper maintenance, but that now a greater fear hung over him, from those who by an argument were destroying the whole world.

*F 19 R<sup>3</sup> (Philo, de aeternitate mundi V 20–24):*

The arguments which prove the world to be ungenerated and imperishable should, out of respect for the visible god, be given their proper precedence and placed earlier in the discussion. All things that admit of being destroyed are subject to two causes of destruction, one inward, the other outward. Iron, bronze and such-like substances you will find being destroyed from themselves, when rust invades and devours them like a creeping disease, and from without when a house or city is set on fire and they catch fire from it and are destroyed by the fierce rush of flame; and similarly death comes to living beings from themselves when they fall sick, and from outside when they have their throats cut or are stoned or burned to death or suffer the unclean death by hanging. Thus if the world, too, is destroyed, it must be either by something outside or by one of the powers in itself. Now each of these is impossible. For there is nothing outside the world, since all things have contributed to its completeness. For so will it be one, whole, and ageless: one, because if some things had been left out another world like the present world would come into being; whole, because all substance has been expended on it; ageless and diseaseless, because bodies caught by disease and old age are destroyed by the violent assault from without of heat and cold and the other contrary forces, none of which powers can escape and circle round and attack the world, since all without exception are entirely enclosed within it. If then there is anything outside, it must be a complete void or an impassive nature which cannot suffer or do anything. Nor again will the world be destroyed by anything within it—first, because the part would then be both greater and more powerful than the whole, which is most absurd; for the world, wielding unsurpassable power, directs all its parts and is directed by none; secondly, because, there being two causes of destruction, one within and one without, things that can suffer the one are susceptible also to the other. Oxen and horses and men and such-like animals, because they can be destroyed by iron, will also perish by



disease. For it is hard, or rather impossible, to find anything that is naturally subject to the external cause of destruction and entirely insusceptible to the internal. Since, then, it was shown that the world will not be destroyed by anything without, because absolutely nothing has been left outside, neither will it be destroyed by anything within, because of the preceding demonstration to the effect that that which is susceptible to the one cause is also by nature susceptible to the other.

*F 20 R<sup>3</sup> (Philo, de aeternitate mundi VI 28-VII 34):*

This may be put in another way. Of composite bodies all that are destroyed are dissolved into their components; dissolution is then nothing but return to the natural state of each thing, so that conversely composition has forced into an unnatural state the parts that have come together. And indeed it seems to be so beyond a doubt. For we men were put together by borrowing little parts of the four elements, which belong in their entirety to the whole universe—earth, water, air and fire. Now these parts when mixed are robbed of their natural position, the upward-travelling heat being forced down, the earthy and heavy substance being made light and seizing in turn the upper region, which is occupied by the earthiest of our parts, the head. The worst of bonds is that which is fastened by violence; this is brief and shortlived, for it is broken sooner by the things bound, because they shake it off through longing for their natural movement, to which they hasten to return. For, as the tragic poet says, “Things born of earth return to earth, things born of an ethereal seed return to the pole of heaven again; nothing that comes into being dies; one departs in one direction, one in another, and each shows its own form.”<sup>1</sup> For all things that perish, then, this is the law and this is the rule prescribed—when the parts that have come together in the mixture have settled down they must in place of their natural order have accepted disorder, and must move to the opposite places, so that they seem to be in a sense exiles; but when they are separated they turn back to their natural lot. Now the world has no part in the disorder which is found in the things we have spoken of. For let us consider: if the world is perishing, its parts must now each have been arranged in a region unnatural to it. But this it is not right to suppose; for to all the parts of the world have fallen perfect position and harmonious arrangement, so that each, as though fond of its own country, seeks no change to a better. For this reason, then, earth was assigned the midmost position, to which all earthy things, even if you throw them up, descend. This is an indication of their natural place; for that region in which a thing brought thither stays and rests,

when under no compulsion, is its allotted home. Water is spread over the earth, and air and fire have moved from the middle to the upper region, to air falling the region between water and fire, and to fire the highest region of all. And so, even if you light a torch and throw it to the ground, the flame will none the less strive against you and lighten itself and return to the natural motion of fire. If, then, the cause of destruction of other creatures is their unnatural situation, but in the world each of its parts is arranged according to nature and has its proper place assigned to it, the world may justly be called imperishable.

*F 21 R<sup>3</sup> (Philo, de aeternitate mundi VIII 39–43):*

The most demonstrative argument is that on which I know countless people to pride themselves, as on something most precise and quite irrefutable. They ask why god should destroy the world. Either to save himself from continuing in world-making, or in order to make another world. The former of these purposes is alien to god; for what befits him is to turn disorder into order, not order into disorder; and further, he would be admitting a change of mind, and hence an affection and disease of the soul. For he should either not have made a world at all, or else, if he judged the work becoming to him, should have rejoiced in the product. The second alternative deserves full examination. For if in place of the present world he is to make another, the world he makes is bound to be either worse or like or better, and each of these possibilities is open to objection. If it is worse, its artificer too will be worse; but the works of god are blameless, free from criticism and incapable of improvement, fashioned as they are by the most perfect art and knowledge. For, as the saying goes, ‘not even a woman is so lacking in good judgement as to prefer the worse when the better is available’; and it is fitting for god to give shape to the shapeless and to deck the ugliest things with marvellous beauties. If the new world is like the old, its artificer will have laboured in vain, differing in nothing from silly children, who often when playing on the beach make great piles of sand and then undermine them with their hands and pull them down again. Much better than making a similar world would be neither to take away nor to add anything, nor change anything for better or for worse, but to leave the original world in its place. If he is to make a better world, the artificer himself must become better, so that when he made the former world he must have been more imperfect both in art and in wisdom—which it is not right even to suspect. For god is equal and like to himself, admitting neither slackening towards the worse nor tautening towards the better.

*F 22 R<sup>3</sup> (Cicero, Academica II xxxviii 119):*

When your Stoic sage has said all these things to you syllable by syllable, Aristotle will come, pouring out his golden flow, to say that the Stoic is talking nonsense; he will say that the world was never generated, because there was never a beginning based on a new plan for such a brilliant work, and that it is so well designed in every part that no force can effect such great movements and so great a change, and no old age can come upon the world by lapse of time, so that this splendid world should ever fall to pieces and perish.

*F 23 R<sup>3</sup> (Cicero, de natura deorum II xv 42):*

Since some living things have their origin in earth, others in water, others in air, Aristotle thinks that it is absurd to suppose that in that part which is fittest to generate living things no animal should be born. Now the stars occupy the ethereal region; and since that region is the most rare and is always in movement and activity, any animal born in it must have the keenest perception and the swiftest movement. Thus since it is in ether that the stars are born, it is proper that in these there should be perception and intelligence. From which it follows that the stars should be reckoned among the gods.

*F 24 R<sup>3</sup> (Cicero, de natura deorum II xvi 44):*

Aristotle is to be praised, too, for judging that all things that move do so either by nature or by force or voluntarily, and that the sun and moon and all the stars are in movement, and that things that move by nature are carried either downwards by their weight or upwards by their lightness, neither of which happens to the stars, because their movement is in an orbit or circle. Nor again can it be said that some greater force makes the stars move contrary to nature; for what force can be greater? What remains, then, is that the movement of the stars is voluntary.

*F 25 R<sup>3</sup> (Censorinus, de die natali XVIII 11):*

There is, further, the year which Aristotle calls greatest (rather than great), which the spheres of the sun, the moon and the five wandering stars complete when they return together to the same point where once they were all together; the winter of such a year is a great cataclysm or flood, the summer an ecpyrosis or conflagration of the world; for at these alternate periods the world seems now to be consumed in fire, now to be covered in water.

*F 26 R<sup>3</sup> (Cicero, de natura deorum I xiii 33):*

Aristotle, in the third book of his *On Philosophy*, creates much confusion by dissenting from his master Plato. For now he ascribes all divinity to mind, now he says that the world itself is a god, now he sets another god over the world and ascribes to him the part of ruling and preserving the movement of the world by a sort of backward rotation. Then he says that the heat of the heavens is a god, not realising that the heavens are a part of the world, which he has himself elsewhere called a god.

(Cicero, *Academica I vii 26*):

The fifth kind, from which are made stars and minds, Aristotle thought to be something distinct, and unlike the four I have mentioned above.

(Cicero, *Tusculanae disputationes I × 22*):

Aristotle, who far exceeded all others—Plato I always except—both in intellect and in industry, after taking account of the four well-known kinds of first principles from which all things were derived, considers that there is a fifth kind of thing, from which comes mind; for thought, foresight, learning, teaching, discovery, remembering many things, love and hate, desire and fear, distress and joy, these and their like he thinks cannot be included in any of those four kinds; he adds a fifth kind, which lacks a name, and so he calls the mind itself by a new name, ἐνδελέχεια, as being a sort of continuous and endless movement.

(Aristoxenus, *Elementa harmonica II 30–31*):

This, as Aristotle was always saying, was the experience of most of those who heard Plato's lecture *On the Good*. Each of them attended on the assumption that he would hear about one of the recognised human goods—such as wealth, health, strength, and in general some marvellous happiness. When Plato's lectures turned out to be about mathematics—numbers, geometry, astronomy—and to crown all about the thesis that the good<sup>1</sup> is one, it seemed to them, I fancy, something quite paradoxical; and so some people despised the whole thing, while others criticised it.

(Philoponus, *Commentarius in de Anima 75.34–76.1*):

By the books *On Philosophy* Aristotle means the work entitled *On the Good*; in this Aristotle reports Plato's unwritten seminars; the work is genuine. He relates there the view of Plato and the Pythagoreans about what exists and about first principles.

F 27 R<sup>3</sup> (Vita Aristotelis Latina 33):

In the work *On the Good* he says: ‘Not only he who is in luck but also he who offers a proof should remember he is a man’.

F 28 R<sup>3</sup> (Alexander, Commentarius in Metaphysica 55.20–56.35):

Both Plato and the Pythagoreans assumed numbers to be the first principles of existing things, because they thought that that which is primary and incomposite is a first principle, and that planes are prior to bodies (for that which is simpler and not destroyed along with something else is primary by nature), and on the same principle lines are prior to planes, and points (which the mathematicians call *sêmeia* but they called units) to lines, being completely incomposite and having nothing prior to them; but units are numbers; therefore numbers are the first of existing things. And since Forms or Ideas are prior to the things which according to him have their being in relation to them and derive their being from them (the existence of these he tried in several ways to establish), he said that the Forms are numbers. For if that which is one in kind is prior to the things that exist in relation to it, and nothing is prior to number, the Forms are numbers. This is why he also said that the first principles of number are first principles of the Forms, and the One is the first principle of all things.

Again, the Forms are the first principles of all other things, and the first principles of number are first principles of Ideas since they are numbers; and he used to say that the first principles of number are the unit and the dyad. For, since there are in numbers both the One and that which is other than the One (i.e. the many and the few), he assumed that the first thing there is in number, apart from the One, is the first principle both of the many and of the few. Now the dyad is the first thing apart from the One, having in itself both manyness and fewness; for the double is many and the half is few, and these are in the dyad; and the dyad is contrary to the One, since the latter is indivisible and the former is divided.

Again, thinking to prove that the equal and the unequal are first principles of all things, both of things that exist in their own right and of opposites (for he tried to refer all things to these as their simplest elements), he assigned equality to the monad, and inequality to excess and defect; for inequality involves two things, a great and a small, which are excessive and defective. This is why he called it an indefinite dyad—because neither the excessive nor the exceeded is, as such, definite; they are indefinite and unlimited. But when limited by the One the indefinite

dyad, he says, becomes the numerical dyad; for this kind of dyad is one in form.

Again, the dyad is the first number; its first principles are the excessive and the exceeded, since it is in the dyad that the double and the half are first found; for while the double and the half are excessive and exceeded, the excessive and the exceeded are not thereby double and half; so that these are elements of the double. And since the excessive and the exceeded when they have been limited become double and half (for these are no longer indefinite, nor is the treble and third, or the quadruple and quarter, or anything else that already has its excess limited), and this is effected by the nature of the One (for each thing is one in so far as it is a 'this' and is limited), the One and the great and the small must be elements in the numerical dyad. But the dyad is the first number. These then are the elements in the dyad. It is for some such reasons that Plato used to treat the One and the dyad as the first principles both of numbers and of all existing things, as Aristotle says in his work *On the Good*.

*F 28 R<sup>3</sup> (Simplicius, Commentarius in Physica 151.6–11):*

Alexander says that according to Plato the first principles of all things, and of the Ideas themselves, are the One and the indefinite dyad, which he used to call great and small, as Aristotle relates in his work *On the Good*. One might gather this also from Speusippus and Xenocrates and the others who were present at Plato's lecture on the Good; for they all wrote down and preserved his doctrine, and they say he used these as first principles.

*F 28 R<sup>3</sup> (Simplicius, Commentarius in Physica 453.25–30):*

They say that Plato maintained that the One and the indefinite dyad were the first principles of sensible things as well. He placed the indefinite dyad also among the objects of thought and said it was unlimited, and he made the great and the small first principles and said they were unlimited, in his lectures on the Good; Aristotle, Heraclides, Hestiaeus, and other associates of Plato attended these and wrote them down in the enigmatic style in which they were delivered.

*F 29 R<sup>3</sup> (Sextus Empiricus, adversus mathematicos III 57–58):*

But Aristotle says . . . that the length without breadth of which they [sc. the geometers] speak is not inconceivable, but that we can without any difficulty arrive at the thought of it. He rests his argument on a rather

clear and illuminating example: we grasp the length of a wall, he says, without considering also its breadth, so that it must be possible to conceive of the length without any particular breadth of which the geometers speak—for the phenomena are our way of seeing what is non-evident.

*F 30 R<sup>3</sup> (Alexander, Commentarius in Metaphysica 59.28–60.2):*

One might ask how it is that, though Plato mentions both an efficient cause . . . and also that for the sake of which and the end . . ., Aristotle mentions neither of these causes in his account of Plato's doctrines. Is it because he mentioned neither of them in what he said about causes (as he has shown in *On the Good*), or because he does not treat these as causes of things that come into being and perish, and did not even work out any theory about them?

*F 31 R<sup>3</sup> (Alexander, Commentarius in Metaphysica 250.17–20):*

For the proof that practically all contraries are referred to the One and plurality as their first principle, Aristotle sends us to the *Selection of Contraries*, where he has treated expressly of the subject. He has also spoken about this selection in the second book *On the Good*.

*F 34 R<sup>3</sup> (Pliny, naturalis historia XXX ii 3):*

Eudoxus related that this Zoroaster lived six thousand years before the death of Plato; Aristotle agrees.

*F 37 R<sup>3</sup> (Cicero, de divinatione I xxv 53):*

What, is the singular, the almost divine, intellect of Aristotle in error, or does he wish others to fall into error, when he writes that his friend Eudemus of Cyprus while on a journey to Macedonia came to Pherae, a Thessalian town of considerable note at that time, but held in cruel subjection by the tyrant Alexander? Now in that town, he says, Eudemus fell so ill that all the doctors feared for his life. He dreamed that a handsome young man told him that he would soon recover, that in a few days the tyrant Alexander would die, and that five years later Eudemus himself would return home. And indeed, Aristotle writes, the first two predictions were fulfilled forthwith: Eudemus recovered and the tyrant was killed by his wife's brothers. But towards the end of the fifth year, when the dream had led him to hope that he would return from Sicily to Cyprus, he died in battle at Syracuse. And so the dream was interpreted as meaning that when Eudemus' soul had left his body it had returned to its home.

(*al-Kindi, cod. Taimuriyye Falsafa 55*):

Aristotle tells of the Greek king whose soul was caught up in ecstasy, and who for many days remained neither alive nor dead. When he came to himself, he told the bystanders of various things in the invisible world, and related what he had seen—souls, forms, and angels; he gave the proofs of this by foretelling to all his acquaintances how long each of them would live. All he had said was put to the proof, and no-one exceeded the span of life that he had assigned. He prophesied too that after a year a chasm would open in the country of Elis, and after two years a flood would occur in another place; and everything happened as he had said. Aristotle asserts that the reason for this was that his soul had acquired this knowledge just because it had been near to leaving his body and had been in a certain way separated from it, and so had seen what it had seen. How much greater marvels of the upper world of the kingdom would it have seen, then, if it had really left his body.

*F 38 R<sup>3</sup> (Themistius, Commentarius in de Anima 106.29–107.4):*

Almost all the weightiest arguments that he [sc. Plato] used about the immortality of the soul make reference to the intellect. . . . as is also the case with the more convincing of those worked out by Aristotle himself in the *Eudemus*.

*F 39 R<sup>3</sup> (Elias, Commentarius in Categorias 114.25–115.3):*

Aristotle establishes the immortality of the soul in his acroamatic works as well, and there he establishes it by compelling arguments; but in the dialogues he naturally uses plausible arguments. . . . In his dialogues he says that the soul is immortal because all we men instinctively make libations to the departed and swear by them, but no-one ever makes a libation to or swears by that which is completely non-existent . . . [115.11–12]. It is chiefly in his dialogues that Aristotle seems to announce the immortality of the soul.

*F 40 R<sup>3</sup> (Proclus, Commentarius in Timaeum 323.31–324.4):*

Aristotle in emulation of him [sc. Plato] treats scientifically of the soul in the *de Anima*, saying nothing either about its descent or about its fortunes; but in his dialogues he dealt separately with those matters and set down the preliminary discussion.

*F 41 R<sup>3</sup> (Proclus, Commentarius in Rem Publicam II 349.13–26):*

The excellent Aristotle also gives the reason why the soul on coming hither from there forgets the sights it saw there, but on going hence



remembers there its experiences here. We must accept the argument; for he himself says that on their journey from health to disease some people forget even the letters they have learned, but that no-one ever has this experience when passing from disease to health; and that life without the body, being natural to souls, is like health, and life in the body, as being unnatural, is like disease. For there they live according to nature, but here contrary to nature; so that it not unreasonably results that souls that pass thence forget the things there, while souls that pass hence thither continue to remember the things here.

*F 42 R<sup>3</sup> (Damascius, Commentarius in Phaedonem 530):*

That there must actually be a whole race of men which is nourished in this way is shown by the case of the man who was nourished by the sun's rays alone, as recorded by Aristotle from his own observation.

*F 43 R<sup>3</sup> (Plutarch, quaestiones convivales 733C):*

Aristotle has related how in Cilicia Timon's grandmother used to hibernate for two months each year, showing no sign of life apart from breathing.

*F 44 R<sup>3</sup> ([Plutarch], Consolatio ad Apollonium 115BE):*

Many wise men, as Crantor says, not of today but of long ago, have wept for the human lot, thinking life to be a punishment and birth the beginning of the greatest disaster for a man. Aristotle says that Silenus stated this opinion to Midas after he had been captured—but let me set down the philosopher's actual words; he says this in the work entitled *Eudemus* or *On the Soul*:

‘For that reason, best and most blessed of all men, in addition to thinking that the dead are blessed and happy, we hold it impious to speak any falsehood about them or to slander them, since they have now become better and greater. And these customs are so ancient and long-established among us that no one at all knows when they began or who first established them, but they have been continuously acknowledged for an indefinite age. In addition to that, you observe the saying which has been on men's lips for many years’.

‘What is that?’, he said.

He said in reply: ‘That not to be born is best of all, and to be dead better than to be alive. Heaven has given this testimony to many men. They say that when Midas had caught Silenus he interrogated him after the hunt and asked him what was the best thing for men and

what the most desirable of all. Silenus at first would not say anything but maintained an unbroken silence; but when, after using every device, Midas with difficulty induced him to address him, he said under compulsion: "Shortlived seed of a toiling spirit and a harsh fortune, why do you force me to say what is better for you not to know? For a life lived in ignorance of its own ills is most painless. It is quite impossible for the best thing of all to befall men, nor can they share in the nature of what is better. For it is best, for all men and women, not to be born; and second after that—the first of things open to men—is, once born, to die as quickly as possible." It is clear that he meant that time spent dead is better than time spent alive'.

*F 45 R<sup>3</sup> (Philoponus, Commentarius in de Anima 141.33–142.6, 144.21–145.7):*

Some . . . thought that the soul was an attunement of the body, and that the different kinds of soul answered to the different attunements of the body. This opinion Aristotle states and refutes. In the present work [i.e. the *de Anima*] he first merely records the opinion itself, but a little later on he also sets out the arguments that led them to it. He had already opposed this opinion elsewhere—I mean, in the dialogue *Eudemus*—and before him Plato in the *Phaedo* had used five arguments against the view.

. . .

These are Plato's five arguments. Aristotle himself, as I have said, has used the two following arguments in the dialogue *Eudemus*. One goes thus: 'Attunement', he says, 'has a contrary, lack of attunement; but the soul has no contrary. Therefore the soul is not an attunement'.. . . Secondly: 'The contrary of the attunement of the body is the lack of attunement of the body; and the lack of attunement of the living body is disease, weakness, and ugliness—of these, disease is lack of attunement of the elements, weakness lack of attunement of the uniform parts, ugliness lack of attunement of the instrumental parts. Now if lack of attunement is disease, weakness, and ugliness, then attunement is health, strength and beauty; but soul is none of these—I mean, neither health nor strength nor beauty; for even Thersites, the ugliest of men, had a soul. Therefore the soul is not an attunement'.

*F 45 R<sup>3</sup> (Damascius, Commentarius in Phaedonem 383):*

Aristotle in the *Eudemus* argues as follows: 'Lack of attunement is contrary to attunement; but soul has no contrary—for it is a substance. And the conclusion is obvious. Again, if the lack of attunement of the

elements of an animal is disease, their attunement must be health, not soul’.

*F 46 R<sup>3</sup> (Simplicius, Commentarius in de Anima 221.28–30):*

And because of this he [sc. Aristotle] says in the *Eudemus*, his dialogue on the soul, that the soul is a sort of form. . .

*F 47 R<sup>3</sup> ([Plutarch], de musica 1139B):*

On the theme that harmony is something noble, divine and grand, Aristotle, the pupil of Plato, says: ‘Harmony is heavenly, by nature divine, beautiful and inspired; having by nature four parts potentially, it has two means, the arithmetical and the harmonic, and the parts of it, their extents, and their excesses one over another, have numerical and proportionate relations; for tunes are arranged in two tetrachords.’

*F 48 R<sup>3</sup> (Olympiodorus, Commentarius in Phaedonem 9):*

Proclus would have heavenly bodies possess only sight and hearing, as Aristotle also would; for of the senses they have only those which contribute to well-being, not those that contribute to being, which is what the other senses do. The poet testifies to this, saying, “Sun, who seest and hearest all things”—which implies that the heavenly bodies have only sight and hearing. Also because these senses, most of all, have knowledge by way of activity rather than of passivity, and are fitter for the unchanging heavenly bodies.

*F 49 R<sup>3</sup> (Simplicius, Commentarius in de Caelo 485.19–22):*

That Aristotle has the notion of something above mind and substance is shown by his saying clearly at the end of his book *On Prayer* that god is either mind or something even beyond mind.

*F 50 R<sup>3</sup> (Stobaeus, Anthologium IV xxxii 21):*

Zeno said that Crates, while sitting in a cobbler’s workshop, read [B 1]<sup>1</sup> Aristotle’s *Protrepticus* which he wrote to Themison, king of Cyprus, saying that no-one had more goods than he for devoting himself to philosophy; for he had great wealth, so that he could spend money on this, and a good reputation as well.

*F 57 R<sup>3</sup> (Oxyrrhynchus Papyrus 666; cf. Stobaeus, Anthologium III iii 25):*

[B2] . . . prevents them from choosing and doing what they should; hence, contemplating the misfortune of these men, we ought to avoid it and believe that happiness consists not in the acquisition of much

property but rather in the manner of the disposition of the soul. For one would not say that it is a body adorned with splendid clothing that is blessed, but one which is healthy and has a good disposition, even if it has none of the things just mentioned; in the same way, if the soul is educated, such a soul and such a man must be called happy, not the man splendidly adorned with external goods but himself worthless. It is not the horse that has a golden curb-chain and costly harness but whose nature is bad that we think worth anything; rather we praise the one that has a good disposition. [B 3] Besides, when worthless men get abundant possessions, they come to value these even more than the goods of the soul; and this is the basest of all conditions. For just as a man would be a laughing-stock if he were inferior to his own servants, so too those for whom possessions are more important than their own nature must be considered miserable. [B 4] This is indeed so: surfeit, as the proverb says, breeds insolence; lack of education combined with power breeds folly. For those who are ill-disposed in soul neither wealth nor strength nor beauty is good; the more lavishly one is endowed with these conditions, the more grievously and the more often they hurt him who possesses them but lacks understanding.<sup>2</sup> The saying ‘No knife for a child’ means ‘Do not give bad men power’. [B 5] But all men would agree that understanding comes from learning and from seeking the things that philosophy enables us to seek; surely, then, we should pursue philosophy unhesitatingly and. . .

*F 51 R<sup>3</sup> (Alexander, Commentarius in Topica 149.11–15):*

E.g. if someone were to say that one should not philosophize, then, since [B 6] to philosophize is both to inquire into the very question whether one should philosophize or not, as he [sc. Aristotle] himself said in the *Protrepticus*, and also to pursue philosophical contemplation, by showing that each of them is proper for a man we shall wholly refute the view stated.

*(Iamblichus, Protrepticus 37.13–22 Pistelli):*

[B 9] Again, some kinds of knowledge produce the good things in life, others use the first kind; some are ancillary, others prescriptive; and in these last, as being more authoritative, rests the true good. If, then, only that kind of knowledge which involves correctness of judgment and uses reason and contemplates the good as a whole—that is to say, philosophy—can use all other kinds of knowledge and prescribe to them according to nature, we ought in every way to philosophize, since philosophy alone comprises right judgment and an infallible prescriptive understanding.

[B 11] Of things that come into being some come from some kind of thought or art, e.g. a house or a ship (for the cause of both of these is a certain art and process of thought), while others come into being through no art but by nature; for nature is the cause of animals and plants, and all such things come into being according to nature. But some things also come into being as a result of chance; for of most of the things that come into being neither by art nor by nature nor of necessity, we say that they come into being by chance. [B 12] Now of the things that come into being by chance none comes into being for the sake of anything, nor have they an end; but in the case of things that come into being by art there is an end and that for the sake of which (for he who possesses the art will always tell you the reason why he wrote, and for the sake of what he did so), and this is better than that which comes into being because of it. I mean the things of which art is the cause by its own nature and not by accident; for we should properly describe medicine rather as the art of health than as that of disease, and architecture as the art of building houses, not of pulling them down. Everything, therefore, that is according to art comes into being for the sake of something, and this is its best end; but that which comes into being by chance does not come into being for the sake of anything: something good might come into being by chance, yet in respect of chance and insofar as it results from chance it is not good—for that which comes into being by chance is always indeterminate.

[B 13] But that which comes into being according to nature does so for the sake of something and is always constituted for the sake of something better than the product of art; for nature does not imitate art, but art nature, and art exists to aid nature and to fill up what nature leaves undone. For some things nature seems able to complete by itself without aid, but others it does with difficulty or cannot do at all; an example close to hand is what happens when something comes into being: some seeds obviously generate without protection, whatever ground they fall into, others need the art of farming as well; similarly, some animals too attain their full nature by themselves, but man needs many arts for his preservation, both at birth and in the matter of nutrition later. [B 14] If, then, art imitates nature, it is from nature that the arts have derived the characteristic that all their products come into being for the sake of something. For we should assume that everything that comes into being rightly comes into being for the sake of something. Now that which comes into being well, comes into being rightly; and everything

that comes or has come into being according to nature, comes into being well, since that which is contrary to nature is bad and the opposite of that which is according to nature; natural coming into being, therefore, is for the sake of something. [B 15] This one can see from any one of our parts; if, for example you consider the eyelid, you would see that it has come into being not in vain but to aid the eyes, in order to give them rest and to ward off things that fall on to them. Thus that for which something has come into being is the same as that for which it should have come into being; e.g. if a ship ought to have been built to provide transport by sea, it is for the sake of that that it has come into being.

[B 16] Now either absolutely all animals belong to the class of things that have come into being by nature and according to nature, or the best and most honourable of them do; for it makes no difference if someone thinks most animals have come into being contrary to nature because of some destruction and evil. The most honourable of the animals in the world is man; so that clearly he has come into being by nature and according to nature.

*(Iamblichus, Protrepticus 51.16–52.5 Pistelli):*

[B 17] If, then, the end of each thing is always better than the thing (for everything that comes into being does so for the sake of its end, and that for the sake of which is better and the best of all things), and if a natural end is that which is completed last in order of generation when this proceeds continuously; now the bodily parts of man are completed first, the parts concerned with the soul later, and the completion of the better is somehow always later than its generation; now soul is later than body, and understanding is what emerges last in soul (for we see that it is by nature the last thing to come into being for men, and this indeed is why old age lays claim to this alone of good things): therefore, some form of understanding is by nature our end and the exercise of it the final activity for the sake of which we have come into being. Now if we have come into being, clearly we also exist to understand and to learn.

*(Iamblichus, Protrepticus 51.6–15 Pistelli):*

[B 18] Then what is it among existing things for the sake of which nature and god have brought us into being? Pythagoras, when asked about this, answered, ‘To observe the heavens’, and used to say that he was an observer of nature and had come into life for the sake of this. [B 19] And when somebody asked Anaxagoras for what end one would choose to come into being and to live, he is said to have answered the

question by saying, ‘To observe the heavens and the stars, moon and sun in them’, everything else being worth nothing.

*(Iamblichus, Protrepticus 52.6–16 Pistelli):*

[B 20] According to this argument, then, Pythagoras was right in saying that every man has been made by god in order to acquire knowledge and contemplate. But whether the object of this knowledge is the universe or some other nature we must consider later; what we have said suffices as a first conclusion; for if understanding is our natural end, to understand must be the best of all things. [B 21] Therefore the other things we do we ought to do for the sake of the goods that are in man himself, and of these those in the body for the sake of those in the soul, and excellence for the sake of understanding; for this is the supreme end.

*(Iamblichus, Protrepticus 34.5–35.18 Pistelli):*

[B 23] As possessing reason, nature of every kind does nothing at random but everything for an end, and banishing chance cares for the end in a higher degree than the arts—for they are, as we know, imitations of nature. Since man is by nature composed of soul and body, and soul is better than body, and that which is inferior is always servant to that which is superior, then the body must exist for the sake of the soul. Recalling that the soul has a rational and an irrational part, we conclude that the irrational part exists for the sake of the rational part. Mind belongs to the rational part: the demonstration thus compels us to state that everything exists for the sake of mind. [B 24] The activities of mind are thoughts, and thinking is the seeing of objects of thought, just as the activity of the faculty of sight is seeing the objects of sight. It is, then, for the sake of mind and thinking that everything is desirable for man; for other things are desirable for the sake of the soul, mind is the best part of the soul, and the other things exist for the sake of the best. [B 25] Again, of thoughts, those are free which are pursued for their own sake, but those which bring about<sup>1</sup> knowledge for the sake of something else are like slaves; a thing pursued for itself is always superior to one pursued for something else, so that<sup>2</sup> that which is free is superior to that which is not. [B 26] Now if in our actions we use our intellect, even though we take into account our own advantage and consider things from that point of view, yet we follow the guidance of our intellect; we also need our body as a servant and are exposed to chance too. . . .<sup>3</sup> [B 27] Of acts of thought, then, those which are done just because of pure contemplation itself are more honourable and better than those useful for some other ends. Contemplative thinking is in itself honourable and wisdom of the

mind is in this kind of thinking desirable; but thinking which involves understanding is honourable because of the actions it produces. The good and the honourable, then, is found in contemplation involving wisdom, but certainly not in every kind of contemplation. . . . [B 28] Man deprived of perception and mind is reduced to the condition of a plant; deprived of mind alone he is turned into a brute; deprived of irrationality but retaining mind, he becomes like god.

*(Iamblichus, Protrepticus 36.7–13 Pistelli):*

[B 29] For what distinguishes us from the other animals shines through in this sort of life alone, a life in which there is nothing ordinary or of little value. For animals too have some small sparks of reason and understanding, but are entirely deprived of contemplative wisdom . . . ;<sup>1</sup> as to sense-perception and impulses, man has less exactness and strength than many animals.

*F 52 R<sup>3</sup> (Iamblichus, Protrepticus 37.22–40.1 Pistelli):*

[B 31] Moreover, since everyone chooses what is possible and expedient, we must admit that these two characteristics are found in philosophy, and also that the difficulty of acquiring it is more than outweighed by its usefulness; for we all do with greater pleasure that which is easy. [B 32] It is easy to show that we are capable of acquiring the sciences that deal with the just and the expedient and also those that deal with nature and the rest of reality. [B 33] The prior is always more knowable than the posterior, and that which is better by nature than that which is worse. For knowledge is more concerned with things that are defined and ordered than with their contraries, and more with causes than with effects. Now good things are more defined and ordered than bad things, just as a good man is more defined and ordered than a bad man: there must be the same difference. Besides, things that are prior are causes rather than things that are posterior; for if the former are removed, the things that have their substance from them are removed—lines if numbers are removed, planes if lines are removed, solids if planes are removed, the so-called syllables if letters are removed. [B 34] Therefore, if soul is better than body (being by nature more able to command), and there are arts and forms of understanding concerned with the body, namely medicine and gymnastics (for we reckon these as sciences and say that some people possess them), clearly with regard to the soul too and its excellences there is a care and an art, and we can acquire it, since we can do this even with regard to things of which our ignorance is greater and knowledge is harder to come by.



[B 35] So too with regard to nature; for it is far more necessary to have understanding of the causes and elements than of things posterior to them; for the latter are not among the highest realities, and the first principles do not arise from them, but from and through the first principles all other things manifestly proceed and are constituted. [B 36] For whether it is fire or air or number or any other natures that are the causes and principles of other things, if we are ignorant of them we cannot know any of the other things; for how could one recognise speech if one did not know the syllables, or know these if one knew none of the letters? [B 37] So much, then, on the theme that there is a science of truth and of the excellence of the soul, and that we can acquire these.

[B 38] That it [sc. understanding] is the greatest of goods and the most useful of all will be clear from what follows: we all agree that the best man and he who is by nature strongest ought to rule, and that the law alone is ruler and has authority; and the law is a sort of understanding and a formula based on understanding. [B 39] Again, what accurate standard or what boundary-marker of what is good do we have apart from the man of understanding? For the things that such a man will choose if his choice follows his knowledge are good and their contraries bad. [B 40] Now since all men choose what accords with their own dispositions (the just man choosing to live justly, the brave man to live bravely, the temperate man to live temperately), similarly it is clear that the man of understanding will choose above all things to understand; for that is the task of this capacity. It is clear, then, that according to the most authoritative opinion understanding is the greatest of goods.

*(Iamblichus, Protrepticus 41.6–11 Pistelli):*

[B 41] One would see the same point more clearly from the following argument. To understand and to come to know is in itself desirable for men (for it is not possible to live a human life without these activities), and useful too for life; for no good comes to us unless it is accomplished after we have calculated and acted in accordance with understanding.

*F 58 R<sup>3</sup> (Iamblichus, Protrepticus 52.16–54.5 Pistelli):*

[B 42] To seek from all knowledge a result other than itself and to demand that it must be useful is the act of one completely ignorant of the distance that from the start separates good things from necessary things; for they differ completely. For the things that are loved for the sake of something else and without which life is impossible must be called necessities and joint-causes; but those that are loved for themselves, even

if nothing else follows from them, must be called goods in the strict sense; for this is not desirable for the sake of that, and that for the sake of something else, and so *ad infinitum*—there is a stop somewhere. It is really ridiculous, then, to demand from everything some benefit besides the thing itself, and to ask ‘What is the gain to us?’ and ‘What is the use?’ For in truth, as we maintain, such a man is in no way like one who knows the noble and the good or who distinguishes causes from joint-causes. [B 43] One would see the absolute truth of what we are saying if someone as it were carried us in thought to the Isles of the Blest. For there there would be need of nothing and no profit from anything; and there remain only thought and contemplation, which even now we describe as the free life. If this is true, would not any of us be rightly ashamed if when the chance was given us to settle in the Isles of the Blest, he were by his own fault unable to do so? The reward that knowledge brings men is, then, not to be despised, nor is the good that comes from it slight. For as, according to the wise among the poets, we receive the gifts of justice in Hades, so, it seems, we gain those of understanding in the Isles of the Blest.

[B 44] It is not at all strange, then, if it [sc. understanding] does not show itself useful or advantageous; for we call it not advantageous but good, and it should be chosen not for the sake of something else but for itself. For as we travel to Olympia for the sake of the spectacle itself, even if nothing more were to follow from it (for the spectacle itself is worth more than much money), and as we view the Dionysia not in order to gain anything from the actors (indeed, we spend money on them), and as there are many other spectacles we should prefer to much money, so too the contemplation of the universe is to be honoured above all things that are thought useful. For surely we should not take great pains to go to see men imitating women and slaves, or fighting and running, and yet not think it right to view without payment the nature and reality of things.

*(Iamblichus, Protrepticus 54.10–56.12 Pistelli):*

[B 46] But that contemplative understanding is also of the greatest usefulness to us for our practical life can easily be seen from the arts. For as clever doctors and most experts in physical training pretty well agree that those who are to be good doctors or trainers must have a general knowledge of nature, so good lawmakers too must have a general knowledge of nature—and indeed much more than the former. For the former only produce excellence in the body, while the latter, being concerned with the excellences of the soul and claiming to teach about the happiness and misery of the state, need philosophy still more. [B 47]

For just as in the ordinary crafts the best tools were discovered from nature, as for instance in the builder's art the plumbline, the ruler and the compasses—for some come from water, others from light and the rays of the sun—and it is by reference to these that we determine what is to the senses sufficiently straight and smooth, in the same way the statesman must have certain boundary-markers taken from nature itself and from truth by reference to which he will determine what is just, what is good, and what is expedient. For just as there these tools excel all others, so too the best law is that which has the greatest possible conformity to nature.

[B 48] Nobody, however, who has not practised philosophy and learned truth is able to do this. Furthermore, in the other arts and crafts men do not take their tools and their most accurate reasonings from first principles and so attain something approaching knowledge: they take them from what is second or third hand or at a distant remove, and base their reasonings on experience. The philosopher alone imitates that which is exact; for he looks at the exact things themselves, not at imitations. [B 49] Consequently, as a man is not a good builder if he does not use the ruler or any other such instrument but takes his measure from other buildings, so presumably if a man either lays down laws for cities or performs actions by looking at and imitating other human actions or constitutions, whether of Sparta or Crete or of any other state, he is not a good or serious lawgiver; for an imitation of what is not good cannot be good, nor can an imitation of what is not divine and stable in its nature be immortal and stable. But it is clear that to the philosopher alone among craftsmen belong laws that are stable and actions that are right and noble. [B 50] For he alone lives by looking at nature and the divine. Like a good helmsman he moors his life to that which is eternal and unchanging, drops his anchor there, and lives his own master.

[B 51] This knowledge is indeed contemplative, but it enables us to frame all our practice in accordance with it. For just as sight makes and shapes nothing (since its only work is to judge and to show us everything than can be seen), yet enables us to act as it directs and gives us the greatest assistance towards action (for we should be almost entirely motionless if deprived of it), so it is clear that, though knowledge is contemplative, yet we do innumerable things in accordance with it, choose some things and avoid others, and in general gain as a result of it everything that is good.

*F 52 R<sup>3</sup> (Iamblichus, de communi mathematica scientia 79.15–80.1 Festa):*

[B 52] Now he who is to consider these matters must not forget that

all things good and useful for human life reside in use and action, not in mere knowledge; for we become healthy not by knowing the things that produce health but by applying them to our bodies; we become wealthy not by knowing wealth but by possessing much property; most important of all, we live well not by knowing something of that which exists, but by doing well; for this is true happiness. It follows that philosophy too, if it is useful, must be either a doing of good things or useful as a means to such acts.

*(Iamblichus, Protrepticus 40.1–41.5 Pistelli):*

[B 53] Now we ought not to flee philosophy if it is, as we think, the acquisition and exercise of wisdom, and wisdom is among the greatest goods; and if in pursuit of gain we run many risks by sailing to the pillars of Hercules, we should not shrink from labour or expense in the pursuit of understanding. It is slave-like to desire to live rather than to live well, to follow the opinions of the many instead of expecting the many to follow one's own, to seek money but show no concern at all for what is noble.

[B 54] As to the value and the greatness of the thing, I think we have sufficiently proved our case; that the acquisition of wisdom is much easier than that of other goods, one might be convinced by the following arguments. [B 55] The fact that those who pursue philosophy get no reward from men to spur them to the considerable efforts they make, and<sup>1</sup> that having spent much on acquiring other skills, nevertheless in a short time their progress in exact knowledge is rapid, seems to me a sign of the easiness of philosophy. [B 56] So too that all men feel at home in philosophy and wish to spend their lives in the pursuit of it, leaving all other cares, is no small evidence that it is pleasant to sit down to it; for no-one is willing to work hard for a long time. Besides, the exercise of philosophy differs very much from all other labours: those who practise it need no tools or places for their work; wherever in the whole world one sets one's thought to work, one is everywhere equally able to grasp the truth as if it were actually present. [B 57] Thus it has been proved that philosophy is possible, that it is the greatest of goods, and that it is easy to acquire; so that on all counts it is fitting that we should eagerly lay hold of it.

*(Iamblichus, Protrepticus 41.15–42.29 Pistelli):*

[B 59] Further, part of us is soul, part body; the one rules, the other is ruled; the one uses, the other is present as its instrument. Again, the use of that which is ruled, i.e. the instrument, is always arranged to fit that

which rules and uses. [B 60] Of the soul one part is reason (which by nature rules and judges in matters concerning ourselves), the other part follows and is of a nature such as to be ruled; everything is well arranged in accordance with its appropriate excellence—for to attain this is good. [B 61] And indeed, when the most authoritative and most honourable parts attain their excellence, then it is well arranged; now the natural excellence of that which is naturally better is the better, and that which is by nature more fit to rule and more authoritative is better, as man is in relation to the other animals; consequently soul is better than body (for it is fitter to rule), and of soul, that part which has reason and thought (for such is that which commands and forbids and says that we ought or ought not to act). [B 62] Whatever excellence, then, is the excellence of this part must be, for all beings in general and for us, the most desirable of all things; for one would, I think, maintain that we are this part, either alone or especially.

[B 63] Further, when a thing best produces that which is—not by accident but in itself—its product, then that thing must be said to be good too, and that excellence in virtue of which each thing can achieve precisely this result must be termed its supreme excellence. [B 64] Now that which is composite and divisible into parts has several different activities; but that which is by nature simple and whose substance does not consist in a relation to something else must have only one proper excellence of its own. [B 65] If, then, man is a simple animal and his substance is ordered according to reason and mind, he has no other product than the most exact truth and a true account of the things that exist; but if he is composed of several faculties, it is clear that when someone can produce several things, the best of them is always his product, e.g. health is of the doctor and safety of the helmsman. Now we can name no better product of thought and the thinking part of the soul than truth. Truth therefore is the supreme product of this part of the soul.

[B 66] Now this it does, generally speaking, by knowledge, and more so by knowledge of a more perfect kind; and the supreme end of this is contemplation. For when of two things one is desirable for the sake of the other, the latter is better and more desirable for the same reason as the other is desirable; e.g. pleasure than pleasant things, health than healthy things; for these are said to be productive of those. [B 67] Now nothing is more worthy of choice, when one state is compared with another, than understanding, which we maintain to be the faculty of the supreme element in us; for the cognitive part, whether taken alone or in combination with the other parts, is better than all the rest of the soul;

and its excellence is knowledge.

[B 68] Therefore none of what are called the particular excellences is its product; for it is better than all of them and the end produced is always better than the knowledge that produces it. Nor is every excellence of the soul in this way its product; nor is happiness. For if it is to be productive, it will produce results different from itself; as the art of building produces a house but is not part of a house. But understanding is part of excellence and of happiness; for we say that happiness either comes from it or is it. [B 69] According to this argument too, then, it cannot be a productive knowledge; for the end must be better than that which is coming to be and nothing is better than understanding, unless it is one of the things we have named—and none of these is a product distinct from it. Therefore we must say that this form of knowledge is contemplative, since it is impossible that its end should be production.

[B 70] Hence understanding and contemplation are the product of the soul, and this is of all things the most desirable for men, comparable, I think, to eyesight. For one would choose to have sight even if nothing other than sight itself were to result from it. [B 71] Again, if we love one thing because something else necessarily results from it, clearly we shall wish more for that which possesses this quality more fully; e.g. if a man chooses walking because it is healthy but finds that running is more healthy and that he can get it, he will prefer running and, if he knows, would choose to run. If, therefore, true opinion is similar to understanding, and if true opinion is desirable precisely according to the manner and extent to which it is like understanding by reason of being true, then if this is found more in understanding, understanding is more desirable than believing truly.

*(Iamblichus, Protrepticus 43.25–27 Pistelli):*

[B 72] Again, if we love sight for its own sake, that is sufficient evidence that all men love understanding and knowing most of all.

*(Iamblichus, Protrepticus 44.26–45.3 Pistelli):*

[B 73] For in loving life they love understanding and knowing; they value life for no other reason than for the sake of perception, and above all for the sake of sight; they evidently love this faculty in the highest degree because it is, in comparison with the other senses, simply a kind of knowledge.

*(Iamblichus, Protrepticus 44.9–26 Pistelli):*

[B 74] Indeed, living is distinguished from not living by perception, and life is determined by its presence and power: if this is taken away life is not worth living; it is as though life itself were removed by the loss of perception. [B 75] Now of perceptions the power of sight is distinguished by being the clearest, and it is for this reason that we prefer it to the other senses; but every sense is a cognitive power which works through the body, as hearing perceives sound through the ears. [B 76] Therefore, if life is desirable for the sake of perception and perception is a kind of knowing, and if it is because the soul can come to know by means of it that we desire to live; [B 77] further, if, as we said just now, of two things, the one which possesses the desirable quality more fully is always more desirable, then of the senses sight must be the most desirable and honourable; and understanding is more desirable than it and than all the other senses, and than life itself, since it has a stronger grasp of truth; hence all men aim at understanding, most of all things.

*(Iamblichus, Protrepticus 56.13–59.17 Pistelli):*

[B 78] That those who have chosen to live according to mind also enjoy life most will be clear from the following argument. [B 79] Things are said to be alive in two senses, in virtue of a potentiality and in virtue of an actuality; for we describe as seeing both those animals which have sight and are naturally capable of seeing, even if they happen to have their eyes shut, and those which are using this faculty and are looking at something. Similarly with knowing and cognition: we sometimes mean by it the use of the faculty and contemplation, sometimes the possession of the faculty and having knowledge. [B 80] If, then, we distinguish life from non-life by the possession of perception, and perceiving has two senses—properly of using one's senses, in another way of being able to use them (it is for this reason, it seems, that we say even of a sleeping man that he perceives)—it is clear that living will correspondingly be taken in two senses: a waking man must be said to live in the true and proper sense; as for a sleeping man, because he is capable of passing into the activity in virtue of which we say that a man is waking and perceiving something, it is for this reason and with reference to this that we describe him as living. [B 81] When, therefore, each of two things is called by the same term, the one by being active the other by being passive, we shall say that the former possesses the property to a greater degree; e.g. we shall say that a man who uses knowledge knows to a greater degree than a man who possesses knowledge, and that a man who is looking at something sees to a greater degree than one who can do so.

[B 82] For we use 'to a greater degree' not only in virtue of an excess (in the case of things which share a single account) but also in virtue of priority and posteriority; e.g. we say that health is good to a greater degree than healthy things, and that what is by its own nature desirable is so to a greater degree than what is productive of this; yet we see that there is not a single account<sup>1</sup> predicated of both when we say both of useful things and of excellence that each is good. [B 83] Thus we say that a waking man lives to a greater degree than a sleeping man, and that a man who is exercising his soul lives to a greater degree than a man who possesses it; for it is because of the former that we say that the latter lives, because he is such as to be active or passive in this manner. [B 84] The use of anything, then, is this: if the capacity is for a single thing, then it is doing just that thing; if it is for several things, then it is doing whichever is the best of these. E.g. a flute: a man uses a flute only or especially when he plays it—for the other cases presumably also fit here. Thus we must say that he who uses a thing aright uses it to a greater degree; for he who uses something well and accurately uses it for the natural end and in the natural way.

[B 85] Now thinking and reasoning are, either alone or above everything else, the products of the soul. It is now simple and easy for anyone to infer that the man who thinks aright lives to a greater degree, and that he who reaches truth in the highest degree lives in the highest degree, and that this is the man who understands and contemplates according to the most precise knowledge; and it is then and to these men that perfect life must be ascribed—to those who understand and are men of understanding. [B 86] Now if for every animal to live is the same as to exist, it is clear that the man of understanding will exist to the highest degree and in the most proper sense, and most of all when he is exercising this faculty and contemplating what is most knowable of all things.

[B 87] Again, perfect and unimpeded activity contains in itself delight; so that the activity of contemplation must be the most pleasant of all. [B 88] Further, there is a difference between enjoying oneself while drinking and enjoying drinking; for there is nothing to prevent a man who is not thirsty, or is not getting the drink he enjoys, from enjoying himself while drinking—not because he is drinking but because he happens at the same time to be looking at something or to be looked at as he sits. So we shall say that such a man enjoys himself, and enjoys himself while drinking, but not that he does so because he is drinking, nor that he is enjoying drinking. In the same way we shall say that



walking, sitting down, learning, any activity, is pleasant or painful, not if we happen to feel pain or pleasure in the presence of these activities, but if we are all pained or pleased by their presence. [B 89] Similarly, we shall call that life pleasant whose presence is pleasant to those who have it; and we shall say that not all who have pleasure while living enjoy living, but only those to whom living is itself pleasant and who rejoice in the pleasure that comes from life.

[B 90] So we assign life to the man who is awake rather than to him who is asleep, to him who understands rather than to him who is foolish, and we say the pleasure of living is the pleasure we get from the exercise of the soul—for that is true life. [B 91] If, then, there is more than one exercise of the soul, still the chief of all is that of understanding as well as possible. It is clear, then, that necessarily the pleasure arising from understanding and contemplation is, alone or most of all, the pleasure of living. Pleasant life and true enjoyment, therefore, belong only to philosophers, or to them most of all. For the activity of our truest thoughts, nourished by the most real of things and preserving steadfastly for ever the perfection it receives, is of all activities the most productive of joy.

*(Iamblichus, Protrepticus 59.19–60.10 Pistelli):*

[B 93] If we should not only infer this from the parts of happiness but also go deeper and establish it on the basis of happiness as a whole, let us state explicitly that as philosophizing is related to happiness so it is related to our character as good or bad men. For it is as leading to or following from well-being that all things are worthy of choice, and of the sources of happiness some are necessary others pleasant. [B 94] Thus we lay it down that happiness is either understanding and a form of wisdom, or excellence, or genuine pleasure, or all of these. [B 95] Now if it is understanding, clearly philosophers alone will enjoy a happy life; if it is excellence of the soul or enjoyment, then too it will belong to them alone or most of all—for excellence is that which governs our life, and understanding is, if one thing is compared with another, the most pleasant of all things. Similarly, if one says that all these things together are identical with happiness, it must be defined by understanding. [B 96] Therefore all who can should practise philosophy; for this is either the perfect life or of all single things most truly the cause of it for souls.

*F 55 R<sup>3</sup>, F 59 R<sup>3</sup>, F 60 R<sup>3</sup>, F 61 R<sup>3</sup> (Iamblichus, Protrepticus 45.4–48.21 Pistelli):*

[B 97] It is no bad thing to throw light on the subject by adducing what appears clearly to everyone. [B 98] To everyone this much is quite plain, that no-one would choose to live in possession of the greatest<sup>1</sup> possible wealth and power but deprived of understanding and mad, not even if he were to be pursuing with delight the most violent pleasures, as some madmen do. All men, then, it seems, shun folly above all things. Now the contrary of folly is understanding; and of two contraries one is to be avoided, the other to be chosen. [B 99] Thus as illness is to be avoided, so health is to be chosen. Hence according to this argument too, in the light of common conceptions, it seems that understanding is most desirable of all things, and not for the sake of anything that follows from it. For even if a man had everything but were destroyed and diseased in his understanding, his life would not be desirable, since even the other good things could not profit him. [B 100] Therefore all men, insofar as they can come within reach of understanding and taste its savour, reckon other things as nothing, and for this reason not one of us would endure being drunk or a child throughout his life.

[B 101] For this reason too, though sleep is a very pleasant thing, it is not desirable, even if we suppose the sleeper to have all possible pleasures, because the images of sleep are false while those of waking men are true. For sleep and waking differ in nothing else but the fact that the soul when awake often knows the truth but in sleep is always deceived; for the whole nature of dreams is an image and a falsity. [B 102] Further, the fact that most men shrink from death shows the soul's love of learning. For it shrinks from what it does not know, from darkness and obscurity, and naturally seeks what is manifest and knowable. This is, above all, the reason why we say we ought to honour exceedingly those who have caused us to see the sun and the light, and to revere our fathers and mothers as causes of the greatest of goods—they are, it seems, the causes of our understanding and seeing. It is for the same reason that we delight in things and men that are familiar, and call dear those whom we know. These things, then, show plainly that what is knowable and manifest and clear is a thing to be loved; and if what is knowable and clear, then also knowing and understanding.

[B 103] Besides this, just as in the case of property it is not the same possession that conduces to life and to a happy life for men, so it is in the case of understanding too: we do not, I think, need the same understanding with a view to mere life and with a view to the good life. The majority of men may well be pardoned for doing this: they certainly pray for happiness, but they are content if they can merely live. But

unless one thinks one ought to endure living on any terms whatever, it is ridiculous not to suffer every toil and bestow every care to gain that kind of understanding which will know the truth. [B 104] One might recognise this from the following facts too, if one viewed human life in a clear light. For one will find that all the things men think great are mere scene-painting; hence it is rightly said that man is nothing and that nothing human is stable. Strength, size, beauty are a laugh and of no worth;. . .<sup>2</sup> only because we see nothing accurately. [B 105] For if one could see as clearly as they say Lynceus did, who saw through walls and trees, would one ever have thought a man endurable to look at if one saw of what poor materials he is made? Honours and reputation, things so envied, are more than other things full of indescribable folly; for to him who catches a glimpse of things eternal it seems foolish to crave for these things. What is there among human things that is long-lived or lasting? It is owing to our weakness, I think, and the shortness of our life that even this appears great. [B 106] Which of us, looking to these facts, would think himself happy and blessed? For all of us are from the very beginning (as they say in the initiation rites) shaped by nature as though for punishment. For it is an inspired saying of the ancients that the soul pays penalties and that we live for the punishment of great sins. [B 107] For indeed the conjunction of the soul with the body looks very much like this. For as the Etruscans are said often to torture captives by chaining dead bodies face to face with the living, fitting part to part, so the soul seems to be extended throughout and affixed to all the sensitive members of the body.

[B 108] Mankind possesses nothing divine or blessed that is of any account except what there is in us of mind and understanding: this alone of our possessions seems to be immortal, this alone divine. [B 109] By virtue of being able to share in this faculty, life, however wretched and difficult by nature, is yet so cleverly arranged that man seems a god in comparison with all other creatures. [B 110] For mind is the god in us—whether it was Hermetimus or Anaxagoras who said so—and mortal life contains a portion of some god. We ought, therefore, either to philosophize or to say farewell to life and depart hence, since all other things seem to be great nonsense and folly.

*F 51 R<sup>3</sup> (Elias, Prolegomena Philosophiae 3.17–23):*

. . . or like Aristotle in his work entitled *Protrepticus*; for he puts it like this: If you ought to philosophize you ought to philosophize; and if you ought not to philosophize you ought to philosophize: therefore, in any case you ought to philosophize. For if philosophy exists, we certainly

ought to philosophize, since it exists; and if it does not exist, in that case too we ought to inquire why philosophy does not exist—and by inquiring we philosophize; for inquiry is the cause of philosophy.

*F 53 R<sup>3</sup> (Cicero, Tusculanae disputationes III xxviii 69):*

Thus Aristotle, accusing the old philosophers who taught that philosophy had been perfected by their own talents, says that they were either very stupid or very conceited; but that he sees that, since in a few years a great advance has been made, philosophy will in a short time be brought to completion.

*F 54 R<sup>3</sup> (Calcidius, Commentarius in Timaeum 225.21–226.2 Waszink):*

. . . Aristotle agrees, saying that at first children, before they are weaned, think that all men are their fathers and all women their mothers, and that as they grow older they make the distinction but they are not always successful in distinguishing and often are taken in by false images and stretch out their hands towards the image.

*F 54 R<sup>3</sup> (Calcidius, Commentarius in Timaeum 226.8–15 Waszink):*

It is the height of madness not merely to be ignorant but not to realize that you are ignorant and therefore to assent to false images and to suppose that true images are false—as when men think that wickedness is advantageous and virtue an impediment that brings destruction; and such an opinion accompanies to their last years many men who believe that doing injury is very expedient and acting rightly disadvantageous, and who are therefore reviled. Aristotle calls such people aged children, because their minds hardly differ from those of children.

*F 56 R<sup>3</sup> (Plutarch, Pelopidas 279B):*

For of the majority of people, as Aristotle says, some do not use it [sc. wealth] through meanness, and others misuse it through extravagance—and the latter spend their lives as slaves to every passing pleasure, the former as slaves to their business.

*F 61 R<sup>3</sup> (Cicero, de finibus II xiii 40):*

. . . man, as Aristotle says, was born for two things, understanding and action, as though he were a mortal god.

*F 62 R<sup>3</sup> (Plutarch, quaestiones convivales 734D):*

Coming into contact with Aristotle's *Scientific Problems*, which had

been brought to Thermopylae, Florus himself came to teem with many puzzles—as is normal and proper to philosophical natures—and passed them on to his companions; he thus bore witness to Aristotle’s remark that much learning is the beginning of many puzzles.<sup>1</sup>

*F 63 R<sup>3</sup> (Diogenes Laertius, IX 53):*

He [sc. Protagoras] was the first to discover the so-called ‘knot’ on which they carry their burdens, as Aristotle says in his *On Education*; for he was a porter, as Epicurus too says somewhere.

*F 64 R<sup>3</sup> (Themistius, orationes 295CD):*

This man, after some slight association with my studies or amusements, had almost the same experience as the philosopher Axiothea, Zeno of Citium, and the Corinthian farmer. . . . The Corinthian farmer, after coming into contact with Gorgias—not Gorgias himself, but the dialogue Plato wrote in criticism of the sophist—at once gave up his farm and his vines, mortgaged his soul to Plato, and sowed and planted Plato’s views there. This is the man whom Aristotle honours in his Corinthian<sup>1</sup> dialogue.

*F 65 R<sup>3</sup> (Diogenes Laertius, VIII 57):*

Aristotle in the *Sophist* says that Empedocles was the first to discover rhetoric, Zeno dialectic.

*F 66 R<sup>3</sup> (Diogenes Laertius, VIII 63):*

Aristotle says that he [sc. Empedocles] was a free spirit and averse to all authority, if (as Xanthus says in his account of him) he refused the kingship which was offered to him, plainly setting more value on simplicity.

*F 67 R<sup>3</sup> (Diogenes Laertius, IX 54):*

Pythodorus, son of Polyzelus, one of the Four Hundred, accused him [sc. Protagoras]; but Aristotle says that Euathlus did.

*F 68 R<sup>3</sup> (Diogenes Laertius, II 55):*

Aristotle says that a vast number of people wrote eulogies and memorials to Grylos, partly in the wish to please his father.

*F 69 R<sup>3</sup> (Quintilian, II xvii 14):*

Aristotle, as is his custom, has in the *Grylos* produced for the sake of inquiry certain arguments of his usual subtlety [to show that rhetoric is

not an art] . . .

*F 70 R<sup>3</sup> (Diogenes Laertius, VIII 57–58):*

In his *On Poets* he [sc. Aristotle] says that Empedocles was both Homeric and skilled in his diction, using metaphor and the other devices of poetry; and that although he wrote other poems too—the Crossing of Xerxes, and a Prelude to Apollo—a sister of his (or, as Hieronymus says, a daughter) later burned them, the Prelude by accident, the Persian verses deliberately because they were unfinished. And he says in general that he also wrote tragedies and works on politics.

*F 71 R<sup>3</sup> (Diogenes Laertius, VIII 51–52):*

Eratosthenes, in his *Olympic Victors*, says that Meton's father<sup>1</sup> won his victory in the seventy-first Olympiad: his authority is Aristotle. . . . Aristotle, and also Heraclides, say that he [sc. Empedocles] died at the age of sixty.

*F 72 R<sup>3</sup> (Athenaeus, 505C):*

Aristotle in his work *On Poets* writes thus: 'Are we then to deny that the so-called mimes of Sophron, which are not even in verse,<sup>1</sup> or those of Alexamenus of Teos, which were written before<sup>2</sup> the Socratic dialogues, are dialogues<sup>3</sup> and imitations?' Thus Aristotle, the most learned of men, says outright that Alexamenus wrote dialogues before Plato.

*F 73 R<sup>3</sup> (Diogenes Laertius, III 37):*

Aristotle says that the form of his [sc. Plato's] writings was in between poetry and prose.

*F 74 R<sup>3</sup> (Macrobius, V xviii 19–20):*

I will quote Aristotle's own words in the second book of his *On Poets*, where he says this about Euripides: 'Euripides says that the sons of Thestius went with their left foot unshod—at all events, he writes that:

In their left step they were unshod of foot, while the other had sandals, so that they should have one knee light.

Now the custom of the Aetolians is just the opposite: their left foot is shod, the right unshod—I suppose because the leading foot should be light, but not the one which remains fixed'.

*F 75 R<sup>3</sup> (Diogenes Laertius, II 46):*

He [sc. Socrates] had as rivals, according to Aristotle in the third book of his *On Poetry*, a certain Antilochus of Lemnos and Antiphon the

soothsayer—just as Pythagoras had Cylon of Croton; Homer when alive Syagrus and when dead Xenophanes of Colophon; Hesiod when alive Cercops and when dead the aforesaid Xenophanes; Pindar, Amphimenes of Cos; Thales, Pherecydes; Bias, Salaros of Priene; Pittakos, Antimenidas and Alcaeus; Anaxagoras, Sosibius; and Simonides, Timocreon.

*F 76 R<sup>3</sup> ([Plutarch], Vita Homeri 3):*

Aristotle in the third book of his *On Poetry* says that in the island of Ios, at the time when Neleus the son of Codrus was leading the Ionian settlement, a certain girl who was a native of the island became pregnant by a spirit which was one of the companions of the Muses in the dance. Being ashamed of what had happened because of the size of her belly, she went to a place called Aegina. Pirates raided the place, enslaved the girl, and took her to Smyrna which was then under the Lydians; they did this as a favour to Maeon, who was the king of Lydia and their friend. He fell in love with the girl for her beauty and married her. While she was living near the Meles the birth-pangs came upon her and she gave birth to Homer on the bank of the river. Maeon adopted him and brought him up as his own child, Critheis having died immediately after her delivery. Not long after, Maeon himself died. When the Lydians were being oppressed by the Aeolians and had decided to leave Smyrna, and their leaders had called on any who wished to follow them to leave the town, Homer, who was still an infant, said he too wished to follow (ὁμηρεῖν); for which reason he was called Homer instead of Melesigenes.

*F 78 R<sup>3</sup> (Cicero, ad Quintum fratrem III v I):*

. . . Aristotle says in his own name what he has to say about the state and the outstanding man.

*F 79 R<sup>3</sup> (Syrianus, Commentarius in Metaphysica 168.33–35):*

In the second book of the *Politicus* he [sc. Aristotle] says the same as his predecessors about this subject—his words are: ‘The good is the most accurate measure of all things’.

*F 80 R<sup>3</sup> (Seneca, de ira I ix 2):*

Anger, Aristotle says, is necessary, nor can any battle be won without it—unless it fills the mind and kindles the spirit. But we must treat it not as a commander but as a soldier.

*(Philodemus, Volumina Rhetorica II. 175, frag. XV):*

A hare that makes its appearance among hounds cannot escape,

Aristotle says, nor can that which is deemed despicable and shameless survive among men.

*F 82 R<sup>3</sup> (Demetrius, de elocutione 28):*

At all events, in Aristotle's work *On Justice*, if the speaker who is bewailing the fate of Athens were to say 'The enemy city they captured, their own they forsook,' he would have used the language of emotion and lament; but if he makes it assonant—'The enemy city they took, their own they forsook'—by heaven he will not rouse any emotion or pity but only tears of laughter.

*F 83 R<sup>3</sup> (Athenaeus, 6D):*

Others call Philoxenus a fish-lover, but Aristotle calls him simply a dinner-lover. He writes, I think, as follows: 'When they are making speeches to crowded audiences they spend the whole day in relating marvels, and that to men who have just sailed in from the Phasis or the Borysthenes, when they have read nothing themselves but the *Dinner* of Philoxenus—and not the whole of that.'

*F 84 R<sup>3</sup> (Suetonius, de blasphemiiis 84 Taillardat):*

Aristotle in the first book of his *On Justice* says that he [sc. Eurybatos] was a thief who, when he was caught and put in chains, was encouraged by the warders to show how he got over walls and into houses: on being set free, he fastened the spikes to his feet and took the sponges—then he easily climbed up, broke through the roof, and got away.

*F 86 R<sup>3</sup> (Plutarch, de Stoicorum repugnantiis 1040E):*

. . . he [sc. Chrysippus] says in criticism of Aristotle on the subject of justice that he is not right in saying that if pleasure is the end justice is destroyed, and with justice each of the other excellences.

*F 87 R<sup>3</sup> (Boethius, Commentarius in de Interpretatione, ed. 2,1 i 27):*

In his work *On Justice* he [sc. Aristotle] makes it clear that nouns and verbs are not sounds that signify objects of perception; he says: 'the objects of thought and the objects of perception are from the start distinct in their natures'.

*F 89 R<sup>3</sup> (Cicero, de officiis II xvi 56–57):*

How much more serious and true is Aristotle's criticism of us for not being astonished at these vast sums of money spent on captivating the populace. For he says<sup>1</sup> that if men besieged by an enemy should be



compelled to pay a mina for a pint of water, that seems at first incredible to us and everyone is astonished; but when they think about it, they pardon it as due to necessity. Yet in the case of this enormous outlay and endless expenditure, we are not greatly astonished at all—even though necessity is not being relieved or respect increased, and the pleasure of the populace itself lasts only a very short time and moreover derives from the most trivial of objects where at the moment of gratification even the memory of the pleasure dies. He rightly infers that these things gratify children, womenfolk, slaves, and slavelike free men; but they can in no way be approved of by a serious man who weighs events with a sure judgment.

(*Philodemus, de oeconomia XXI 28–35*):

. . . which happened to Aristotle in respect of the argument in the work *On Wealth*<sup>1</sup> to show that the good man is also a good money-maker and the bad man a bad money-maker (as Metrodorus proved).

*F 91 R<sup>3</sup> (Stobaeus, Anthologium IV xxix A 24)*:

From Aristotle *On Good Birth*. ‘In short, with regard to good birth, I for my part am at a loss to say whom one should call well-born.’

‘Your difficulty’, I said, ‘is quite reasonable; for among the many and even more among the wise there is division of opinion and obscurity of statement, particularly about its value. What I mean is this: is it a valuable and good thing, or, as Lycophron the sophist wrote, something altogether empty? For, comparing it with other goods, he says the nobility of good birth is obscure, and its dignity a matter of words—the preference for it is a matter of opinion, and in truth there is no difference between the low-born and the well-born.’

*F 92 R<sup>3</sup> (Stobaeus, Anthologium IV xxix A 25)*:

In the same book. ‘Just as it is disputed what height is good, so it is disputed who those are who ought to be called well-born. Some think it is those born of good ancestors, which was the view of Socrates; he said that because Aristides was good his daughter was nobly born. They say that Simonides, when asked who it is that are well-born, said “those whose family has long been rich”; but at that rate Theognis’ reprimand is wrong, and so is that of the poet who wrote “Mortals honour good birth, but marry rather with the rich”. Good heavens, is not a man who is rich himself preferable to one who had a rich great-grandfather or some other rich ancestor, but is himself poor?’

‘Surely’, he said.

‘And one ought to marry with the rich rather than with the well-born; for it is people who were once rich who are well-born, but people who are now rich who are more powerful. Is it not much the same, then, if one supposes that it is not those born into a once rich family but those born into a once good family who are well-born? One would suppose that recent goodness is better than ancient, that a man has more in common with his father than with his great-grandfather, and that it is more desirable to be good oneself than to have a great-grandfather or some other ancestor who was good.’

‘You are right’, he said.

‘Well, then, since we see that good birth does not consist in either of these things, should we not look elsewhere to see what it consists in?’<sup>2</sup>

‘We should’, he said.

‘ “Good (τὸ εὖ)” means, I suppose, something praiseworthy and excellent; e.g. having a good face or good eyes means, on this showing, something good or fine.’ ‘

‘Certainly’, he said.

‘Well then, having a good face is having the excellence proper to a face, and having good eyes is having the excellence proper to eyes, is it not?’

‘Yes’, he said.

‘But one family (γένος) is good, another bad and not good.’

‘Certainly’, he said.

‘And we say each thing is good in virtue of the excellence proper to it, so that a family is good in the same way.’

‘Yes’, he said.

‘Clearly, then’, I said, ‘good birth (εὐγένεια) is excellence of family.’

*F 93 R<sup>3</sup> (Diogenes Laertius, II 26):*

Aristotle says that he [sc. Socrates] had two wives, first Xanthippe from whom he had Lamprocles, and secondly Myrto, the daughter of Aristides the Just, whom he took without a dowry and from whom he had Sophroniscus and Menexenus.

*F 93 R<sup>3</sup> (Plutarch, Aristides 335CD):*

Demetrius of Phaleron, Hieronymus of Rhodes, Aristoxenus the writer on music, and Aristotle (if the work *On Good Birth* is to be reckoned among his genuine works) relate that Myrto, grand-daughter of Aristides,

lived with the sage Socrates, who was married to another woman but took Myrto under his protection when she was widowed because she was poor and lacking in the necessities of life.

*F 94 R<sup>3</sup> (Stobaeus, Anthologium IV xxix C 52):*

From Aristotle's work *On Good Birth*: 'It is evident, then', I said, 'on the subject which has for so long puzzled us, why those born into once rich or once good families are thought to be better born than those whose possession of these advantages is recent. For a man's own goodness is nearer to him than that of a grandfather, and on that basis it would be the good man who is well born. And some have said this, claiming by this deduction to argue against good birth: Euripides, for example, says that good birth belongs not to those whose ancestors have long been good, but to a man who is himself good, simply. That is not so; those are right who give preference to ancient excellence. Let us state the reasons for this. Good birth is excellence of family, and excellence is good; and a good family is one in which there have been many good men. Now this happens when the family has had a good origin; for an origin has the power of producing many products like itself: this is the function of an origin—to produce many results like itself. When, then, there has been one man of this kind in the family, a man so good that many generations inherit his goodness, the family is bound to be good. There will be many good men if the family is human, many good horses if it is equine, and so too with the other animals. Thus it is reasonable that not rich men nor good men but those born into once rich or once good families should be well born. The argument has its eye on the truth: the origin counts more than anything else. Yet not even those born of good ancestors are in every case well born, but only those who have among their ancestors originators who are good.<sup>1</sup> When a man is good himself but has not the natural power to beget many like him, the origin has not in such a case the power we have ascribed to it. . .<sup>2</sup> People are well born if they come of such a family—not if their father is well born but if the originator of the family is so. For it is not by himself that a father begets a good man, but because he came of such a family.'

*F 96 R<sup>3</sup> (Athenaeus, 564B):*

Aristotle said that lovers look to no other part of the bodies of their beloved than their eyes, in which modesty dwells.

*F 97 R<sup>3</sup> (Plutarch, Pelopidas 287D):*

It is said also that Iolaus, who was the beloved of Hercules, shares in

the contests of the Thebans and fights alongside them. Aristotle says that even in his day lovers and their beloved still pledged their troth on the tomb of Iolaus.

*F 98 R<sup>3</sup> (Plutarch, Amatorius 761 A):*

Aristotle says that Cleomachus died in a different way, after defeating the Eretrians in battle, and that the man embraced by his lover was one of the Chalcidians from Thrace who had been sent to help the Chalcidians in Euboea—hence the Chalcidian song, ‘O children. . .’.

*(al-Dailami, cod. Tübingen Weisweiler 81):*

It is said in a certain book of the ancients that the pupils of Aristotle assembled before him one day. And Aristotle said to them: ‘While I was standing on a hill I saw a youth who stood on a terrace roof and recited a poem, the meaning of which was this: whoever dies of passionate love, let him die in this manner—there is no good in love without death’. Then said his pupil Issos: ‘O philosopher, inform us concerning the essence of love’. And Aristotle replied: ‘Love is an impulse which is generated in the heart; when it is once generated, it moves and grows; afterwards it becomes mature. When it has become mature it is joined by affections of appetite whenever the lover in the depth of his heart increases in his excitement, his perseverance, his desire, his concentrations, and his wishes. And that brings him to cupidity and urges him to demands, until it brings him to disquieting grief, continuous sleeplessness, and hopeless passion and sadness and destruction of mind’.

*F 101 R<sup>3</sup> (Athenaeus, 674F):*

Aristotle in the *Symposium* says that we offer nothing mutilated to the gods, but only what is perfect and whole; and what is full is perfect; and garlanding signifies a certain sort of filling.

*F 103 R<sup>3</sup> (Apollonius, Historiae mirabiles 25):*

Aristotle in his *On Drunkenness* says that Andron of Argos, though he ate many salty and dry foods, remained all through his life without thirst and without drink. Besides, he twice travelled to Ammon through the desert, eating dry barley-groats but taking no liquid.

*F 104 R<sup>3</sup> (Athenaeus, 641 DE):*

Aristotle, in his *On Drunkenness*, talks of second courses in the same way as we do, thus: ‘We must consider that a sweetmeat differs entirely from a foodstuff, as much as what is eaten differs from what is nibbled

‘nibbles’ was the old Greek word for things served as sweetmeats); so that the first person to speak of ‘second courses’ seems to have been justified—for the eating of sweets is a sort of extra dinner, and the sweetmeats form a second meal’.

*F 105 R<sup>3</sup> ([Julian], Letters 391 BC):*

The fig . . . is so useful to mankind that Aristotle actually says that it is an antidote to every poison, and that for precisely that reason it is served at meals both as an hors d’oeuvre and as a dessert—as though it were being wrapped round the iniquities of the food in preference to any other sacred antidote.

*F 106 R<sup>3</sup> (Athenaeus, 447AB):*

Aristotle in his work *On Drunkenness* says . . . : ‘Something peculiar happens in the case of the barley-liquor which they call *pinon*. Those who are drunk on other intoxicants fall in all directions—to left, to right, face down, face up: those who are drunk on *pinon* only<sup>1</sup> fall backwards and face up’.

*F 107 R<sup>3</sup> (Athenaeus, 429CD):*

Aristotle in his work *On Drunkenness* says: ‘If wine is boiled down slightly, it is less intoxicating when drunk; for when it is boiled down its potency becomes weaker. Older men’, he says, ‘get drunk very quickly because of the scarcity and weakness of the natural heat in them; and very young men get drunk fairly quickly because of the abundance of heat in them—for they are easily overcome by the added heat from the wine. And of the lower animals, pigs get drunk when they are fed on masses of pressed grapes, ravens and dogs when they have eaten the so-called wine-plant, monkeys and elephants when they drink wine. That is why men hunt for monkeys and ravens after getting them drunk on wine or on the wine-plant’.

*F 108 R<sup>3</sup> (Plutarch, quaestiones convivales 650A):*

Florus was surprised that Aristotle, having written in his work *On Drunkenness* that old men are most susceptible to drunkenness and women least so, did not work out the cause, although he does not normally omit such inquiries.

*F 109 R<sup>3</sup> (Athenaeus, 429F):*

Aristotle says that a pint and a half of watered Samagorian wine, as they call it, will make more than forty men drunk.

*F 110 R<sup>3</sup>, F 111 R<sup>3</sup> (Athenaeus, 464CD):*

Aristotle in his work *On Drunkenness* says: ‘The cups they call Rhodian are introduced at drinking-parties both because of their taste and because when heated they make the wine less intoxicating. For they put myrrh, rushes, and other such stuffs into water and bring it to the boil; when this is added to the wine it is less intoxicating’. In another part of the work he says: ‘Rhodian cups are made by boiling together myrrh, rushes, dill, saffron, balsam, cardamom, and cinnamon. The liquor resulting from this is added to the wine and inhibits intoxication to such an extent that, by working on the spirits, it even dispels sexual desire’.

## II • LOGIC

### F 112-124 R<sup>3</sup>

*F 112 R<sup>3</sup> (Alexander, Commentarius in Topica 63.11–13):*

But problems put forward in this way are physical problems, as he [sc. Aristotle] has said in his *On Problems*; for physical phenomena whose causes are unknown constitute physical problems.

*F 114 R<sup>3</sup> (Diogenes Laertius, III 80):*

Plato, Aristotle says, used to divide things in this way: of goods, some are in the soul, some in the body, some external. For example, justice, wisdom, courage, temperance, and the like are in the soul; beauty, good condition, health, and strength in the body; friends, the happiness of one's country, and wealth fall among external goods.

*F 114 R<sup>3</sup> (Diogenes Laertius, III 109):*

Thus of existing things, some exist in their own right, others are relative. And according to Aristotle, he [Plato] used to divide the primary things too in this way.

*F 116 R<sup>3</sup> (Simplicius, Commentarius in Categorias 65.2–10):*

But in which [sc. category] are negations, privations, and the various inflexions of the verb to be placed? This question Aristotle himself answered in his *Notes*. For in his *Methodics*, in his *Divisions*, and in another set of *Notes* entitled *On Language* (which, even if it is thought by some not to be a genuine work of Aristotle, is at all events the work of some member of the school)—in all of these, after putting forward the categories, he adds 'I mean these with their cases' (i.e. inflexions), and he connects his exposition of them with negations, privations, and indefinite terms.

*F 117 R<sup>3</sup> (Ammonius, Commentarius in Categorias 13.20–25):*

It should be known that in the old libraries forty books of *Analytics* have been found and two of *Categories*. One began: Of existing things, some are called homonymous, others synonymous'. The other is the one now before us. . . . This version has been preferred as being superior in order and in matter, and as everywhere proclaiming Aristotle as its begetter.

*F 118 R<sup>3</sup> (Simplicius, Commentarius in Categorias 387.17–388.1):*

But now that the language of Aristotle has been clarified, let us see what the more famous interpreters make of the passage. For since the Stoics pride themselves on their working out of logical problems, they are anxious in the matter of contraries—as well as in all other matters—to show that Aristotle furnished the starting point for everything in one book which he called *On Opposites*, in which there is an immense number of problems set forth. Of these the Stoics have set out a small portion: the rest it would not be reasonable to include in an introduction, but those which the Stoics set out in agreement with Aristotle must be mentioned. There has been laid down an ancient definition of contraries, which we have mentioned previously, viz. that they are the things which differ most from one another within a genus: in his work *On Opposites* Aristotle subjected this definition to all kinds of tests, and amended it. He asked whether things that differ are contraries, and whether difference can be contrariety, and whether complete divergence is maximum difference, and whether the things that are furthest apart are identical with those that differ most, and what distance is, and how we are to understand maximum distance. Since all this proves to lead to absurdity, something must be added to the genus, so that the definition comes to be ‘the things that are furthest apart in the same genus’. He pointed out the absurdities consequent upon this; he asked whether contrariety is otherness,<sup>1</sup> and whether the things that are most different are contraries, and added many other criticisms. . . . [388.13–14] This is only a small part of the difficulties raised by Aristotle in his work *On Opposites*.

*F 119 R<sup>3</sup> (Simplicius, Commentarius in Categorias 389.5–10):*

He [sc. Aristotle] in his book *On Opposites* says that justice is contrary to injustice, but that the just man is not said to be contrary, but to be contrarily disposed, to the unjust man. If these too are contraries, he says, ‘contrary’ will be used in two ways: things will be called contraries either in themselves, like excellence and badness, movement and rest, or by virtue of sharing in contraries, e.g. that which moves and that which rests, or the good and the bad.

*F 120 R<sup>3</sup> (Simplicius, Commentarius in Categorias 389.28–390.5):*

This distinction was first drawn by Aristotle, who held that a simple term is not contrary to the definition of its contrary, e.g. that wisdom is not contrary to ignorance of things good, bad and neutral; but that, if there is contrariety here at all, definition is to be opposed to definition,



and the definitions should be said to be contrary by being definitions of contrary things. He elaborates further on this by saying that a definition is contrary to a definition if their subjects are contrary in genus or in differentiae or in both; e.g. let the definition of beauty be mutual symmetry of parts; mutual asymmetry of parts is contrary to this, and the contrariety is in respect of the genus; but in other cases it is by virtue of differentiae: e.g. white is colour that pierces the sight, black is colour that compresses it—in these the genus is the same, but there is contrariety in respect of the differentiae.

*F 121 R<sup>3</sup> (Simplicius, Commentarius in Categorias 390.19–25):*

Aristotle himself in his book *On Opposites* considered whether if someone who has lost one of two things does not of necessity gain the other, there must be something between the two; or whether this is not in all cases so. For a man who has lost a true opinion does not necessarily acquire a false one, nor does he who has lost a false one necessarily acquire a true—sometimes you pass from one opinion to a complete absence of opinion or else to knowledge. But there is nothing between true and false opinion, if ignorance and knowledge are not.

*F 122 R<sup>3</sup> (Simplicius, Commentarius in Categorias 402.30–403.1):*

Aristotle took his distinction between state and privation not from the realm of custom but from that of nature, where the antithesis of state and privation is properly applied. . . . In his book *On Opposites* he himself says that some privations are privations of natural states, others of customary states, others of possessions, others of certain other things—blindness a privation of a natural state, nakedness a privation of a customary state, loss of money a privation of something acquired in practice. There are several other types of privation, and some it is impossible some possible to lose.

*F 124 R<sup>3</sup> (Simplicius, Commentarius in Categorias 409.30–410.2):*

In the book *On Opposites* he added to these types of contrariety also that of things neither good nor bad to things neither good nor bad, saying that it is in this way that white is contrary to black, sweet to bitter, high to low, rest to movement.

### III • RHETORIC AND POETICS

F 125–179 R<sup>3</sup>

*F 136 R<sup>3</sup> (Cicero, de inventione II ii 6–7):*

Aristotle brought together in a single compilation the ancient writers on the art of rhetoric, going right back to their founder and inventor, Tisias; with great care he sought out the main tenets of each author name by name, wrote them down clearly, and meticulously expounded the difficult passages. And with the charm and brevity of his diction he so excelled the inventors themselves that no-one looks to learn their precepts from the original books, but everyone who wants to understand what they were resorts to Aristotle as a far more convenient expositor. Thus Aristotle published his own views and also those of his predecessors, so that from this work we become acquainted both with his own views and with the others.

*F 137 R<sup>3</sup> (Cicero, Brutus XII 46–48):*

Eloquence is the companion of peace, the ally of leisure, and, so to say, the offspring of a well-ordered state. And for this reason, Aristotle says, it was when the tyrants in Sicily had been removed and restitution in private matters was after a long interval being sought in the courts, that for the first time—since that people was sharp and born to controversy—the Sicilians Corax and Tisias wrote *Arts* and *Precepts* of rhetoric; for before that no-one was accustomed to speak with the methodical application of technique, although there were several who spoke carefully and precisely. Some discussions of important topics—what are now called commonplaces—were written and prepared by Protagoras; Gorgias too did the same thing, writing speeches in praise and condemnation of particular topics, because he thought that the ability to inflate a topic with praise and again to belittle it with disparagement was the most essential part of being an orator; Antiphon of Rhamnous produced some similar works (and Thucydides, a reliable source, who actually heard him, says that no-one ever offered a better defence against a capital charge than he did when defending himself). Lysias indeed began by claiming to be versed in the art of rhetoric; but later, seeing that Theodorus was more sophisticated in matter of theory though weaker in

his speeches, he took to writing speeches for others and abandoned theory; in a similar fashion, Isocrates began by denying that there was any art of rhetoric, during which period he wrote speeches for others to use in the law-courts; but when he found himself repeatedly in court on a charge of breaking the law against circumvention by judicial procedure, he gave up writing speeches for others and devoted himself entirely to composing *Arts*.

*F 140 R<sup>3</sup> (Dionysius of Halicarnassus, Isocrates XVIII 576–77):*

Let no-one suppose that I do not know either that Aphareus (who was an ancestor of mine and was adopted by Isocrates) claimed in his speech against Megacleides on the Antidosis that his father wrote no speeches for the law-courts. or that Aristotle says that a large number of volumes of Isocrates' forensic speeches were published by the book-sellers. I am indeed aware of these men's statements, and I neither believe Aristotle (because he wanted to discredit the man) nor fall in with Aphareus (who was putting together a fine-seeming speech on his behalf). I think that Cephisodorus the Athenian is a sufficient judge of the truth here: he lived with Isocrates, was a most faithful pupil, and made a splendid speech for the defence in the counter-pleas against Aristotle. And so I believe that Isocrates did write some speeches for the law-courts—but not many.

*F 144 R<sup>3</sup> (Athenaeus, 556DF):*

One might be surprised, Aristotle says, that nowhere in the *Iliad* did Homer portray a concubine sleeping with Menelaus, yet presented everyone else with women. Indeed, even the old men—Nestor and Phoenix—sleep with women according to him. For they had not exhausted their bodies in their youth through drunkenness or sex or even through the dyspeptic effects of gluttony, and so not unnaturally they are enjoying a vigorous old age. Thus the Spartan seems to respect his wife Helen, on whose behalf he had actually collected the army; and this is why he avoids sleeping with any other women. Agamemnon is disparaged by Thersites as a womaniser. . . . But it is hardly likely, Aristotle says, that this number of women was for use—it was rather a mark of status; after all, it was not for getting drunk that he had a large supply of wine.

*F 149 R<sup>3</sup> (Porphyry, apud Scholiast to Homer, Iliad III 277):*

Why, having said the sun looks over all things and hears all things, did Homer portray him as needing a messenger in the case of his oxen? . . .

Aristotle resolves this by saying that it is either because the sun indeed sees all things but not at one and the same time; or because Lampetia was messenger to the sun in the way sight is to man; or because, he says, it was appropriate to speak in this way both for Agamemnon when swearing the oath in the Single Combat—‘and sun, you who look over all things and hear all things’—and for Odysseus when addressing his companions; for he does not also see what goes on in Hades.

*F 160 R<sup>3</sup> (Porphyry, apud Scholiast to Homer, Iliad X 153):*

The placing of the spears on their spikes is thought to be poor; especially since a single one of them, by falling over, had already created panic everywhere at night. Aristotle resolves this by saying that Homer always portrays things as they were at that time. And the ancient practice was the same as present practice among the barbarians; and this is the custom of many of the barbarians.

*F 161 R<sup>3</sup> (Porphyry, apud Scholiast to Homer, Iliad X 252):*

For example, it is agreed that the following is one of the old puzzles: ‘and now the star had advanced, and more than two parts of the night had passed, and a third part still remained’. For how is it that if two parts and more have gone, yet the third part is left and not a fraction of the third? . . . Aristotle thinks to resolve it as follows, where he says: ‘Division into two may in this case be division into equal parts. Now since<sup>1</sup> what is more than half is indeterminate, when it is increased to such an extent that a third of the whole is left, a stickler for accuracy would determine this and indicate how much remains in order to make clear by how much the half of the whole has been increased. For example, 3 is half of 6. If 6 were divided into two equal parts, they will be 3. If one part is increased, it is unclear whether this is by a fraction or by a whole unit. Now if it becomes larger by a whole unit<sup>2</sup>, the part still remaining will be a third of the whole; and if you say “one of the two parts became more and left a third part,” you indicate that the increase has been by a unit—since the three have become four and there remain two, which is a third of the original six. Now since the twelve parts of night can be divided into two equal divisions—into sixes—and one of these parts was increased and became larger, and it was unclear by how many hours it had been increased (for the increase could have been by one, two, three, or more hours), the poet determines the size of this indeterminate “more” and, because it was increased by two hours, he adds that a third was left—since eight hours have gone by and four remain, which is a third of the

whole. Thus too, if something had 18 parts (dividing into two nines) and you were to say that more than one part of the two-part division has gone and the third part remains, you would make clear, by saying that the third (i.e. 6) remains, that you mean that 12 have been taken. Suppose we ask the same question of the hours of a full day, and suppose someone to say that more than one part of the two-part division of the hours has passed—still without determining how much—and to add that the third part of the whole remains: it is clear that, since the two-part division is into 12 and 12 and a third of the whole (i.e. 8) remains, the “more” of the one part amounts to 4, so that 16 hours have passed in all and 8 remain. Thus when there is a division into two and into three equal parts, anyone who adds to one part of the two-part division and leaves a third of the three-part division, determines in how much more the increase consists. Thus the poet cleverly indicates how large the indeterminate part<sup>3</sup> of the increase of the half was—that it consisted of two hours and that the eighth hour has passed<sup>4</sup>—by saying “and a third part still remained.” For, if you know that the night contains 12 hours in all, and that division into two parts gives 6 and 6, and division into three 4 and 4 and 4,<sup>5</sup> and if you hear that more than one part of the two-part division has passed and then learn that a third of the three-part division, i.e. 4 hours, remains, you know at once that two hours have gone by since midnight’.

*F 166 R<sup>3</sup> (Porphyry, apud Scholiast to Homer, Iliad XXIV 15):*

Why did Achilles go on dragging Hector around the tomb of Patroclus, treating the corpse contrary to established custom? There is a solution, Aristotle says, referring to the customs of the time—they were like that, since even today in Thessaly men drag [corpses] around the tombs.

*F 170 R<sup>3</sup> (Scholiast to Homer, Odyssey V 93):*

‘And she mixed red nectar’:

If the gods drink nothing but nectar, why does Calypso give it to Hermes after mixing it? For if it has been mixed with water, they drink not only nectar but water also. And yet, he says, she served him plain ambrosia ‘and mixed red nectar’. Now Aristotle in resolving this says that ‘she mixed’ means either to combine one liquid with another one or to pour out; for ‘to mix’ means both. So here ‘and she mixed red nectar’ means not to combine but simply to pour out.

*F 171 R<sup>3</sup> (Scholiast to Homer, Odyssey V 334):*

Aristotle asks why he speaks of Calypso and Circe and Ino alone as ‘having speech (αὐδήεσσα)’; for all the others had voices. He did not want to solve this, but emends the text, in some places to αὐλήεσσα—by which he says is meant that they were solitary—and in the case of Ino to οὐδήεσσα—for this characteristic belonged to all and only these people since they all resided on earth.

*F 172 R<sup>3</sup> (Scholiast to Homer, Odyssey IX 106):*

Aristotle asks how Polyphemus the Cyclops was a Cyclops himself when neither his father (who was Poseidon) nor his mother was a Cyclops. He himself solves it by reference to another myth; for horses were sired by Boreas, and the horse Pegasus had Poseidon and Medusa as parents.

*F 175 R<sup>3</sup> (Eustathius, 1717, on Homer, Odyssey XII 130):*

It should be recognized that they say that Aristotle gives an allegorical account of these herds, and especially of the herds of oxen, associating them with the days of the twelve lunar months, which number three hundred and fifty; for that is also the number of the seven herds which each contain fifty beasts. That is why Homer says that they neither are born nor die; for those days never vary in amount.

## IV • ETHICS

F 180–184 R<sup>3</sup>

*F 182 R<sup>3</sup> (David, Prolegomena Philosophiae 74. 17–25):*

He [sc. Aristotle] also wrote on economy, where he discusses household management (he says there that four things must come together in a household: the relation of man to wife, love of father for children, fear of slaves for masters, and that expenditure be commensurate with income—for each lack of measure is ignoble: if income is found to be large, expenditure small, there is something ignoble—such a man is found to be miserly; if income is small, expenditure large, there is something ignoble—such a man is found to be extravagant).

*F 183 R<sup>3</sup> (Clement, Paedagogus III xii 84):*

1 would advise even married men not to kiss their wives at home in front of the servants; for Aristotle does not even allow us to laugh in front of our slaves, still less to let our wives be seen to be embraced in their presence.

# V • PHILOSOPHICAL WORKS

F 185–208 R<sup>3</sup>

*F 185 R<sup>3</sup> (Syrianus, Commentarius in Metaphysica 120.33–121.4):*

That he [sc. Aristotle] has nothing more than this to say against the theory of Forms is shown both by the first book of this treatise [i.e. the *Metaphysics*] and by the two books he wrote *On the Forms*; for it is by taking everywhere practically these same arguments, and sometimes cutting them up and subdividing them, sometimes putting them forward more concisely, that he tries to correct his predecessors in philosophy.

*F 186 R<sup>3</sup> (Scholiast to Dionysius Thrax, 116.13–16 Hilgard):*

And one must realize that it is of universals and things eternal that there are definitions, as Aristotle too has said in *On Ideas*, which he wrote against Plato's Ideas. For while particular things all change and never remain in the same condition, universals are unchangeable and eternal.

*(Alexander, Commentarius in Metaphysica 79.3–88.2):*

They [sc. the Platonists] made further use of the sciences in establishing the Ideas, and in more ways than one, as he [sc. Aristotle] says in the first book of *On Ideas*; and the arguments he seems to have in mind at the present moment [i.e. [5] in the *Metaphysics*] are the following sort. If every science performs its task by referring to some one and the same thing and not to any of the particulars, then there will be with respect to each science something different apart from perceptible individuals, eternal and a pattern for the things produced in each science; and such a thing is the Idea. Again, the things of which there are sciences exist; the sciences are of certain different things apart from particulars (for the latter are infinite and indeterminate, while the sciences are of determinate things); so there are certain [10] things apart from particulars, and these are the Ideas. Again, if medicine is not a science of this particular health but of health simply, there will be a certain health-itself; and if geometry is not a science of this particular equal and this particular commensurate, but of equal simply and the commensurate simply, there will be a certain equal-itself and a commensurate-itself; and these are the Ideas. [15]

Now such arguments do not prove the thesis at issue, which was that there are Ideas; but they do prove that there are certain things apart from



particulars and perceptibles. But it does not follow that if there are certain things which are apart from particulars, these are Ideas; for the common objects, which we say are also the objects of the sciences, are apart from the particulars. Again, these arguments show that there are also Ideas of the things that fall under the arts. For every art too [20] refers what is produced by it to some one thing, and things of which there are arts exist, and the arts are of certain different things apart from particulars. And the last argument, besides equally failing to prove that there are Ideas, will also be thought to establish Ideas of things for which they do not wish there to be Ideas. For [80.1] if, because medicine is not a science of this particular health but of health simply, there is some thing health-itself, then such will be the case also in each of the arts. For an art is not of the particular nor of *this*, but of that simply which is its concern, e.g. carpentry is of chair simply but not of this particular one, and of bed simply but [5] not of this particular one; and sculpture, painting, building, and each of the other arts are similarly related to the things that fall under them. So there will be an Idea of each of the things that fall under the arts—which they do not want.

They also use the following argument to establish the Ideas. If each of the many men is a man, and each of the animals is an animal, and similarly in the other [10] cases; and if in the case of each of these it is not that something is predicated of itself but that some one thing is being predicated of all of them while not being the same as any one of them, then there will be something which is apart from the particulars which exist, separated from them and eternal; for it is predicated always alike of all [15] the changing particulars. And that which is one over many, both separated from them and eternal, is an Idea; so there are Ideas.

This argument, he [sc. Aristotle] says, establishes Ideas even of negations and of things that do not exist. For one and the same negation is predicated of many things and of things which do not exist, and is not the same as any one of the things which it is truly predicated of. For ‘not-man’ is predicated of horse and of dog and of [20] everything apart from man, and for this reason is one thing over many and is not the same as any one of the things of which it is predicated. Again, it always remains alike true of like things; for ‘not-musical’ is true of many things (of everything [81.1] non-musical), and similarly ‘not-man’ of non-men; consequently, there are Ideas also of negations. But that is absurd; for how could there be an Idea of non-being? For if one were to accept that, there would be a single Idea for things that are of *different* kinds and that differ in every respect—of, as it might be, line and man; for [5] all these

are non-horses. Again, there will be a single Idea both of things that are indeterminate and of things that are infinite. But also of what is primary and what is secondary; for both man and animal are non-wood, of which the one is primary, the other secondary—and they did not want there to be either genera or Ideas of such things. Clearly, this argument too fails to show that there are Ideas; but it too [10] tends to show that what is commonly predicated is other than the particulars of which it is predicated. Again, the very people who wish to prove that what is commonly predicated of several things is some single thing and in fact an Idea, try to establish it from negations. For if someone in denying something of several things will do so by referring to some single thing (for someone who says of a man that he is not white and of a horse that it is not white is not in each case denying something [15] peculiar to it but is making reference to some single thing and denying the same white of each), then someone in affirming the same thing of several things will not be affirming something different in each case but there will be some single thing which he is affirming, e.g. man, with reference to some one and the same thing; for as with negation so with affirmation. So there is something that is different apart from what is in the perceptibles, which is the cause of the affirmation that is both true of several things and common, and this is the Idea. Now this argument, he says, [20] produces Ideas not only of things that are affirmed but also of things that are denied; for in both cases there is a similar reference to something single.

The argument that tries to establish that there are Ideas from thinking is as [25] follows. If whenever we think of man or footed or animal, we are thinking of something that is both among the things that exist yet is not one of the particulars (for when the latter have perished the same thought remains), clearly there is something apart from particulars and perceptibles, which we think of whether the latter exist or not; for we are certainly not then thinking of something non-existent. [82.1] And this is a Form and an Idea. Now he says that this argument also establishes Ideas of things that are perishing and have perished, and in general of things that are both particulars and perishable—e.g. of Socrates, of Plato; for we think of these men and keep some image of them even when they no longer exist. And indeed we also think of things that do not exist at all, like a Hippocentaur, a Chimaera: [5] consequently neither does this argument show that there are Ideas.

The argument that tries to establish Ideas from relatives is as follows. In those cases where some same thing is predicated of several things not homonymously but as revealing some single nature, it is true of them

either by their strictly being what [83.1] is indicated by what is predicated, as when we say Socrates is a man and Plato is; or by their being likenesses of the genuine things, as when we predicate man of painted men (for in the case of these latter we reveal the likenesses of men by indicating the same particular nature in all of them); or on the grounds of one of them being the [5] pattern, while the rest are likenesses, as if we were to call both Socrates and likenesses of him men. And we predicate the equal itself of things here, although it is predicated of them only homonymously; for neither does the same account fit all of them, nor do we indicate things that are truly equal; for among perceptibles quantity changes and shifts continuously and is not determinate. Nor moreover do [10] any of the things here accurately receive the account of the equal. And no more indeed on the grounds of one of them being pattern, the other likeness; for one is no more pattern or likeness than the other. And even if someone were to accept that the likeness is not homonymous with its pattern, it still follows that these equal things are equal as likenesses of that which is strictly and truly equal. And if this is the case, there is some equal itself quite strictly, relative to which things here, as [15] likenesses, are both produced and called equal, and this is an Idea, a pattern for those things which are produced relative to it.

This argument, Aristotle says, establishes Ideas even of relative terms. At any rate the present proof has been advanced in the case of the equal, which is a relative; but they used to say that there were no Ideas of relatives because while Ideas, being for them kinds of substances, existed in their own right, relatives had their being in [25] their relationship to one another. And again, if the equal is equal to an equal, there will be more than one Idea of the equal; for the equal-itself is equal to an equal-itself; for if it were not equal to something, it would not be equal at all. Again, by the same argument there will have to be Ideas of unequals too; for opposites are [30] in a similar case—there will or will not be Ideas of both; and the unequal is admitted by them too to involve more things than one.

The argument which introduces the third man is as follows. They say that what are commonly predicated of substances both are strictly such things and are Ideas. [84.1] And again, things that are like each other are like each other by sharing in the same certain thing, which is strictly the thing in question; and this is the Idea. But if this is the case, and what is commonly predicated of certain things, if it is not the same as any one of those things of which it is predicated, is some other thing apart from it

(for that is why man-himself is a genus—because while being predicated of the [5] particulars it is not the same man as any of them), then there will be some third man apart both from the particular, e.g. Socrates and Plato, and from the Idea; and this too will be itself one in number.

And there was an argument presented by the sophists introducing the third man as follows. If when we say ‘a man is walking’ we are saying neither that man as [10] an Idea is walking (for the Idea is not capable of motion) nor that some particular individual is (how could we when we do not know who it is? For while we know that a man is walking we do not know which particular man it is of whom we are saying it), we are saying that some other third man apart from these is walking: so there [15] will be a third man of whom we predicated the walking. Now this argument, which is sophistical, is given encouragement by those who separate what is common from the particulars, as those who posit the Ideas do. And Phantias says, in *Against Diodorus*, that the sophist Polyxenus introduced the third man by saying “If it is both by participation and sharing in the Idea, i.e. in man-himself, that man exists, then there must be some man who will have his existence relative to the Idea. But [20] neither man-himself, i.e. the Idea, exists by participation in the Idea, nor does any particular man. It remains then that there is some third man who has his existence relative to the Idea.”

The third man is proved also in the following way. If what is predicated truly of several items is also something other apart from the things of which it is predicated, separated from them (for it is this that those who posit the Ideas think to [25] prove; for in their opinion man-himself is something because man is predicated truly of particular men, who are more than one in number, and is different from these particular men)—but if this is so, there will be some third man. For if the man that is predicated is different from those of whom he is predicated, and exists on his own, and man is predicated both of the particular men and of the Idea, then there [85.1] will be some third man apart both from the particular and from the Idea. On this basis there will be also a fourth man, predicated of the third man, of the Idea, and of the particulars; and similarly also a fifth, and so on *ad infinitum*.

This argument is the same as the first; this comes about for them because they [5] supposed that like things were like by sharing in the same thing; for both men and the Ideas are like. Now he refuted both these arguments though they were thought to be rather refined, the one on the grounds that it established Ideas even of relative terms, and the other because it introduces a third man and then multiplies men to

infinity. And a similar multiplication will be suffered by any of the other things of which they say there are Ideas. While others have used the first exposition of the third man—there is a specially clear use by Eudemus in his *On Diction*—the last [10] was used by Aristotle himself both in the first book of *On Ideas* and a little later on in the present work [i.e. the *Metaphysics*].

Now they are more—in fact most—concerned to establish that there are first [15] principles; for first principles are for them first principles of the Ideas themselves. And the one and indefinite dyad are first principles, as he has said a little earlier and has himself explained in his *On the Good*; but in their view these are the first principles of number too. Now he says that these arguments for establishing the Ideas destroy these first principles.

And if these are destroyed, the things after the first principles will also be [20] destroyed, given that they come from the first principles; so consequently the Ideas too will be. For if in the case of all things which have a common predicate it is both separated and an Idea, and if the dyad is predicated of the indefinite dyad too, there will be something primary and an Idea of this latter; and consequently the indefinite dyad will no longer be a first principle. But nor will the dyad in its turn be both primary and a first principle; for number is predicated of it in its turn since it is an [25] Idea; for the Ideas are assumed by them to be numbers: consequently number, being a kind of Idea, will be primary for them. And if this is so, number will be prior to the [86.1] indefinite dyad, which is for them a first principle, but not the dyad to number; and if this is so, the dyad would no longer be a first principle, if it is what it is by sharing in something. Again, while it is assumed to be a first principle of number, yet according to the argument just stated number becomes prior to it; but if number is relative (for every number is a number of something), and number is first of the [5] things that exist, given that it is prior even to the dyad which they assumed as a first principle, then on their view what is relative will be prior to what exists in its own right. And that is absurd; for everything relative is secondary. For a relative indicates the condition of a pre-existing nature, which is prior to that condition which happens to belong to it. . . . But even if someone were to say that number is a [10] quantity and not a relative, it would have as a consequence that quantity was prior to substance.

Again, they are committed to saying that what is relative is both a first principle of and prior to what exists in its own right, in so far as the Idea is in their view a first principle of substances, and what it is for an

Idea to be an Idea lies in its [15] being a pattern, and a pattern is relative; for a pattern is a pattern of something. Again, if being for Ideas lies in their being patterns, then things that come into being in relation to them and of which they are Ideas will be likenesses of them; and so someone might say that according to them all naturally constituted things become relative; for all things are likenesses and patterns. Again, if being for Ideas [20] lies in their being patterns, and a pattern exists for the sake of what comes into being relative to it, and what exists on account of something else is less worthy than that thing, then the Ideas will be less worthy than what comes into being relative to them.

The following are some of the arguments which, in addition to those already stated, through the positing of Ideas destroy their first principles. If what is [87.5] commonly predicated of certain things is both the first principle and Idea of those things, and if first principle is commonly predicated of the first principles and element of the elements, there will be something prior to and a first principle of the first principles and of the elements; and in this way there will be neither first principles nor elements. Again Idea is not prior to Idea; for all Ideas similarly are first principles. And the one-itself and the dyad-itself are alike Ideas—as is [10] man-itself and horse-itself and each of the other Ideas; so there will not be any of these that is prior to any other—so that none will be a first principle either; so it is not the case that the one and the indefinite dyad are first principles. Again, it is absurd that an Idea should be given form by an Idea; for all are Forms; but if the one and the indefinite dyad are first principles, there will be Ideas given form by Ideas; for the dyad-itself will be given form by the one-itself; for it is in this way that they say that these are first principles—in the sense that one is form, the dyad [15] matter; so these are not first principles. And if they say that the indefinite dyad is not an Idea, then first there will be something prior to it although it is a first principle; for there is the dyad-itself, by sharing in which even this is a dyad, since this is not the dyad-itself; for it is by virtue of sharing that dyad will be predicated of it, since the same goes for particular dyads. Again, if the Ideas are simple, they will not come from different first principles, but the one and the indefinite dyad are [20] different. Again, the number of dyads will be amazing if one is the dyad-itself, another the indefinite dyad, another the mathematical dyad, which we use in counting and which is not the same as either of the former, and again besides these another in numerable and perceptible things. This is absurd; so that clearly by [88.1] following the very assumptions made by them it is possible to destroy the first principles, which are for them more

important than the Ideas.

(*Alexander*, *Commentarius in Metaphysica* 97.27–98.24):

That it is not, as Eudoxus and some others thought, by mixture with the Ideas that other things exist: Aristotle says it is easy to infer many impossibilities as consequences of this opinion. If the Ideas are mixed with the other things, in the [98.1] first place, they will be bodies; for it is of bodies that there is mixture. Again, they will be contrary to each other; for mixture occurs with respect to contrariety. Again, mixture will occur in such a way that either a whole Idea will be in each of the things with which it is mixed or else part of one. But if a whole, then what is one in number will be in several things; for an Idea is one in number. While if in parts, a [5] man will be what participates in a part of man-himself, not what participates in man-himself as a whole. Again, Ideas will be divisible and partible, although they are impassive. Then they will be uniform if all things which have some part from it are like each other. But how can the Forms be uniform? For part of man cannot be a [10] man, as a part of gold is gold. Again, as Aristotle himself says a little later [sc. in the *Metaphysics*], in each thing there will not be one Idea mixed but many; for if there is one Idea of animal and another of man, and a man is both an animal and a man, he will participate in both Ideas. And man-himself, the Idea, insofar as it is also an animal, will also itself participate in animal; and consequently the Ideas will no longer be simple but composed from many, and some of them primary, others [15] secondary. But if it is not an animal, surely it is absurd to say that man is not an animal? And again, if they are mixed with things that are relative to them, how can they still be patterns, as they say they are? For it is not in this way, as the result of a mixture, that patterns are causes of the similarity that their likenesses have to them. And again, they will be destroyed along with the destruction of the things they are in. Nor yet will they be in themselves separable, but will be in the things that [20] participate in them. In addition to these points, they will no longer be unchangeable—and all the other absurdities which Aristotle in his examination of this opinion in the second book of his *On Ideas* showed it to have. For it was for this reason that he said ‘for it is easy to infer many impossibilities against this view’—for they were inferred there.

F 191 R<sup>3</sup> (*Apollonius*, *historiae mirabiles* 6):

Again in Caulonia, according to Aristotle . . .<sup>1</sup> in addition to much other information about him, he says that in Tyrrhenia he killed a deadly biting snake by biting it himself. He also says that Pythagoras foretold to

the Pythagoreans the coming political strife; that is why he departed to Metapontum unobserved by anyone, and while he was crossing the Cosas he, with others, heard the river say “Good morning, Pythagoras”—and those present were terrified. He once appeared both at Croton and at Metapontum on the same day and at the same hour. Once, while sitting in the theatre, he stood up—so Aristotle tells—and showed those sitting there his own thigh, which was golden.

*F 191 R<sup>3</sup> (Aelian, varia historia II 26):*

Aristotle says that Pythagoras was called by the people of Croton the Hyperborean Apollo. The son of Nicomachus adds that Pythagoras was once seen by many people, on the same day and at the same hour, both at Metapontum and at Croton; and at Olympia, during the games, he got up and showed that one of his thighs was golden.<sup>2</sup> The same writer says that while crossing the river Cosas he was hailed by the river, and that many people heard him so hailed.

*F 192 R<sup>3</sup> (Iamblichus, vita pythagorica VI 31):*

Aristotle relates in his books *On the Pythagorean Philosophy* that the following division was preserved by the Pythagoreans as one of their greatest secrets: of rational living creatures, some are gods, some men, and some beings like Pythagoras.

*F 193 R<sup>3</sup> (Apuleius, de deo Socratis XX 166–7):*

But I suppose Aristotle is a sufficient witness to the fact that the Pythagoreans marvelled greatly at anyone who said he had never seen a divine being.

*F 194 R<sup>3</sup> (Aulus Gellius, IV xi 12):*

Since the fact is unexpected, I add Plutarch’s own words: ‘Aristotle says the Pythagoreans abstain from eating womb and heart, the sea anemone, and certain other such things, but use all other kinds’.

*F 194 R<sup>3</sup> (Diogenes Laertius, VIII 19):*

Aristotle says that at times they [sc. the Pythagoreans] abstain from womb and red mullet.

*F 195 R<sup>3</sup> (Diogenes Laertius, VIII 34):*

Aristotle says in his work *On the Pythagoreans* that he [sc. Pythagoras] enjoyed abstention from beans either because they are like the genitals or because they are like the gates of Hades . . .<sup>1</sup> (for they alone have no



joints), or because they are destructive, or because they are like the nature of the universe, or because they are oligarchical (being used in the choice of rulers by lot).

*F 196 R<sup>3</sup> (Porphyry, Vita Pythagorae 41):*

Pythagoras used to say certain things in a mystical and symbolic way, and Aristotle has recorded many of these; e.g. that he called the sea the tears of Cronos, the Bears the hands of Rhea, the Pleiades the lyre of the Muses, the planets the dogs of Persephone; the ringing sound of bronze when struck was, he said, the voice of a divine being imprisoned in the bronze.

*F 197 R<sup>3</sup> (Porphyry, Vita Pythagorae 42):*

There was also another kind of symbol, of the following sort: 'Do not step over a balance', i.e. do not be covetous; 'Do not poke the fire with a sword', i.e. do not vex with sharp words a man swollen with anger; 'Do not pluck the crown', i.e. do not offend against the laws which are the crowns of cities. Or again, 'Do not eat heart', i.e. do not vex yourself with grief; 'Do not sit on the corn ration', i.e. do not live in idleness; 'When on a journey do not turn back', i.e. when you are dying, do not cling to this life; 'Do not walk the highway', i.e. do not follow the opinions of the many but pursue those of the few and educated; 'Do not receive swallows in your house', i.e. do not take into your house talkative men who cannot control their tongues; 'Add to the burdens of the burdened, do not lighten them', i.e. contribute to no man's sloth, but to his excellence; 'Do not carry images of the gods in your rings', i.e. do not make your thought and speech about the gods manifest and obvious, nor show it to many; 'Make your libations to the gods at the ear of the cup', i.e. celebrate and honour the gods with music, for this goes through the ears.

*F 198 R<sup>3</sup> (Martianus Capella, VII 731):*

(Philosophy speaks). 'Although Aristotle, one of my followers, reasoning from the fact that it [sc. the unit] itself is one alone and wishes always to be sought after, asserts that it is called Desire because it desires itself, since it has nothing beyond itself and, never carried beyond itself or linked with other things, turns its own ardours on itself.'

*F 199 R<sup>3</sup> (Theo of Smyrna, p. 22. 5–9 Hiller):*

But Aristotle in his *Pythagoreans* says that the One partakes of the nature of both; for added to an even number it makes an odd, and added to an odd an even, which it could not do if it did not share in both

natures; and that for this reason the One was called even-odd.

*F 200 R<sup>3</sup> (Simplicius, Commentarius in de Caelo, 386.20–23):*

Right, above and before they called good, and left, below and behind evil, as Aristotle himself related in his collection of Pythagorean doctrines.

*F 201 R<sup>3</sup> (Stobaeus, Eclogae I xviii 1c):*

In the first book of his work *On the Philosophy of Pythagoras* Aristotle writes that the heaven is one, and that time and breath and the void, which divides for ever the regions of different things, are drawn in from the infinite.

*F 202 R<sup>3</sup> (Alexander, Commentarius in Metaphysica 75.15–17):*

Of the arrangement in the heavens which the Pythagoreans assigned to the numbers, Aristotle informs us in the second book of his work *On the Belief of the Pythagoreans*.

*F 203 R<sup>3</sup> (Alexander, Commentarius in Metaphysica 38.8–41.2):*

He [sc. Aristotle] has shown what likenesses the Pythagoreans said there were between numbers and the things that exist and come into being; for assuming that [10] reciprocity and equality were properties of justice and finding them to exist in numbers, they said, for this reason, that the first square number was justice, for in every case the first of a number of things that admit of the same definition is most truly that which it is said to be. Now this number some declared to be the number 4, because, being the first square number, it is divided into equals and is itself equal [15] (being twice 2), while others declared it to be the number 9, which is the first square number produced by multiplying an odd number (3) by itself. Again, they said the number 7 was season; for natural things seem to have their perfect seasons of birth and completion in terms of sevens, as in the case of man. Men are born after seven months, they begin to grow their teeth in seven months, they reach puberty about the end of the second set of seven years, and grow beards about the end of the third. [20] The sun, too, since it is itself thought to be (as he says) the cause of seasons, they maintain to be established where the number 7 resides, which they identify with season; for the sun holds the seventh place among the ten bodies that move round [39.1] the centre and hearth of the universe; it moves after the sphere of the fixed stars and the five spheres of the planets; after it come the moon, eighth, and the earth, ninth, and after the earth the counter-earth. Since the

number 7 neither generates nor is generated by any of the numbers in the decad, for this reason they also said that it [5] was Athene. For the number 2 generates 4, 3 generates 9 and 6, 4 generates 8, and 5 generates 10, and 4, 6, 8, 9 and 10 are generated, but 7 neither generates any number nor is generated from any; and so too Athene was motherless and ever virgin. Marriage, they said, was the number 5, because it is the union of male and [10] female, and according to them the odd is male and the even female, and 5 is the first number generated from the first even number, 2, and the first odd number, 3; for the odd is for them (as I said) male, and the even female. Mind (which was the name they<sup>1</sup> gave to soul) and substance they identified with the One. Because it was unchanging, alike everywhere, and a ruling principle they called mind both a unit [15] and one; but they also applied these names to substance, because it is primary. Opinion they identified with the number 2 because it can move in both directions; they also called it movement and addition. Picking out such likenesses between things and numbers, they assumed numbers to be the first principles of things, saying that all things are composed of numbers.

[20] But they also saw the harmonies to be constituted according to particular numbers, and said that numbers were the first principles of these also; the octave depends on the ratio 2:1, the fifth on the ratio 3:2, the fourth on the ratio 4:3. They said, too, that the whole universe is constructed in accordance with a certain harmony . . . because it consists of numbers and is constructed in accordance with [25] number and harmony. For the bodies that move round the centre have their distances in a certain ratio, and some move faster and others slower, and in their movement the slower strike a deep note and the faster a high one, and these notes, [40.1] being proportionate to the distances, make the resultant sound harmonious; and since they said that number was the first principle of this harmony, they naturally made number the first principle of the heavens and of the universe. For they thought the sun to be, say, twice as far from the earth as the moon, Venus to be [5] three times as far, Mercury four times, and each of the others to be in a certain ratio, and the movement of the heavens to be harmonious, and the bodies that move the greatest distance to move the fastest, those that move the least distance the slowest, and the intermediate bodies to move in proportion to the size of their orbit. [10] On the basis of these likenesses between things and numbers, they supposed existing things both to be composed of numbers and to be particular numbers.

Thinking numbers to be prior to nature as a whole as to natural

things (for nothing could either exist or be known at all without number, while numbers could be known even apart from other things), they laid it down that the elements and [15] first principles of numbers are the first principles of all things. These elements were, as has been said, the even and the odd, of which they thought the odd to be limited and the even unlimited; of numbers they thought the unit was the first principle, composed of both the even and the odd; for the unit was at the same time even-odd, which he used to prove from its power of generating both odd and even number: added to an even it generates an odd, added to an odd it generates an even. [20]

As regards the agreements which they found between numbers and harmonious combinations on the one hand, and the attributes and parts of the heavens on the other, they took these for granted straight off, as being obvious, and showed that the heavens are composed of numbers and arranged in harmony. If any of the celestial phenomena seemed to fail to conform with the numerical principles, they made the [25] necessary additions themselves and tried to fill the gap so as to make their whole treatment of the matter consistent. At least, treating the decad straight off as the perfect number, and seeing that in the visible world the moving spheres are nine in number—seven spheres of the planets, the eighth that of the fixed stars, the ninth the earth (for this, too, they thought, moves in a circle about the resting hearth of [30] the universe, which according to them is fire)—they added, in their system, a counter-earth, which they supposed to move in an opposite direction to the earth, and to be for that reason invisible to those on earth.

Aristotle speaks of these matters both in the *De Caelo* and, with greater [41.1] precision, in his *Beliefs of the Pythagoreans*.

*F 204 R<sup>3</sup> (Simplicius, Commentarius in de Caelo 511.26–31):*

The Pythagoreans . . . do not say that the earth is about the centre, but that the centre of the universe is a fire, and that about the centre the counter-earth moves, being itself an earth but called a counter-earth because it is on the opposite side to our earth. ‘After the counter-earth came our earth, itself also moving about the centre, and after the earth the moon’: so he himself [sc. Aristotle] relates in his work *On the Pythagorean Doctrines*.

*F 204 R<sup>3</sup> (Simplicius, Commentarius in de Caelo 512.12–13):*

For this reason, some call it [sc. fire] the tower of Zeus, as Aristotle himself related in his work *On the Pythagorean Doctrines* . . .

*F 205 R<sup>3</sup> (Simplicius, Commentarius in de Caelo 392.16–32):*

How can he [sc. Aristotle] say that the Pythagoreans place us in the upper part and on the right side of the universe, and those opposite to us in the lower part and on the left side if, as he himself relates in the second book of his collection of Pythagorean doctrines, they say that one part of the whole universe is up and the other down, and that the lower part is right and the upper left, and that we are in the lower part? Is it that he has used the words ‘upper’ and ‘on the right’ here [sc. in the *de Caelo*] in accordance not with his own view but with that of the Pythagoreans? They coupled up and before with right, down and behind with left. But Alexander thinks that the statement in Aristotle’s collection of Pythagorean doctrines has been altered by someone and should run thus—‘the upper part of the universe is on the right, the lower part on the left, and we are in the upper part,’ not in the lower as the text now runs. In this way it will agree with what he says here, that we, who say we live in the lower part and therefore on the left side (since the lower part is coupled with the left side) are in opposition to the Pythagorean statement that we live in the upper part and on the right side. That the text has been altered is perhaps likely, since Aristotle knows that the Pythagoreans coupled the higher position with the right side and the lower with the left.

*F 206 R<sup>3</sup> (Simplicius, Commentarius in de Caelo 296.16–18):*

In his epitome of Plato’s *Timaeus* he [sc. Aristotle] writes: ‘He says it [sc. the universe] is generated; for it is perceptible, and he is assuming that what is perceptible is generated and that what is intelligible is not generated.’

*F 207 R<sup>3</sup> (Damascius, dubitationes et solutiones 306):*

Aristotle in his work on Archytas relates that Pythagoras too called matter ‘other’, as being in flux and always becoming other.

*F 208 R<sup>3</sup> (Simplicius, Commentaria in de Caelo 294.33–295.22):*

A few words quoted from Aristotle’s *On Democritus* will reveal the line of thought of those men [sc. the Atomists]:—Democritus thinks the nature of the eternal entities consists of small substances infinite in number; he supposes a place for them, different from them and infinite in extent, and to this he applies the names ‘void’, ‘nothing’, and ‘the infinite’, while to each of the substances he applies the names ‘thing’, ‘solid’, and ‘existent’. He thinks the substances are so small as to escape our senses, but have all

sorts of shapes and figures, and differences of size. From these, then,<sup>1</sup> as from elements, are generated and compounded visible and perceptible masses. The substances are at variance and move in the void because of their dissimilarity as well as the other aforesaid differences, and as they move they collide with each other and interlock in such a way that, while they touch and get close to each other, yet a single substance is never in reality produced from them; for it would be very simple-minded to suppose that two or more things could ever become one. The cause of these substances remaining with one another for some time he ascribes to the bodies fitting into one another and catching hold of one another; for some of them are scalene, others hook-shaped, others concave, others convex, and others have countless other differences. He thinks that they cling to one another and remain together until some stronger necessity arriving from the environment scatters them apart and separates them. He ascribes the genesis and the separation opposed to it not only to animals but also to plants, and to worlds, and generally to all perceptible bodies.

# VI • PHYSICS

F 209–278 R<sup>3</sup>

F 209 R<sup>3</sup> (*Aulus Gellius, XX iv 3–4*):

. . . I sent him words excerpted from a book of Aristotle's entitled *Standard Problems*: 'Why are the Dionysian artists for the most part bad? Because they have hardly any share in reason and philosophy, since the great part of their life is involved in necessary skills, and because for a large part of the time they are in a state of incontinence, and sometimes in a state of poverty—and both of these conditions incline to produce badness'.

F 211 R<sup>3</sup> (*Simplicius, Commentarius in de Caelo 505.23–25*):

Aristotle too makes this clear in his *Scientific Problems*, where he raises puzzles for the assumptions of the astronomers from the fact that the sizes of the planets do not appear equal.

F 214 R<sup>3</sup> (*Aulus Gellius, XIX v 9*):

I have extracted from the book a few of Aristotle's own words and written them down: 'Why is water from snow and ice bad? Because whenever water is frozen the finest and lightest part turns to vapour. A sign of this is that when it freezes and then thaws it becomes less than before; therefore, once the healthiest part has gone, of necessity in every case what is left behind is worse'.

F 215 R<sup>3</sup> (*Plutarch, quaestiones naturales 912A*):

Why are trees and seeds naturally nourished more by rain water than by running water? . . . Or is what Aristotle says true?—that it is because rain water is recent and fresh while pool water is stale and old.

F 225 R<sup>3</sup> (*Galen, de simplicium medicamentorum temperamentis XII 164 K*):

Now astringent things once they have been burnt lose much of their heat, while things that are not of that sort gain in heat. But nothing which has been burnt is completely cold. For there is left behind in it as it were a kind of ember (that is how Aristotle names it); and this is what is cleaned away in washing. It is the lightest part of the substance of burnt things, and when it departs along with the water, what is left of the burnt

thing is an earthy substance; for the burning exhausts all the moisture, and what is left behind is earthy together with what Aristotle calls the ember.

*F 232 R<sup>3</sup> (Apollonius, historiae mirabiles 51):*

Aristotle talks of something worthy of note in his *Scientific Problems*: he says that a man who has fed and drunk weighs the same as when he is fasting; and he also attempts to give an account of the cause of this.

*F 234 R<sup>3</sup> (Apollonius, historiae mirabiles 9):*

Aristotle in his *Scientific Problems* says: ‘Those who eat only one meal a day are likely to have more irritable characters than those who eat two’.

*F 235 R<sup>3</sup> (Athenaeus, 692BC):*

Aristotle, the most learned of men, asks in his *Scientific Problems*: ‘Why is it that those who use hair-oil are greyer? Is it because the oil is a drying agent because of the herbs in it (hence those who use hair-oil are dry), and dryness makes men greyer? For either greyness is a drying up of the hair or it is a lack of heat—and dryness puts out fire. That is why felt caps also make men go grey more quickly; for the natural moisture of the hair is drawn out’.

*F 237 R<sup>3</sup> (Apollonius, historiae mirabiles 28):*

Aristotle in *Pertaining to Animals*: ‘Wax in the ears, being bitter, becomes sweet in long illnesses’. And this, he says, has been observed to occur in many cases. And in the *Scientific Problems* he also gives the cause of this occurrence.

*F 242 R<sup>3</sup> (Plutarch, quaestiones convivales 734DF):*

. . . what they say about dreams—that they are particularly uncertain and false during the months when the leaves fall—somehow came up after dinner. . . . Your friends—my sons—thought that Aristotle had solved the puzzle, and they believed that there was no need to argue or search any further, except to say as he does that the harvest is the cause. For fruit, when it is fresh and juicy, generates a quantity of disorderly wind in the body; for it is not likely that wine alone boils and protests or that oil alone when newly pressed causes the lamps to sputter as the heat makes the wind rise in waves—rather, we see that new grain and all fruits stretch and swell until they exhale gaseous and uncooked matter. To show that some foods bring bad dreams and disturb our sleeping visions, they adduce beans and the head of the octopus, from which those who



resort to divination through dreams are ordered to abstain.

*F 243 R<sup>3</sup> (Aulus Gellius, XIX vi 1):*

In the *Problems* of the philosopher Aristotle, this is written: ‘Why is it that those who are ashamed turn red and those who are afraid turn pale, although those emotions are very similar? Because the blood of those who are ashamed runs from the heart to all the parts of the body and thus rises to the surface, while the blood of those who are afraid rushes together to the heart and thus leaves the other parts’.

*F 244 R<sup>3</sup> (Aulus Gellius, I xi 17–19):*

However, Aristotle in the books of *Problems*, wrote that the custom of marching into battle to the tunes of flute-players was begun by the Spartans in order that the confidence and keenness of the soldiers might become more evident and more certain. For, he says, marching in this manner is least compatible with lack of confidence and fear, and men depressed and fearful are incapable of such an intrepid and seemly mode of advance. I have added a few words of Aristotle’s on the matter: ‘Why is it that whenever men are about to run into danger, they advance to the flute? In order that they may recognise the cowards by their failure to keep time. . . .’<sup>1</sup>

*F 246 R<sup>3</sup> (Photius, Bibliotheca 249. 441b6–15):*

Aristotle dealt with this topic [sc. the flooding of the Nile]. For he himself actually thought the matter out on the basis of nature, determining to send Alexander of Macedonia to those parts and to discover by inspection the causes of the Nile’s increase. That is why he says that this is no longer a problem; for it has been plainly observed that it increases from the rains, and—what is paradoxical—that in the driest parts of Ethiopia where there is neither winter nor water there occur rainstorms in the summer.

*F 252 R<sup>3</sup> (Scholiast to Aratus, 1095. p. 547 Maass):*

Aristotle says: ‘Whenever the air is cold and wet, then at that time the islands, being moistened, produce vegetation and supply food for the birds there; but whenever the air is arid and dry, then since the islands produce no vegetation at all, the island birds flee to the mainland where they can find at least a little nourishment. And when the jackdaws fly from the islands it is a sign to farmers of drought and poor harvests; but if they migrate in season they indicate a good harvest’.

*F 267 R<sup>3</sup> (Athenaeus. 652A):*

Aristotle in *On Plants*: ‘Of seedless dates, which some call “eunuchs” and others “stoneless”. . . .’

## VII • BIOLOGY

F 279–380 R<sup>3</sup>

F 284 R<sup>3</sup> (*Strabo*, XV xxii 695):

Aristotle relates that there have been cases of septuplets [sc. in Egypt], and himself calls the Nile very fertile and nourishing, because of the moderate concoction from the periods of the sun which leave behind the nourishing factor while evaporating the superfluous.

F 286 R<sup>3</sup> (*Pliny*, *naturalis historia* XI cliv 273):

I am surprised that Aristotle not only believed but actually stated that there are certain signs of longevity in the body itself. And although I think that his view is baseless and should not be published without hesitation (lest everyone anxiously hunts for such signs in himself), nevertheless I shall touch on it because so learned a man did not despise it. Thus he lays down that signs of a short life are few teeth, long fingers, leaden complexion, and a large number of broken lines on the palm; on the other hand, long life is given to those who have sloping shoulders, one or two long lines on their palms, more than thirty two teeth, and big ears.

F 288 R<sup>3</sup> (*Apollonius*, *historiae mirabiles* 27):

Aristotle in *Pertaining to Animals* (for there are two works by him, *On Animals* and *Pertaining to Animals*) says: ‘Lice on the head do not perish during long illnesses; but when the patient is on the point of death the lice are found on the pillows, having abandoned the head’.

F 294 R<sup>3</sup> (*Athenaeus*, 305D):

Aristotle in *On Animals*: ‘Others are toothless and smooth, like the needlefish; some are stoneheaded, like the cremys; some are very hard and rough-skinned, like the boar-fish; some have two stripes, like the seserinus; some have many stripes and red lines, like the saupe’.

F 297 R<sup>3</sup> (*Athenaeus*, 286F):

Aristotle, in the work entitled *Pertaining to Animals* or *On Fish*, says: ‘Those with dorsal markings are called bogues, those with oblique markings mackerel’.

*F 298 R<sup>3</sup> (Athenaeus, 313D):*

Aristotle in his *Pertaining to Animals* writes thus: ‘Fish with speckled tails include the blacktail and the sarg—they have many black markings’.

*F 299 R<sup>3</sup> (Athenaeus, 305C):*

Aristotle in his *Pertaining to Animals*: ‘Some have black speckles, like the blackbird; others variegated speckles, like the thrush’.

*F 308 R<sup>3</sup> (Athenaeus, 277E):*

Now when some bonito had been served, someone said: ‘Aristotle records that these have covered gills, that they are saw-toothed, belong to the gregarious and carnivorous groups, and have a gall-bladder and a spleen as long as their gut. And it is said that when they are caught they jump up and bite off the hook, thus escaping’.

*F 311 R<sup>3</sup> (Athenaeus, 298B):*

Aristotle says that eels like very clean water. So eel-breeders pour clean water on them—for they are stifled in turbid water. That is why those who hunt them stir up the water in order to stifle them. For they have small gills and the ducts are immediately blocked by the mud. Thus during storms too, when the water is disturbed by the winds, they stifle. They copulate by twining together, and they then release a glue-like substance from themselves which, left in the mud, becomes a living creature. Eel-breeders say that they feed at night and lie still in the mud during the day; and they live, for the most part, for eight years.

*F 346 R<sup>3</sup> (Athenaeus, 389AB):*

Aristotle says this about the creature: ‘The partridge is a land animal, with divided feet; it lives for fifteen years, though the female lives for even longer (for among birds the female are longer-lived than the males). It broods over its eggs and hatches them like a domestic hen. When it realizes that it is being hunted, it runs out in front of its nest and limps along by the hunter’s legs, giving him the hope of catching it; and it deceives him until the nestlings have flown away—whereupon it flies away itself. The creature is bad-natured and mischievous; it is also salacious. That is why it breaks the female’s eggs—so that it may tread her again. Thus the female, recognising this, runs away to lay’.

*F 363 R<sup>3</sup> (Aelian, de natura animalium XVI 33):*

Aristotle says that the horns and ears of the cattle among the Neuri grow out of the same spot and are knitted together. The same author says

that a certain place in Libya has goats with their udders suspended from their breasts. The following too is from the son of Nicomachus: he says that among the Boudini who live by the Cariscus white sheep are not to be found—they are all black.

*F 366 R<sup>3</sup> (Aelian, de natura animalium V 8):*

Aristotle says that the land of the Astypalaeans is hostile to snakes, just as—so the same author tells us—Rhenea is to weasels.

*F 368 R<sup>3</sup> (Aelian, de natura animalium IV 57):*

Aristotle says that a man who has been bitten by a water-snake immediately gives off a very heavy smell, so that no-one is able to approach him. According to the same author, anyone who has been bitten is overcome by drowsiness—and in fact a great mist comes over his eyes, and madness and very violent trembling ensue, and he dies two days later.

*F 373 R<sup>3</sup> (Galen, Commentarius in Hippocratis de natura hominis XV 25–26 K):*

And if you want to investigate the opinions of the old doctors, you can read the volumes of the medical collection which are ascribed to Aristotle but are agreed to have been written by his pupil Menon—which is why some call them the *Menonia*. It is clear that Menon carefully sought out those books of the old doctors which were still extant in his time, and thence collected their opinions.

*F 380 R<sup>3</sup> (Vita Aristotelis Marciana 170–5 Gigon):*

And in mathematics he showed that the cone of the lines of sight is acute-angled because the line of sight extends further than the magnitude which it sees. And for this reason none of the things seen is seen as a whole at one and the same time, and hence the axis is larger than the base and the cone is acute-angled.

## VIII • HISTORICAL WORKS

F 381–644 R<sup>3</sup>

F 472 R<sup>3</sup> (*Athenaeus*, 272D):

In the *Constitution of the Aeginetans* Aristotle says that they had 470,000 slaves.

F 473 R<sup>3</sup> (*Strabo*, VII vii 2):

Aristotle's *Constitutions* show that from of old they [sc. the Leleges] were nomads, both in association with them [sc. the Carians] and by themselves. For in the *Constitution of the Acarnanians* he says that while the Curetes held part of it [sc. of Acarnania], the Leleges, and then the Teleboae, held the western part. And in that of the Aetolians he calls Leleges those who are now Locrians, and he says that they also held Boeotia. Similarly in those of the Opuntians and of the Megarians. In that of the Leucadians he also names an autochthonous Lelex, his grandson Teleboa, and the latter's twenty-two children, the Teleboae, some of whom settled in Leucas.

F 476 R<sup>3</sup>. F 510 R<sup>3</sup> (*Pollux*, IV 174):

Aristotle, in the *Constitution of the Acragantines*, having said that they used to levy a fine of fifty litres, adds that 'the litre is worth an Aeginetan obol.' And in the *Constitution of the Himerans* he says that the Siceliots call two bronze pieces a dizas, one an ounce, three a trias, six a half-litre, an obol a litre, a Corinthian stater a decalitre (which is worth ten obols).

F 486 R<sup>3</sup> (*Scholiast to Pindar*, Pythian I 89):

Aristotle says in the *Constitution of the Geloans* that Hieron's brother died of dropsy, and, in the *Constitution of the Syracusans*, that Hieron himself suffered from cystitis.

F 491 R<sup>3</sup> (*Strabo*. VIII vi 15):

Epidaurus used to be called Epicarus. For Aristotle says that the Carians held it, as they also held Hermione; but that when the Heraclidae returned, Ionians from the Attic Tetrapolis followed them to Argos and settled with the Carians.

F 492 R<sup>3</sup> (*Harpocration*, s.v. Ἐλλανοδίκαι):

. . . Aristotle in the *Constitution of the Eleans* says that to begin with the Eleans appointed one Hellanodikes, but after a time two, and finally eight.

*F 496 R<sup>3</sup> (Eustathius, 1747, on Odyssey XIII 408):*

The same author [sc. Pausanias] says that Aristotle relates that when a plague struck them [sc. the Boeotians] and a large flock of crows appeared, the men hunted down the crows, purified them with incantations, and let them go free; and they said to the plague: ‘Go to the crows’.

*F 497 R<sup>3</sup> (Harpocration, s.v. τετραρχία):*

Aristotle in the *Constitution of the Thessalians* says that in the time of Aleuas the Red Thessaly was divided into four portions.

*F 498 R<sup>3</sup> (Scholiast to Euripides, Rhesus 311*

Aristotle in the *Constitution of the Thessalians* writes as follows: ‘Dividing up the government. . .<sup>1</sup> Aleuas ordered that each group according to lot should provide fifty cavalymen and eighty peltasts. A *peltê* is a shield without a rim, not bronze-covered but made of stretched sheep- or goat-skin (not of cow-hide). And they all carried three javelins and a short spear called a *schedion*’.

*F 501 R<sup>3</sup> (Scholiast to Dionysius Thrax, p. 183.1–5 Hilgard):*

Others, including Ephorus in his second book, say that Cadmus was the inventor of the alphabet. But some say that he conveyed to us the invention of the Phoenicians—as Herodotus says in his *Histories* and as Aristotle relates. For they say that while the Phoenicians invented the alphabet, Cadmus introduced it to Greece.

*F 501 R<sup>3</sup> (Scholiast to Dionysius Thrax, p. 190.19–21 Hilgard):*

Cadmus is the inventor of the alphabet, as Ephorus and Aristotle say; but others say that it was the invention of the Phoenicians and that Cadmus imported it to Greece.

*F 501 R<sup>3</sup> (Pliny, naturalis historia VII lvi 192):*

Aristotle holds that 18 [sc. of the letters of the Greek alphabet] are original, and that two—psi and zeta—were added by Epicharmus rather than by Palamedes.

*F 504 R<sup>3</sup> (Etymologicon Magnum, s. v. Ἀρκείστος):*

Aristotle, in the *Constitution of the Ithacans*, says that Cephalus, while living in the Cephallenian islands which got their name from him, had been childless for a long time, and on inquiring of the god was ordered to copulate with anything female he should happen to meet. Now arriving back in his own country he fell in with a she-bear, and in obedience to the oracle copulated away: the bear, becoming pregnant, turned into a woman and gave birth to a child, Arceisios (from ἄρκτος [‘bear’]).

*F 512 R<sup>3</sup> (Scholiast to Apollonius Rhodius, IV 982–92):*

The island is Corcyra. This previously used to be called Scheria. Aristotle gives the reason in his *Constitution of the Corcyreans*. For he says that Demeter was afraid that the rivers flowing from the mainland would make it part of the mainland, and so she begged Poseidon to divert the courses of the rivers. Thus, since the rivers had been held back, it was called Scheria instead of Drepane.

*F 515 R<sup>3</sup> (Athenaeus, 618EF):*

Aristotle at any rate says in the *Constitution of the Colophonians*: ‘And Theodorus himself also died later by a violent death. And he is said to have become rather soft-living, as is clear from his poetry; for even today the women sing his songs at the time of the festivals’.

*F 519 R<sup>3</sup> (Scholiast to Pindar, Pythian II 127):*

Aristotle says that Achilles was the first to have used the war-dance (πυρρίχη) at the pyre (πνρᾶ) of Patroclus (this is the dance, he says, that is called the *prulis* among the Cyprians); so he takes the word πυρρίχη to derive from pyre.

*F 532 R<sup>3</sup> (Scholiast to Pindar, Isthmian VII 18):*

The Aegeidae are a phratry of the Thebans, from whose number some came to help the Spartans in their war against the Amycleans; their leader was Timomachus, who was the first man to instruct the Spartans in all military matters, and who received great honours from them. And his bronze breastplate is put on display at the Hyacinthia—the Thebans used to call this a ‘weapon’. Aristotle relates this in the *Constitution of the Spartans*. . . Aristotle says that when the Spartans were engaged in their war with the Amycleans, having ascertained from the god that they should take the Aegeidae as allies, they set out for Athens. But while lodging in Thebes they were invited to the banquet of the Aegeidae phratry. On hearing the priest praying after dinner that the gods would give good things to the Aegeidae, they interpreted the oracle and



concluded their alliance in Thebes.

*F 533 R<sup>3</sup> (Plutarch, Lycurgus 39E):*

Least of all is there agreement about the date at which he [sc. Lycurgus] lived. Some say that he flourished at the same time as Iphitus and joined with him in establishing the Olympic truce—among them, Aristotle the philosopher, who cites as evidence the discus at Olympia on which is preserved an inscription of Lycurgus' name.

*F 540 R<sup>3</sup> (Harpocration, s.v. μόρων):*

Aristotle has discussed this in the *Constitution of the Spartans*. He says that there are six named *morae* and that all the Spartans are divided among the *morae*.

*F 544 R<sup>3</sup> (Scholiast to Euripides, Andromache 445):*

In the next lines he [sc. Euripides] berates them [sc. the Spartans] in particular for their love of money. Aristotle too relates this in his *Constitution of the Spartans*, and he adds the verse pronounced by the god: 'Love of money, nothing else, will ruin Sparta'.

*F 547 R<sup>3</sup> (Polybius, XII v 4–5):*

Nevertheless, I have no compunction in saying and writing that the account we have received from Aristotle about the colonisation [of Locri] is truer than that given by Timaeus. For I am aware that the Locrians agree that the tradition about the colonisation handed down to them from their fathers is the one Aristotle, not the one Timaeus, told. And they would offer the following proofs of it. . .

*F 549 R<sup>3</sup> (Athenaeus, 576AB):*

Aristotle too relates that something similar happened when he writes in the *Constitution of the Massaliots* as follows: 'Phocaeen merchants from Ionia founded Massilia. Euxenus the Phocaeen was the guest of Nanos the king (that was his name). Now this Nanos was celebrating the marriage of his daughter and he invited Euxenus, who happened to be there, to the feast. The marriage took place in the following way: the girl had to come in after dinner with a cup of mixed wine and give it to any of the suitors present she wished—the man she gave it to would be the bridegroom. Now the girl came in and, either by chance or for some other reason, gave it to Euxenus. (The girl's name was Petta.) When this occurred, and her father asked him to take her since the gift was sanctioned by the gods, Euxenus took her for his wife and lived with her, changing her

name to Aristoxene. And there is a family in Massilia that traces its origins back to her and is still called the Protiadae—for Protis was the son of Euxenus and Aristoxene’.

*F 551 R<sup>3</sup> (Athenaeus, 235E):*

Aristotle in the *Constitution of the Methonians* says: ‘There were two parasites for each magistrate, and one for each military official; and they received fixed contributions from various sources and, in particular, fish from the fishermen’.

*F 554 R<sup>3</sup> (Photius, Lexicon s.v. τὸ Μηλιακὸν πλοῖον):*

Aristotle says that when Hippotes was setting out to found a colony he laid a curse on those who were unwilling to sail with him. For those who stayed behind excused themselves by saying that their wives were sickly or that their ships were leaky; so he laid a curse that their ships might never be watertight and that they might always be ruled by their wives.

*F 558 R<sup>3</sup> (Athenaeus, 348AC):*

Aristotle in the *Constitution of the Naxians* writes about this proverb as follows: ‘Most of the rich men in Naxos lived in the town, while the rest were scattered among the villages. Now in one of the villages, called Leistadae, there lived Telesagoras, a very rich man with a good reputation who was honoured by the people in various ways including the daily sending of gifts. And when they came down from the town and haggled over anything being sold, the sellers used to say that they would rather give it to Telesagoras than sell it at such a price. Now some young men were buying a large fish, and when the fisherman made the usual remark they were annoyed at hearing it so often; so, being tipsy, they roistered round to his house. Telesagoras received them civilly; but the young men assaulted him and his two daughters, who were of marriagable age. The Naxians were enraged at that, took up arms, and attacked the young men. And there was then serious unrest, the Naxians being led by Lygdamis who from this generalship became tyrant of his country’.

*F 562 R<sup>3</sup> (Harpocration, s.v. Ἀμφισσα):*

Aristotle in the *Constitution of the Opuntians* says this: ‘Andraimon was the founder, and he called it Amphissa because the place was surrounded by mountains’.

*F 577 R<sup>3</sup> (Plutarch, Pericles 166D):*

Aristotle says that Pericles himself was earlier defeated in a sea-battle by Melissus.

*F 583 R<sup>3</sup> (Athenaeus, 520CD):*

So far gone in luxury were they [sc. the Sybarites] that they actually trained their horses to dance to the pipe at their feasts. Now the Crotoniates knew this, and when they made war against them, as Aristotle says in his account of their constitution, they struck up the dance music for the horses—for they had pipers among their soldiery. And when the horses heard the pipers they not only danced but actually deserted, carrying their riders, to the Crotoniates.

*F 588 R<sup>3</sup> (Athenaeus, 435DE):*

Aristotle in his *Constitution of the Syracusans* says that he [sc. Dionysius the younger] was sometimes drunk for ninety days on end, and that that is why his sight became somewhat dim.

*F 593 R<sup>3</sup> (Stephanus of Byzantium, s.v. Τένεδος):*

[On the proverb, ‘an axe of Tenedos.’] Or rather, as Aristotle says in the *Constitution of the Tenedians*, because a certain king in Tenedos laid down a law that anyone who caught an adulterous pair should kill both with an axe. Now it happened that his son was caught committing adultery, and he confirmed that the law should be observed even in the case of his own son; after his son had been killed, the matter gave rise to a proverb for cruel treatment.

*F 609 R<sup>3</sup> (Dionysius of Halicarnassus, Antiquitates Romanae I lxxii 3–4):*

Aristotle the philosopher relates that certain of the Achaeans who were returning from Troy sailed round Cape Malea and were caught in a violent storm; for a time they were carried by the winds and wandered all over the sea, but at last they came to that part of Opice which is called Latinium and lies on the Tyrrhenian Sea. Overjoyed at the sight of land, they beached their ships there and spent the winter months preparing to sail at the beginning of spring. But their ships burned one night, and having no way to leave they were compelled willy-nilly to settle in the spot where they had landed. This happened because of certain female prisoners whom they had brought from Troy: they burned the ships because they feared that if the Achaeans sailed home they would be made into slaves.

*F 614 R<sup>3</sup> (Ammonius, de adfinium vocabulorum differentia 334):*

Aristotle, in his *Claims of the Cities*, records the following: ‘At the same time, Alexander the Molossian, when the Tarentines summoned him to make war against the barbarians, sailed with fifty ships and numerous vessels for horse- and troop-transport’.

*F 615 R<sup>3</sup> (Plutarch, Solon 83F):*

For the Amphictyons were persuaded by him [sc. Solon] to go to war, as several authors testify, including Aristotle who, in his *List of Pythian Victors*, ascribes the decision to Solon.

*F 637 R<sup>3</sup> (Scholiast to Aristides, Panathenaicus 189.4):*

The order of the festivals according to Aristotle is this: first, the Eleusinia, because of the harvest of Demeter; second, the Panathenaea, for Aster the giant who was killed by Athena;<sup>1</sup> third, the festival founded in Argos by Danaus because of the marriage of his daughters; fourth, the one founded in Arcadia by Lycaon and called the Lycaea; fifth, the one at Iolcus, begun by Acastus<sup>2</sup> for his father Pelias; sixth, the one at the Isthmus, introduced by Sisyphus for Melicertes; seventh, the Olympic festival, introduced by Hercules for Pelops; eighth, the one at Nemea, which the Seven against Thebes founded for Archemorus;<sup>3</sup> ninth, the one at Troy which Achilles instituted for Patroclus; tenth, the Pythian festival which the Amphictyons founded for the death of Pytho. This is the order of the old and ancient festivals set out by Aristotle who composed the *Peplai*.

## IX • LETTERS

F 645–670 R<sup>3</sup>

*F 645 R<sup>3</sup> (Athenaeus, 697A):*

And Aristotle himself, in his defence against the charge of impiety (if the speech is not a forgery) says: ‘If I had decided to sacrifice to Hermeias as an immortal I would not have prepared a memorial to him as a mortal, and if I had wished to immortalise his nature I would not have adorned his body with burial honours’.

*F 646 R<sup>3</sup> (Vita Aristotelis Marciana 94–96 Gigon):*

In order to confer a benefit on all mankind, he [sc. Aristotle] wrote a book to Alexander on kingship, instructing him on how to rule.

*F 647 R<sup>3</sup> (Themistius, orationes 107CD):*

We should do honour to Aristotle, who slightly altered Plato’s words and made his thesis truer. He said that it was not merely unnecessary for a king to be a philosopher, but actually a disadvantage; rather, a king should be attentive and obedient to true philosophers, since then he would fill his reign with good deeds not with words.

*F 651 R<sup>3</sup> (Harpocration, s.v. ὅτι ξένου):*

. . . Aristotle, in one of his letters to Philip, says that he [sc. Philip] released the daughters of Apollophanes to Satyrus the actor.

*F 652 R<sup>3</sup> (Vita Aristotelis Marciana 34–40 Gigon):*

When he [sc. Aristotle] was seventeen, he received an oracle from the Pythian god to become a philosopher in Athens. There he attended on Socrates, and stayed with him for the short time that remained before the latter’s death; after him, he attended on Plato and stayed with him too until death, a period of some twenty years as he himself says in a letter to Philip.

*F 654 R<sup>3</sup> (Vita Aristotelis Marciana 121–27 Gigon):*

. . . and he can be seen in his letters expressing his admiration for Plato and recommending to the kings those connected to Plato by birth.

*F 655 R<sup>3</sup> (Vita Aristotelis Marciana 73–80 Gigon):*

He [sc. Aristotle] was so valued by Philip and Olympias that they set up a statue of him with themselves; and the philosopher, being such a considerable part of the kingdom,<sup>1</sup> through his philosophy used his power as an instrument for benefaction, doing good both to individuals and to entire cities and to all men at one and the same time. For the benefits he bestowed on individuals are revealed in the letters which he wrote on various subjects to the royal couple. . . .

*F 656 R<sup>3</sup> (Demetrius, de elocutione 233):*

Aristotle, however, actually uses demonstrations in his letters; for example, wishing to get it across that one should benefit large and small states alike, he says: ‘For the gods in both are equal; hence, since the Graces are goddesses, equal grace will accrue to you from both’.

*F 657 R<sup>3</sup> (Dio Chrysostom, XLVII 9–11):*

I used sometimes to congratulate Aristotle, who, coming from Stagira (a small town in Olynthia), after the fall of Olynthus managed through his intimacy with Alexander and Philip to secure the refounding of the site; and I used to say that he was the only man to have had the good fortune to be the founder of his own country. Now the other day I chanced on a letter in which Aristotle is repenting and lamenting and saying that some of the people in question were trying to destroy the king and the governors he had sent, so that no good had come of it nor had the city been established at all. But if it pained some men that, having been stateless fugitives, they should acquire a country and live in freedom according to the laws, and if they preferred to live in villages like barbarians rather than have the form and name of a state, why should we be amazed if anything else pains men? Aristotle writes in his letter that he has given up the business—for he says that he is putting his hands up.

*F 658 R<sup>3</sup> (Plutarch, de Alexandri fortuna 329B):*

He [sc. Alexander] did not do as Aristotle advised—act towards Greeks as their leader, towards foreigners as their master, treating the former as friends and kinsmen and the latter as animals or plants—and so fill his reign with many wars and banishments and festering factions.

*F 659 R<sup>3</sup> (Aelian, Varia Historia xii 54):*

Aristotle, wishing to pacify Alexander’s rage and to put a stop to his anger with so many people, wrote to him as follows: ‘Anger and rage are directed not against lesser men but against greater; and you have no

equal’.

*F 660 R<sup>3</sup> (Stobaeus, Anthologium III xx 55):*

Just as smoke stings our eyes and prevents us from seeing what is under our feet, so anger, once aroused, clouds our reason and does not allow our mind to anticipate the absurdity which will result from it.

*F 661 R<sup>3</sup> (Stobaeus, Anthologium III xx 46):*

Or do you not see that when anything is done in rage our reason goes abroad, fleeing anger as a harsh tyrant?

*F 663 R<sup>3</sup> (Aristocles, frag. 2 Heiland = Eusebius. Praeparatio Evangelica XV ii 14):*

. . . as for his [sc. Aristotle’s] marriage to Pythias, he himself has given a full enough defence in his letters to Antipater. For he married her on Hermeias’ death because of his regard for Hermeias: she was a modest and good woman, and in unfortunate circumstances because of the disasters that had overtaken her brother.

*F 664 R<sup>3</sup> (Plutarch, de tranquilizate animi 472E):*

Aristotle in writing to Antipater said: ‘It is not just Alexander who has good reason to be proud because he has power over many men: pride is no less appropriate on the part of those who possess correct beliefs about the gods’.

*F 665 R<sup>3</sup> (Demetrius, de elocutione 225):*

Who would speak to a friend as Aristotle does to Antipater in a letter on behalf of some exile who was an old man? He says: ‘If this man has journeyed as an exile in every land without ever returning home, clearly no reproach attaches to men who wish to return home to Hades’.

*F 666 R<sup>3</sup> (Aelian, Varia Historia xiv 1):*

Aristotle . . . wrote to Antipater when someone deprived him of the honours voted him at Delphi, commenting thus: ‘As to what was voted me at Delphi and of which I have been deprived, my present attitude is neither one of great concern nor yet one of complete indifference’.

*F 667 R<sup>3</sup> (Vita Aristotelis Marciana 184–91 Gigon):*

When the Athenians rose against him, he withdrew to Chalcis, hinting at his reasons: ‘I will not allow the Athenians to wrong philosophy twice.’ And, since citizens and foreigners did not have the same duties to the

state of Athens, he writes in a letter to Antipater: 'Life at Athens is difficult—for pear grows old on pear and fig on fig,' punning on the succession of informers.<sup>1</sup>

*F 668 R<sup>3</sup> (Demetrius, de elocutione 144):*

Elegance comes both from colloquial words, as when Aristotle says 'For the more I am a loner the more fond of stories have I become,' and also from coined words, as for example the same author in the same passage: 'For the more I am a selfer and a loner, the more fond of stories have I become' (the word 'loner' is of somewhat colloquial usage, while 'selfer' is coined from 'self').

*F 669 R<sup>3</sup> (Demetrius, de elocutione 29):*

However, they [sc. homoeoteleuta] are sometimes useful, as when Aristotle says: 'I came to Athens from Stagira because of the great king, from Stagira to Athens because of the great winter'.

*F 670 R<sup>3</sup> (Demetrius, de elocutione 230):*

Aristotle, who has a high reputation as a letter-writer, says: 'I am not writing to you on this matter; for it is not suitable for a letter'.

*(Ptolemy, Life of Aristotle p. 214 Düring):*

Thereupon, one of the priests which are called hierophants, by name Eurymedon, came forward with the purpose of denouncing him. He indicted him for impiety, claiming that Aristotle did not hold the gods in honour. He was prompted by a grudge which he bore to him in his heart, and Aristotle speaks of this in a letter to Antipater.

*(Ptolemy, Life of Aristotle p. 215 Düring):*

With what zest he practised goodness and strove to do good services to his fellow men is apparent from his open letters and his books and from what the reader can gather in these writings concerning the numerous interviews he had with contemporary kings and individuals, by which negotiations he promoted their affairs and proved useful to them.



## X • POEMS

F 671–675 R<sup>3</sup>

*F 650 R<sup>3</sup>. F 673 R<sup>3</sup> (Olympiodorus, Commentarius in Gorgiam 41.9):*

That Aristotle actually honours him [sc. Plato] as his teacher is clear from the fact that he wrote a whole speech in praise of him; for he narrates his biography and lavishes praise upon him. And it is not just in the encomium that he praises him: in the elegy addressed to Eudemus he praises Plato himself in the following lines:

Coming to the fair land of Cecropia  
he piously founded an altar of holy friendship  
for a man whom the wicked may not properly even praise;  
he, alone or the first of mortals, showed clearly  
by his own life and by the courses of his arguments  
that a man becomes good and happy at the same time:  
but now none can grasp this any more.<sup>1</sup>

*F 675 R<sup>3</sup> (Diogenes Laertius, V 7; Athenaeus, 696BE; Didymus, in Demosthenem col. 6):*

Excellence, greatly striven for by mankind,  
noblest quarry in life,  
for your form, maiden,  
to die is an enviable fate in Greece  
and to endure violent untiring labours.  
Such is the fruit you cast into the mind,  
immortal, better than gold  
and parents and the soft rays of sleep.

For your sake Hercules, son of Zeus, and the children of Leda underwent  
much, with their deeds

hunting your power.

From desire for you Achilles and Ajax went to the house of Hades.

For the sake of your dear form the nursling of Atarneus forsook the rays  
of the sun.

Therefore, celebrated for his deeds and immortal, the Muses will magnify  
him,

daughters of Memory, magnifying the honour of Zeus, god of guests, and  
the reward of steadfast friendship.<sup>1</sup>

## ARISTOTLE'S WILL

*(Diogenes Laertius, V 11–16):*

It will be well; but if anything should happen, Aristotle has made the following provisions:

Antipater is to be executor in all matters and in perpetuity; but until Nicanor arrives, Aristomenes, Timarchus, Hipparchus, Dioteles, and Theophrastus (if he is willing and able) are to take care of the children and of Herpyllis and of the estate.

And when my daughter comes of age, they are to marry her to Nicanor; and should anything happen to her—may it not, nor will it—before her marriage or after she has married but before there are children, Nicanor is to be responsible for administering the affairs of my son and the others in a fashion worthy both of himself and of us. Let Nicanor take care of both my daughter and my son Nicomachus in whatever way he judges appropriate to their affairs, as though he were both father and brother to them.

If anything should previously happen to Nicanor—may it not—either before he has taken my daughter or after he has taken her but before there are children, then if he has made arrangements let these take effect. If Theophrastus wishes to live with my daughter, let the same provisions stand as with Nicanor; if he does not, the executors, after consultation with Antipater, are to administer the affairs both of my daughter and of my son in whatever way they think best.

The executors and Nicanor are to remember me in taking care also of Herpyllis (for she was good to me) in all respects, and in particular, if she wants to take a husband, they are to see to it that she is given away in a fashion not unworthy of us. And in addition to what she has previously been given, they are to give her also a talent of silver from the estate and three woman servants, if she wishes, and the maidservant which she has, and the slave from Pyrrha. And if she wants to live in Chalcis, she is to have the guest-house by the garden, if in Stagira the family house; and whichever of these she wants, the executors are to furnish with whatever seems both proper to them and satisfactory to Herpyllis.

Nicanor is also to take care of the slave Murmex, so that he is conveyed in a fashion worthy of us to his own people, together with those of his belongings which we received. They are to free Ambracis and to

give her on the marriage of my daughter five hundred drachmae and the maidservant which she has. They are also to give to Thale, in addition to the maidservant which she has (the one who was purchased), a thousand drachmae and a maidservant. As for Simo, apart from the money which has earlier been given him for another slave, they are either to buy him a slave or to give him money. Tacho is to be freed on the marriage of my daughter, as are Philo and Olympius and his child. Do not sell any of the slaves who served me, but employ them; and when they come of age, send them away free men as they deserve.

They are to take care too that the statues which I commissioned from Gryllio are completed and set up—both the one of Nicanor and the one of Proxenus (which I intended to commission), and the one of Nicanor's mother; as for the one of Arimnestus which is already completed, set it up as a memorial to him since he died childless. They are to dedicate the statue of my mother to Demeter in Nemea or wherever seems best. Wherever they make my grave they are to take and deposit there Pythias' bones too, just as she instructed. And Nicanor, if he is preserved (which is a prayer I have offered on his behalf) is to set up statues in stone four cubits in height to Zeus Saviour and Athena Saviourress at Stagira.

<sup>1</sup>Reading ἐπιτεθειμένων.

<sup>2</sup>Text uncertain.

<sup>3</sup>Reading Πυθιονῖκαι μουσικῆς ἅ.

<sup>4</sup>Reading περὶ Σηλυμβριανῶν.

<sup>5</sup>Reading ‘Ἡστοδείων for θείων.

<sup>1</sup>Pohlenz marks a lacuna.

<sup>1</sup>Omitting τῆς φύσεως.

<sup>1</sup>Euripides, frag. 836 Nauck.

<sup>1</sup>Reading τάγαθόν.

<sup>1</sup>These signs refer to the fragments in Düring’s edition.

<sup>2</sup>Understanding’ and its cognates here, and throughout the *Protrepticus* fragments, translate φρόνησις and its cognates.

<sup>1</sup>Text uncertain.

<sup>2</sup>Reading ὥστε for ὅτι.

<sup>3</sup>Text corrupt.

<sup>1</sup>Text corrupt.

<sup>1</sup>Reading πολὺ τε.

<sup>1</sup>Reading οὐχ εἷς for οὐχ ἧ.

<sup>1</sup>Retaining μεγίστην.

<sup>2</sup>Text corrupt.

<sup>1</sup>The text of the last clause is disputed.

<sup>1</sup>Perhaps read Νηρίνθω.

<sup>1</sup>Meton was Empedocles’ father.

<sup>1</sup>Reading ἐμμέτρους ὄντας τοὺς.

<sup>2</sup>Reading πρότερον for πρῶτον.

<sup>3</sup>Reading διαλόγους for λόγους.

<sup>1</sup>Reading *ait enim for at ii.*

<sup>1</sup>Text uncertain.

<sup>2</sup>Reading τίνι τοῦτο ἐνι ποτέ.

<sup>1</sup>Reading ὄντες ἀγαθοί.

<sup>2</sup>There is a lacuna in the text.

<sup>1</sup>Reading μόνον for μόνοι.

<sup>1</sup>Reading ἐτερότης.

<sup>1</sup>Reading ἐπεὶ δὴ, and placing a comma before ὅταν.

<sup>2</sup>Comma after γένηται, no comma after ἀπολειπόμενον.

<sup>3</sup>Omitting τρίτον.

<sup>4</sup>Text uncertain.

<sup>5</sup>Adding καὶ δ'.

<sup>1</sup>There is a lacuna here.

<sup>2</sup>Text uncertain.

<sup>1</sup>There is a lacuna in the text.

<sup>1</sup>Reading εἶπον.

<sup>1</sup>Reading ἤδη for ἦδει.

<sup>1</sup>There is a lacuna in the text.

<sup>1</sup>There is a lacuna in the text here.

<sup>1</sup>Reading ὑπὸ Ἀθηναίων ἀναφερόμεντι.

<sup>2</sup>Reading Ἀκάστου.

<sup>3</sup>Reading Ἀρχεμόρω.

<sup>1</sup>Reading βασιλείας for φιλοσοφίας.

<sup>1</sup>Fig = σῦκος, informer = συκοφάντης.

<sup>1</sup>Text uncertain.

<sup>1</sup>Text often uncertain.

# INDEXES

REFERENCES give Bekker page-, column-, and approximate line-numbers: these numbers are to be found in the margins of the present translation. References of the form “CA *n*” give section-numbers in the *Constitution of Athens*. References to the fragments are all of the form “p. *n*” and give page-numbers of the present translation.

The Index of Names is largely confined to writers or thinkers mentioned by Aristotle. It does not include historical figures who occur mainly in the *Politics*. A few historical figures—and also a few geographical locations—are given in the General Index.

For reasons of space, the General Index is highly selective, both in its headings and (for all but the major items) in the passages it cites. Entries are not analytical. The reader who requires more detailed information must consult Bonitz’s *Index Aristotelicus* (Greek) or Organ’s *Index to Aristotle* (English)—or else turn to the indexes in the several volumes of the original Oxford translation.

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